

# SMEs in Developing Asia

*New Approaches to Overcoming Market Failures*



*Edited by  
Paul Vandenberg  
Pornpinun Chantapacdepong  
Naoyuki Yoshino*

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Asian Development Bank Institute  
Kasumigaseki Building 8F  
3-2-5, Kasumigaseki, Chiyoda-ku  
Tokyo 100-6008, Japan  
[www.adbi.org](http://www.adbi.org)

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# Contributors

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**Yot Amornkitvikai** is an assistant professor at Rangsit University, Pathum Thani, Thailand.

**Pornpinun Chantapacdepong** is a research fellow at the Asian Development Bank Institute, Tokyo, Japan and is on secondment from the Bank of Thailand.

**Akira Goto** is professor emeritus at the University of Tokyo, Japan.

**Charles Harvie** is an associate professor at the University of Wollongong, Australia.

**Patarapong Intarakummerd** is a full professor at the National Graduate Institute for Policy Studies, Tokyo, Japan.

**Satoshi Kuwahara** is the president of the CRD Association, Tokyo, Japan.

**Kye Woo Lee** is a professor of economics at the KDI School of Public Policy and Management, Sejong City, Republic of Korea.

**Gary V. Maningo** is an assistant manager at the Bangko Sentral ng Pilipinas, Manila, Philippines.

**Anshul Pachouri** is an independent policy analyst based in India.

**Naqeeb Ur Rehman** is a professor at Hazara University, Mansehra, Pakistan.

**Megumi Sagara** is a sales planning manager at the CRD Association, Tokyo, Japan.

**Savita Shankar** is an associate professor at Keio Business School, Keio University, Yokohama, Japan.

**Sankalp Sharma** is a senior researcher at the Institute for Competitiveness, Gurgaon, India.

**Charan Singh** is the RBI chair professor of economics at the Indian Institute of Management, Bangalore, India.

**Tientip Subhanij** is a faculty member at the College of Management, Mahidol University, Bangkok, Thailand.

**Farhad Taghizadeh-Hesary** is an assistant professor of economics at Keio University and a visiting professor at the Graduate School of Economics, University of Tokyo, Japan.

**Long Q. Trinh** is a research consultant at the Asian Development Bank Institute, Tokyo, Japan and a researcher at the Central Institute for Economic Management, Ha Noi, Viet Nam.

**Paul Vandenberg** is a senior economist at the Asian Development Bank who is currently on leave and serving as a visiting professor at Thammasat University, Bangkok, Thailand.

**Kishinchand Poornima Wasdani** is a consultant at the Indian Institute of Management, Bangalore, India.

**Naoyuki Yoshino** is dean of the Asian Development Bank Institute, Tokyo, Japan.

# Preface

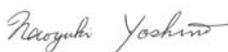
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Economic wealth, aside from farming output, is created through enterprises. When economists, policy makers, and ordinary citizens talk about the growth of the economy, they are mostly talking about the expansion of enterprise output. Large firms contribute substantially to economic growth and wealth creation but the aggregate contribution of small and medium-sized enterprises (SMEs) is also considerable—in some countries, it is greater than that of large enterprises. Along with output, SMEs create jobs, make investments, and export their goods to foreign markets. Dynamic and innovative SMEs expand the technological frontiers of their sector and their country.

Despite their contribution, smaller firms face many barriers. Some barriers arise from government regulations that disproportionately hamper smaller firms. But there are also barriers inherent in markets that affect enterprises because of their size. These barriers we call “size-induced market failures” and they occur in the key areas that affect enterprise competitiveness. Failures in the markets for credit, technology, and skilled workers, along with difficulty in accessing domestic and international markets, are the main areas for concern. Information asymmetries in some markets, notably for finance, are a major obstacle, as are the disproportionately higher costs that SMEs face in accessing credit and other markets.

Policy makers throughout Asia have sought to address these failures through policies and programs that assist SMEs. This book is about identifying and understanding key market failures and assessing the efforts of government in addressing them. The book comprises studies presented at the workshop on SMEs in Developing Asia: New Approaches to Overcoming Market Failures, held on 19–20 November 2015 at our institute in Tokyo. We were happy to organize this event in collaboration with three Japanese organizations: the SME Agency of the Ministry of Finance, the Japan International Cooperation Agency (JICA) Research Institute, and the Credit Risk Database Association.

It is my hope that the chapters contained herein will contribute to a better understanding of SME constraints and lead to improved policy making across Asia.



**Naoyuki Yoshino**

Dean

Asian Development Bank Institute  
Tokyo, Japan

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# Abbreviations

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ADB	Asian Development Bank
ADBI	Asian Development Bank Institute
AMEEN	Access to Microfinance and Enhanced Enterprise Niches
ASEM	Asia–Europe Meeting
BAAC	Bank of Agriculture and Agricultural Cooperatives
BDS	business development service
BOI	Board of Investment
BSP	Bangko Sentral ng Pilipinas
CEO	chief executive officer
CGC	credit guarantee corporation
CGS	credit guarantee scheme
CIMO	Calidad Integral y Modernizacion (Integrated Human Resources Quality Improvement and Modernization)
CLO	collateralized loan obligation
CRD	Credit Risk Database
CSF	Credit Surety Fund
DBP	Development Bank of the Philippines
EU	European Union
FWWB	Friends of Women’s World Banking
GDP	gross domestic product
GSB	Government Savings Bank
ICT	information and communication technology
IFAD	International Fund for Agricultural Development
IGLF	Industrial Guarantee Loan Fund
ILO	International Labour Organization
IPR	intellectual property rights
ITRI	Industrial Technology Research Institute
KCCI	Korea Chamber of Commerce and Industry
KUR	Kredit Usaha Rakyat (People’s Business Credit)
KUT	Korea University of Technology and Education
MAI	Market for Alternative Investment
MFB	microfinance bank
MFI	microfinance institution
MSMEs	micro, small, and medium-sized enterprises
MUDRA	Micro Units Development and Refinance Agency
NBFC	nonbanking financial company
NGO	nongovernment organization
NIA	National Innovation Agency

NPL	nonperforming loan
OSMEP	Office of Small and Medium Enterprises Promotion
PCA	principal component analysis
PKSF	Palli Karma-Sahayak Foundation
PRC	People's Republic of China
R&D	research and development
RBI	Reserve Bank of India
RSP	rural support program
SBP	State Bank of Pakistan
SFA	stochastic frontier analysis
SFI	specialized financial institution
SMEs	small and medium-sized enterprises
STI	Science, Technology and Innovation
TC	training consortium
TCG	Thai Credit Guarantee Corporation
TIFAC	Technology Information, Forecasting and Assessment Council
VRF	Village and Urban Revolving Fund

## Currencies

B	baht
CNY	yuan
NT\$	NT dollar
PRs	Pakistan rupees
Rp	rupiah
Rs	Indian rupees
S\$	Singapore dollar
Tk	taka
€	euro
\$	US dollar
¥	yen



# 1

## Small Firms, Market Failures, and Government Policy

*Paul Vandenberg, Pornpinun Chantapacdepong,  
and Naoyuki Yoshino*

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### 1.1 Introduction

Small and medium-sized enterprises (SMEs) make a significant contribution to the economies of Asia. Their sheer number is overwhelming, as they account for 98% or more of all enterprises in most countries. They generate employment, make investments in plant and machinery, and create value through the production of goods and services. More progressive SMEs are innovators of process and product technologies, pushing outward the technological frontier. Most SMEs serve the domestic market, providing nontradable services, but some also supply the export market. Smaller firms are increasingly involved in the production of parts and components for regional and global value chains serving large producers locally or abroad.

Whereas their aggregate clout is impressive, their variety is even more so. Along with innovative start-ups and internet-savvy marketers, many enterprises find their niche in mid- and low-level technology activities, serving domestic customers. They are not particularly progressive or innovative and are not creating new markets. Most SMEs are retailers and service providers. They are the entrepreneurs running retail shops that link producers with consumers. They run operations as mundane as hair salons, automotive repair shops, or small fleets of three-wheelers ferrying people from the suburbs to the centers of Asia's metropolises. This heterogeneity makes it difficult to speak of them as one group when trying to pinpoint the market failures they face, or design effective policies.

However, it is neither their variety nor their economic importance that provides the rationale for governments to intervene. Their economic importance does draw the attention of policy makers but it does not provide by itself the basis for intervening in the private sector. It can be argued that SMEs can develop and grow on their own and rely on the general and nondiscretionary activities of the government vis-à-vis the private sector (i.e., infrastructure, education, legal system, and others).

Instead, policies are needed to support SMEs because they suffer from constraints that are related to their size. We call these constraints “sized-induced market failures.”<sup>1</sup> These enterprises find it more difficult to access credit, to recruit and train skilled workers, to secure technology, to access input markets, and to enter export markets. This book is about these market failures and how government policy—effectively designed and applied—can help SMEs in Asia to overcome them.

This introductory chapter reviews the key market failures faced by SMEs and the policies and programs designed to address them. It is prefaced by a look at the economic importance of SMEs in 14 selected countries. The subsequent review of market failures in this chapter draws on the detailed analysis contained in the chapters that follow. Those chapters analyze market failures in specific national contexts and in some cases through multicountry comparisons. The cases range widely, from Pakistan in the west to Japan in the east, and include South and Southeast Asia.

## 1.2 Definitions: What Is an SME?

The reported size of the SME contribution to economies in Asia is affected by three factors. The first is economic structure itself; that is, the size of the SME sector relative to the large firm sector. The second factor is the size of the agriculture sector and the fact that most farms are not recognized as enterprises. The contribution of SMEs will be smaller if the agriculture sector is large. The third factor, which we focus on in this section, is how SMEs are defined.

Each country sets a threshold that distinguishes medium-sized enterprises from large ones. Obviously a lower threshold means less aggregate significance of SMEs and a higher threshold means more. For example, if SMEs are defined as having up to 1,000 workers, as they are

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<sup>1</sup> To our knowledge this phrase has not been used before, although its meaning is implicit in the many efforts to understand the constraints faced by SMEs.

in some sectors in the People's Republic of China (PRC), they will have greater aggregate significance than if the threshold is set at 200 workers, as it is for some sectors in Thailand.

Definitions vary widely between economies, not only for a common indicator, such as employment, but also in the type of indicators used. Along with employment, the other common criteria are assets or capital, and revenue, which may be defined as sales or turnover. The definitions used by 14 Asian economies are provided in Table 1.1. Many economies set two criteria, one is employment and the other is assets or revenue. For example, manufacturing firms in Malaysia are considered SMEs if they have fewer than 200 workers or revenues of less than RM50 million (about \$12 million).

There also may be different criteria for different sectors. The PRC has 15 sector definitions, Japan has 4, and Singapore has 1. To make matters even more complicated, government agencies within the same country may use different definitions. A ministry uses one definition while the national statistics office uses another, and a priority lending policy may adopt yet another.

Researchers have called for a standard definition across countries to make comparative analysis easier. But to date governments, which design national policies and therefore need only national definitions, have not felt compelled to agree a common definition. The European Union has adopted standard criteria for its member states, which is set at less than 250 workers and turnover of not more than €50 million, or a balance sheet of not more than €43 million. However, individual states still use their own definitions for domestic purposes.

### 1.3 Contribution of SMEs

Four indicators are commonly used to gauge the importance of SMEs. They specify the SME share of the total for (i) the number of enterprises, (ii) employment, (iii) domestic output, and (iv) exports. Not all economies compile data on all four indicators, with the first two being the most common. Tables 1.2 and 1.3 present recent available data on 14 Asian economies, including the region's three largest—the PRC, Japan, and India.

The share of the total number of enterprises is the most consistently used indicator across countries, both in Asia and around the globe. The share for our Asian group is in the narrow range between 97% and over 99%. Both Bangladesh, which until recently was a low-income country, and the Republic of Korea, a high-income one, have shares of 99% or more. The figures include highly competitive and technologically

**Table 1.1: SME Size Definitions, Upper Threshold**

Sectors		Assets	Revenue	Assets	Revenue
		LCU millions	LCU millions	\$ millions	\$ millions
<b>High income</b>					
Japan	manufacturing and others	300	...	2.8	...
	wholesale	100	...	0.9	...
	retail	50	...	0.5	...
	services	50	...	0.5	...
Rep. of Korea	manufacturing	8000	...	6.9	...
	primary/some services		20,000	...	17.2
Singapore	all	...	100	...	73.0
<b>Upper middle-income</b>					
PRC	heavy industry	...	400	...	61.3
	wholesale	...	400	...	61.3
Thailand	general	200	...	5.7	...
	wholesale	100	...	2.8	...
	retail	60	...	1.7	...
Malaysia	manufacturing	...	50	...	12.4
	services and others	...	20	...	5.0
Kazakhstan	all	...	5,200	...	15.6
Philippines	all	100	...	2.1	...
<b>Lower middle-income</b>					
Indonesia	all	10,000	50,000	0.7	3.6
India	manufacturing	300	...	4.5	...
	services	150	...	2.3	...
Sri Lanka	manufacturing	...	750	5.1	...
	services	...	750	5.1	...
Viet Nam	general	100,000	...	...	4.5
	trade and services	50,000	...	...	2.2
Bangladesh	manufacturing	300	...	3.8	...
	services	150	...	1.9	...
<b>Low income</b>					
Cambodia	all	...	...	0.5	...

LCU = local currency units (yen, baht, won, etc.), PRC = People's Republic of China, SME = small and medium-sized enterprise.

Sources: Asian Development Bank (ADB). 2015. *Asia SME Finance Monitor*. Manila; Office of Small and Medium Enterprise Promotion (OSMEP). 2015. *White Paper on Small and Medium Enterprises in Thailand 2015*. Government of Thailand. [www.sme.go.th/eng/images/data/SR/download/2015/report\\_year/ExecutiveSummary/Chapter%204.pdf](http://www.sme.go.th/eng/images/data/SR/download/2015/report_year/ExecutiveSummary/Chapter%204.pdf); Government of Japan, Ministry of the Economy, Trade and Industry. 2015. *2015 White Paper on Small Enterprises in Japan: Take-Off Time for Micro Businesses*. Tokyo. [www.chusho.meti.go.jp/pamflet/hakusyo/H27/h27/shoukibodeta/download/2015shohaku\\_eng.pdf](http://www.chusho.meti.go.jp/pamflet/hakusyo/H27/h27/shoukibodeta/download/2015shohaku_eng.pdf); and SME Corporation Malaysia. 2015. *Annual Report 2014–2015*. [www.smecorp.gov.my/index.php/en/resources/2015-12-21-11-07-06/sme-annual-report/book/7/Array](http://www.smecorp.gov.my/index.php/en/resources/2015-12-21-11-07-06/sme-annual-report/book/7/Array)

### **Box 1.1: Shifting Definitions in the People's Republic of China, Singapore, and India**

Countries occasionally change the definition of what qualifies as an SME. Changes are important as they affect which enterprises have access to government support programs. Definitions set in monetary terms (assets, sales) are subject to change because inflation erodes the real value.

The People's Republic of China (PRC) revised its definitions in 2003 and again in 2011. The country now has one of the most varied structures in the world with specific definitions for 15 sectors. In most cases, the definition includes employment and operating revenue, but some include only employment, or assets and revenue. An SME in heavy industry has either fewer than 1,000 workers or revenue below CNY400 million (about \$61 million).

The revisions in 2011 tended to reduce the employment thresholds relative to 2003 criteria; for example, it fell from 3,000 to 1,000 workers in transportation. However, revenue criteria tended to rise; for example, it rose from CNY300 million to CNY400 million in the wholesale sector.

Singapore also changed its definition in 2011. Instead of separate definitions for manufacturing (based on assets) and nonmanufacturing (based on workers), a unified definition was created. Enterprises in all sectors are classified as SMEs if they have not more than 200 workers or sales of not more than S\$100 million. The government dropped the criteria on assets because equipment and buildings are often leased, not owned. The change increased the number of enterprises classified as SMEs by 700 to 154,100.

India set size thresholds in 2006 based solely on assets. The real values of the thresholds were eroded by inflation and business groups called for an upward revision. In early 2015, the government responded by introducing in Parliament a bill to triple both the asset threshold for services enterprises to Rs150 million (about \$2.26 million) and the threshold for manufacturing enterprises to Rs300 million.

Sources: SPRING Singapore. n.d. Factsheet on New SME Definition. [www.spring.gov.sg/NewsEvents/PR/Documents/Fact\\_Sheet\\_on\\_New\\_SME\\_Definition.pdf](http://www.spring.gov.sg/NewsEvents/PR/Documents/Fact_Sheet_on_New_SME_Definition.pdf) (accessed 10 May 2016); Dezan Shira and Associates. 2011. China Issues Classifications Standards for SMEs. China Briefing. [www.china-briefing.com/news/2011/07/07/china-issues-classification-standards-for-smes.html](http://www.china-briefing.com/news/2011/07/07/china-issues-classification-standards-for-smes.html); and PRS Legislative Research. n.d. The Micro, Small and Medium Enterprises Development (Amendment) Bill, 2015. [www.prsindia.org/billtrack/the-micro-small-and-medium-enterprises-development-amendment-bill-2015-3750/](http://www.prsindia.org/billtrack/the-micro-small-and-medium-enterprises-development-amendment-bill-2015-3750/)

advanced medium-sized firms but also a long tail of micro and small enterprises. The reason that the share of enterprises is similar across countries, despite different definitions, is that most SMEs are very small. Variations in the threshold that differentiates medium-sized enterprises from large ones have very little effect on the overall shares. For example, 99.3% of enterprises in Thailand are small and only 0.5 are medium-sized (OSMEP 2015). In Japan, an astonishing 87% of all enterprises employ not more than 5 workers (Government of Japan 2015). Likewise,

**Table 1.2: SME Share of Enterprises, Exports, and Output, Selected Asian Economies**

	Share of all Enterprises	Share of Exports	Share of Output	Indicators for Output	Data Year*
	(%)	(%)	(%)		
<b>High income</b>					
Japan	99.7	...	43.7	Sales	2012
Rep. of Korea	99.9	18.8	47.6	MVA	2012
Singapore	99.4	...	45.0	GDP	2012
<b>Upper middle-income</b>					
PRC	97.3	41.5	60.0	GDP	2013, 2011, 2013
Kazakhstan	97.5	...	26.0	GDP	2014, 2013
Malaysia	97.3	...	35.9	GDP	2014
Philippines	99.6	...	35.7	GVA	2013, 2006
Thailand	99.7	26.3	39.6	GDP	2014
<b>Lower middle-income</b>					
Bangladesh	99.0	...	25.0	GDP	2013, 2014
India	...	42.4	37.5	MVA	2013
Indonesia	99.9	15.7	60.3	GDP	2013
Sri Lanka	99.5	20.0	30.0	GDP	2013
Viet Nam	97.7	...	...		2012
<b>Low income</b>					
Cambodia	99.8	...	...		2014

GDP = gross domestic product, GVA = gross value added, MVA = manufacturing value added, PRC = People's Republic of China, SME = small and medium-sized enterprise.

Note: For the PRC, the definition of SME used for the share of enterprises is those with fewer than 1,000 workers, and the share of exports refers to the share of industrial exports.

\* When more than one year is indicated, the first year refers to share of the enterprises, the second refers to exports, and the third to output.

Sources: Asian Development Bank (ADB). 2015. *Asia SME Finance Monitor*. Manila; Office of Small and Medium Enterprise Promotion (OSMEP). 2015. *White Paper on Small and Medium Enterprises in Thailand 2015*. Government of Thailand. [www.sme.go.th/eng/images/data/SR/download/2015/report\\_year/ExecutiveSummary/Chapter%204.pdf](http://www.sme.go.th/eng/images/data/SR/download/2015/report_year/ExecutiveSummary/Chapter%204.pdf); Government of Japan, Ministry of the Economy, Trade and Industry. 2015. *2015 White Paper on Small Enterprises in Japan: Take-Off Time for Micro Businesses*. Tokyo. [www.chusho.meti.go.jp/pamflet/hakusyo/H27/h27/shoukibodeta/download/2015shohaku\\_eng.pdf](http://www.chusho.meti.go.jp/pamflet/hakusyo/H27/h27/shoukibodeta/download/2015shohaku_eng.pdf); and SME Corporation Malaysia. 2015. *Annual Report 2014–2015*. [www.smeCorp.gov.my/index.php/en/resources/2015-12-21-11-07-06/sme-annual-report/book/7/Array](http://www.smeCorp.gov.my/index.php/en/resources/2015-12-21-11-07-06/sme-annual-report/book/7/Array)

**Table 1.3: SME Employment Share, Selected Asian Economies**

	SME Employment as a Share of:	SME Share (%)	Year
Rep. of Korea	enterprise employment	87.7	2012
Thailand	enterprise employment	80.3	2014
Bangladesh	nonagricultural employment	75.0	2014
Cambodia	enterprise employment	71.8	2014
Japan	enterprise employment	69.7	2012
PRC	industry employment	64.7	2011
Philippines	enterprise employment	63.7	2013
Singapore	total employment	68.0	2012
Malaysia	total employment	65.0	2014
Viet Nam	total employment	46.8	2012
Sri Lanka	total employment	35.0	2013
Kazakhstan	total employment	32.1	2014

PRC = People's Republic of China, SME = small and medium-sized enterprise.

Note: For Bangladesh, the figure is 70%–80%; we have taken the average.

Sources: Asian Development Bank (ADB). 2015. *Asia SME Finance Monitor*. Manila; Office of Small and Medium Enterprise Promotion (OSMEP). 2015. *White Paper on Small and Medium Enterprises in Thailand 2015*. Government of Thailand. [www.sme.go.th/eng/images/data/SR/download/2015/report\\_year/ExecutiveSummary/Chapter%204.pdf](http://www.sme.go.th/eng/images/data/SR/download/2015/report_year/ExecutiveSummary/Chapter%204.pdf); Government of Japan, Ministry of the Economy, Trade and Industry. 2015. *2015 White Paper on Small Enterprises in Japan: Take-Off Time for Micro Businesses*. Tokyo. [www.chusho.meti.go.jp/pamflet/hakusyo/H27/h27/shoukibodeta/download/2015shohaku\\_eng.pdf](http://www.chusho.meti.go.jp/pamflet/hakusyo/H27/h27/shoukibodeta/download/2015shohaku_eng.pdf); and SME Corporation Malaysia. 2015. *Annual Report 2014–2015*. [www.smecorp.gov.my/index.php/en/resources/2015-12-21-11-07-06/sme-annual-report/book/7/Array](http://www.smecorp.gov.my/index.php/en/resources/2015-12-21-11-07-06/sme-annual-report/book/7/Array)

in the European Union (EU), 93% of all SMEs are micro businesses with fewer than 10 employees (EU 2015).<sup>2</sup>

When we move beyond the number of enterprises to the three economic indicators, the SME share falls and the variation between countries increases. The contribution of these economic variables follows a general pattern: the employment share is the largest, followed by the GDP share, and then the export share. In other words, they employ many workers, account for a sizable share of output, and contribute an important but smaller share of exports. Drawing on our Asian sample, SMEs employ about 60% to 90% of the enterprise

<sup>2</sup> In the EU, to be classified as micro, an enterprise must have fewer than 10 employees and meet one of the two other criteria: (i) turnover of not more than €2 million or (ii) a balance sheet (asset) total of not more than €2 million. In 2012, it was found that 59% of micro businesses had no employees at all (EU 2015).

workforce,<sup>3</sup> generate 30% to 70% of output, and contribute 15% to 40% of exports. There are exceptions to these patterns but they are true for a large number of countries, both in Asia and elsewhere. We consider each of these indicators in more detail.

The share of the workforce employed by SMEs varies greatly. It ranges from 32% to 88% in our sample (Table 1.3). Countries present figures on the SME share of either the enterprise workforce—which excludes agricultural activities that are not organized as enterprises—or the entire workforce. This difference is important for countries with a large farm sector. The highest figure is for the Republic of Korea, at 88%, probably in part due to high asset and revenue thresholds for SMEs but also because it does indeed have a significant SME sector. The low-end figures for Kazakhstan at 32% and Sri Lanka at 35% represent the share of the entire workforce, including an agriculture sector that represents between a quarter and third of the labor force.

The figures for Asia are in line with other regions. In the European Union, SMEs account for 67% of employment in the nonfinancial business sector (EU 2015).<sup>4</sup> A study of 104 developing economies by Ayyagari et al. (2014) reports a mean employment share of 48%. This is below the figures we present for Asia, but their study does not include enterprises with fewer than 5 workers and SMEs are defined as having fewer than 100 workers. This latter criterion is more restrictive than most country-based definitions (which we use) or the EU definition, which is up to 250 employees.

Despite the variation in our data, the proportions in all countries are significant and indicate that support for the SME sector is—or can be—an important part of employment policy. Or, we can think of it the other way around: that employment policy, including efforts to generate jobs and reduce unemployment, can target SMEs and not rely solely on investment by large enterprises.

The SME contribution to output varies substantially (Table 1.2). Most Asian countries use gross domestic product (GDP) as the indicator but some report manufacturing value added and Japan uses sales. The share of GDP ranges from 25% to 60%, although most countries fall into a narrower range of 30% to 50%. These ranges hold for other definitions of output. In only 2 of the 12 cases is the share over half. These cases are the PRC, with a very high threshold definition of medium-sized, and

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<sup>3</sup> The enterprise workforce excludes most of the agricultural or farm-based workforce, which tends not to be organized (or counted) as registered enterprises.

<sup>4</sup> The nonfinancial business sector in the EU excludes financial services; government services; education; health, arts, and culture; and agriculture, forestry, and fishing (EU 2015).

### Box 1.2: Do SMEs Create More Jobs Than Large Enterprises?

It is sometimes noted that SMEs “create” more jobs than large firms. This is different than saying SMEs “employ” more workers than large firms, which the figures in the upper portion of Table 1.1 suggest that they do. Studies to determine job growth over time face large methodological challenges, which include high “churning” rates among SMEs (i.e., high rates of enterprise births but also high death rates) and how to treat the entry into and exit from the SME size classification.

The existing evidence does suggest that they create more jobs than large firms. In 24 states of the European Union, SME employment grew annually by 1.0% compared with 0.5% for large enterprises over the period 2002–2010 (de Kok et al. 2011). In the United States, SMEs have higher job creation rates than large enterprises but when controlling for enterprise age, the systematic relationship between size and job growth vanishes (Haltiwanger et al. 2013). Across a panel of 104 developing countries, SMEs are found to create more jobs than large firms but the analysis relies on survey rather than census data and takes no account of entry and exit (Ayyagari et al. 2014).

If SMEs create more jobs than large enterprises, we would see an increase in their employment share over time relative to large firms. Do we see this? In Thailand, the employment share of SMEs rose from 76% in 2007 to 81% in 2013, although it fell during that period after peaking at 84% in 2011 (Amornkitvikai and Harvie, Chapter 6). The Republic of Korea shows a similar pattern with the SME share rising overall between 2000 and 2012 but peaking in 2007 and declining slightly thereafter (SMBA 2014).

Sources: de Kok et al. 2011. *Do SMEs Create More and Better Jobs?* Prepared by EIM Business and Policy Research for the European Communities, Zoetermeer, the Netherlands; J. Haltiwanger et al. 2013. *Who Creates Jobs? Small vs. Large vs. Young.* *Review of Economics and Statistics*. 95(2). pp. 347–361; M. Ayyagari et al. 2014. *Who Creates Jobs in Developing Countries?* *Small Business Economics*. 43. pp. 75–99; and Small and Medium Business Administration (SMBA), Republic of Korea. 2014. No. of Korean SMEs and Employees by Year. [www.smba.go.kr/eng/smes/statistics\\_01.do?mc=usr0001148](http://www.smba.go.kr/eng/smes/statistics_01.do?mc=usr0001148)

Indonesia. The threshold for Indonesia is relatively low; enterprises with assets above about \$700,000 or sales above about \$3.6 million are classified as large. The results suggest that there are relatively few large firms in Indonesia. While these two countries exhibit high shares in our sample, they may not be disproportionate to countries in other regions. In the European Union, for example, SMEs including microenterprises, account for 58% of value added (EU 2015).

Economies and firms are often measured by their ability to export. Exporting is a sign of competitiveness, as it implies that the firm can compete with domestic firms in other countries and with other exporters. Most SMEs are engaged in nontradable services and many smaller firms in manufacturing are unable to reap the economies of scale needed to

keep production costs low. Nonetheless, large SMEs do export and in some cases contribute considerably to their country's total. Our figures, available for only six countries, show that SMEs account for just over 40% of total exports of India and the PRC but for only 15% to 30% for the other countries.

## 1.4 Size-Induced Market Failures

SMEs face a number of size-induced market failures that affect their survival and limit their growth. These failures occur in the key areas that contribute to firm competitiveness: accessing technology and engaging in innovation, accessing finance, securing and training skilled workers, and accessing markets. We explore these four areas below with reference to the chapters that compose this book. The analysis focuses both on the existence and nature of the particular market failure and on the solutions that governments have devised to overcome them. SMEs also face constraints from government regulation that are related to size. These include barring enterprises below a certain size from accessing a support program, setting flat fee charges for all firms, and asking SMEs to comply with the same regulations as large enterprises, making the cost of compliance proportionately costlier for smaller firms. We do not address these size-induced government failures.

### 1.4.1 Innovation and Technology

Innovating and adopting leading technologies are important for the competitiveness of firms of all sizes. Creating entirely new products is difficult as it normally requires a gestation period of research and development (R&D), including prototyping and testing, and the investment to fund these activities. Globally most private sector R&D is conducted by large firms, although small innovative startups exist not only in the Silicon Valley but throughout the world. Along with the creation of new products and the improvement of existing ones, innovation can occur in the processes of producing goods and services.

Small firms are often characterized as being innovative and dynamic, with the flexibility to adapt quickly—due to their size—to changing market conditions and consumer demands. Certainly some of them are innovative, but as a broad undifferentiated trait, this is probably off the mark. The SME sector in most countries is best characterized as comprising a minority group of highly innovative firms, a larger group of mild innovators (often in process technologies and product

modifications), and then a massive underbelly of enterprises that are unlikely to innovate, such as retail outlets and small service providers.

India provides an interesting and probably a representative example of innovation among SMEs. The majority of SMEs in India are not engaged in innovation activities, even when the term is broadly defined to include process changes and the adoption of new machinery. Pachouri and Sharma (Chapter 4), using data on 8,846 enterprises with fewer than 500 workers, find that only about 35% of SMEs are engaged in some type of innovation. The key form of innovation is the purchase of new machines (68% of innovators), followed by efforts to improve product quality and standardization (42%). Few Indian SMEs engage in R&D as they lack the finance and capacity to do so. About 80% of innovative firms source innovation internally with a portion of these also combining with external sources, such as other firms or institutions.

Rehman (Chapter 3) explores in detail the differences between internal and external R&D among SMEs in India and Pakistan. With a combined dataset of over 4,000 firms, but geared to medium-sized enterprises, he finds that 46% of firms engage in internal R&D in India, as against 9% in Pakistan. External R&D is much lower in both countries at 9% and 6%, respectively. A key finding is that internal and external R&D are highly complementary and when firms combine the two they achieve much higher innovation than when focusing on one source alone. Firms in India also engage in fairly high levels of product and process innovation, with about 60% and 65% of firms engaged in the two types, respectively. Not surprisingly, the study finds that innovation increases with enterprise size, as smaller firms lack the human resources, capital, and R&D activity of medium-sized firms, confirming what Schumpeter (1942) argued much earlier.

Government has an important role to play in helping firms to innovate and climb the technological ladder. Intarakumnerd and Goto (Chapter 2) suggest three types of policies: demand-side policies in which the government procures goods and services from innovators; supply-side policies that offer financial and other incentives; and systemic policies that coordinate domestic firms, high-tech foreign firms, and local research institutions. Supply-side policies are the most common and include loans, grants, and tax measures to spur the innovation of private firms. Systemic policies are also important, such as in the case of Taipei, China, where foreign technology brought in by multinational corporations was leveraged and supported by public research institutions to foster indigenous innovation by domestic firms. In a review of four economies in East Asia, the authors of Chapter 2 find that having individual policies is not sufficient to develop an innovative economy—it is critical that the policy and support regime evolve and adapt to the changing technological

level of the economy. Singapore and Taipei, China were successful in this regard and have emerged as successful innovators and high-income economies. Malaysia and Thailand have been less able to evolve the policy regime and face the middle-income trap as a result. Other factors are important to entice innovation including developing the necessary human resources; fostering a long-term commitment to innovation; and developing the necessary institutions to protect intellectual property, encourage efficient and clean government, and link public bodies with the private sector.

### 1.4.2 Finance

The most widely known area of market failure is access to finance. Credit and other forms of finance are critical for providing working capital to support the regular operations of the enterprise, and investment capital is required to scale up the enterprise through the acquisition of machinery, vehicles, patents, land, and buildings, and through R&D and expansion into new markets.

Financial institutions, notably banks, generate profits by lending to creditworthy borrowers who can repay their loans or in the event of default forego assets put forward as collateral. Because smaller firms have weaker accounting systems, they are less able to provide credible evidence of financial performance or generate quality loan proposals. Therefore, the information asymmetries between borrower and lender are greater for small firms. In addition, the cost of assessing the creditworthiness of smaller firms, who borrow smaller amounts, is comparatively larger than for large firms due to the fixed cost element of assessment. These factors contribute to the difficulties that SMEs face in accessing finance.

Singh and Wasdani (Chapter 10) found that micro and small enterprises mainly in and around Bangalore, India, face a range of barriers to securing credit including collateral requirements, complicated loan procedures, and a lack of proper financial statements, and that microenterprises suffer from a lack of financial literacy. Their study found that enterprises at different stages of the life cycle—start-up, survival, growth, and sustenance—faced some common and some different challenges. Those at the early stages of the life cycle relied more on informal loans from family and friends. More established firms wished to avail themselves of government credit schemes but faced a paucity of information about what schemes existed and where to apply. In addition to these challenges, enterprises in the growth and sustenance stages also reported high interest rates and service fees, as well as procedural complications, as hurdles to securing financial access. A critical observation was the low level of financial literacy coupled with

the high level of financial inclusion (e.g., all entrepreneurs studied had a bank account).

To address these market failures, governments in Asia have devised a variety of policies and programs. The most direct approach is to establish a dedicated bank such as the Small and Medium Enterprise Development Bank of Thailand (SME Bank) or the Small Industries Development Bank of India. The public sector bears the added cost of overcoming the asymmetry of information and a potentially higher default rate that is likely to develop because the government is normally not better able to assess creditworthiness than private banks.

Thailand has eight specialized financial institutions (SFIs), several of which focus on SMEs. Amornkitvikai and Harvie (Chapter 6) find that not more than 4% of manufacturing SMEs avail themselves of credit from the two key SFIs, the SME Bank and the Export-Import Bank of Thailand. However, the researchers did find a significant positive correlation between access to SFI finance and higher technical efficiency and export performance of the borrowing firms. The finding suggests that finance from these institutions boosts firm competitiveness.

Government can also overcome credit market failure by providing a guarantee on loans from commercial banks. Credit guarantee schemes operate in many upper middle-income and high-income countries but also in some less developed ones. Their clients are SMEs because large firms do not need a guarantee to secure credit. The share of the loan guaranteed varies by country and ranges generally from 50% to 90%. A high guaranteed share creates a moral hazard as the lender bears little risk, which discourages due diligence on loan appraisal. How much of the loan to guarantee—and therefore what share the bank bears—is a key public policy question. Yoshino and Taghizadeh-Hesary (Chapter 7) suggest that the share of the guarantee (and therefore the risk) should not be the same for all banks but should vary based on the risk profile of each bank or group of banks. The guaranteed share should also be based on macroeconomic conditions and the policy objectives of the government. The authors provide a practical model that includes these parameters.

In the Philippines, the Bangko Sentral ng Pilipinas, the central bank, decided to supplement the existing credit guarantee scheme with the creation of the Credit Surety Fund (CSF). Officially known as a credit enhancement program, it provides a guarantee on bank lending to SMEs and cooperatives. Maningo (Chapter 12) explains that a key difference with traditional guarantee agencies is the diverse shareholding membership of the CSF, which includes local governments, cooperatives, and NGOs. Cooperatives review and provide a guarantee on all loans. Established in 2008, the number of local CSFs has grown

to 37 and they are spread across the country, contributing to financial inclusion. The funds have guaranteed credit to over 14,000 enterprises and cooperatives and boast a past due rate of only 1.6%.

The market failure in credit can also be eased by building institutions to provide information on SME creditworthiness. Many countries have established private credit bureaus and public credit registries to gather information that allows banks to make informed decisions on loan requests by households and small enterprises. Japan has moved one step further and has developed the Credit Risk Database (CRD), which amasses credit information on SMEs from credit guarantee corporations, banks, and other financial institutions. As explained by Kuwahara et al. (Chapter 11), the data are anonymous and not used to assess individual enterprises but instead help to develop credit scoring models that lending institutions can use to better assess loan applications. The CRD Association operates the database and builds the models. A key objective is to distinguish sound SMEs from unhealthy ones and thereby reduce the risk premium charged to the former. After the CRD was established, the government was able to switch from a uniform credit guarantee fee of 1.35% to a nine-level free structure. The most creditworthy enterprises pay a fee of only 0.50% but the least creditworthy enterprises (who are able to secure the guarantee) must pay 2.20%. However, it is not clear whether the CRD has led to an increase in the overall flow of credit to SMEs. The analysis of data also feeds into policy making.

SMEs have difficulty in providing the collateral demanded by banks. Land and buildings are normally used but movable assets can also be an important source of collateral if there is a conducive legal framework in place. Such a framework includes a secured transactions law and a public assets registry for movable property. SME can register machinery, vehicles, inventories, and other assets, and banks are more inclined to accept them as collateral if they are registered. The impact of reforms in this area can be substantial. In the PRC, the new Property Law enacted in 2007 opened the door for the development of secured transactions. The central bank created a new online registry for receivables and also adopted modern registry rules and principles. An evaluation in 2011 found that 385,000 registrations had been entered and were used to facilitate \$3.5 trillion in credit. About one-third, \$1.1 trillion, was financing for SMEs (IFC n.d.). A number of other countries in Asia have been involved in reforming laws related to the use of movable property for collateral and in establishing registries. Thailand has recently reformed the law to make it easier to use a broader range of assets as security for credit (Box 1.3).<sup>5</sup>

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<sup>5</sup> A chapter on secured transactions is not included in the book.

### Box 1.3: Reforming Collateral Law

Governments can also help SMEs gain access to finance by reforming collateral laws. In Thailand, the law has, until recently, limited the use of collateral by businesses to secure loans. Collateral was confined to land and buildings, ships, floating houses, beasts of burden, and a few other assets. Other movable property could be used but had to be handed over to the lender for the duration of the loan. This meant that machinery and inventories were generally not pledged as collateral because they were needed to run the business.

In 2015, the government passed the Business Collateral Act to overcome these limitations. The act allows movable business property, such as machinery, finished goods, inventories, and raw materials, to be used as collateral and does not require that these assets be physically transferred to the lender during the loan period. Other assets that can be used as security now include intellectual property, claims (accounts receivable), and entire businesses. The act came into effect in mid-2016.

Source: Clifford Chance. 2015. *Thailand: Business Collateral Act*. Briefing Note. September. [www.cliffordchance.com/briefings/2015/09/thailand\\_businesscollateralact.html](http://www.cliffordchance.com/briefings/2015/09/thailand_businesscollateralact.html)

The spread of microfinance institutions (MFIs) in Asia has meant that households and microenterprises have greater possibilities to access credit. However, small enterprises have difficulty when they outgrow the small amounts lent by MFIs but are not yet able to secure bigger loans from commercial banks. Shankar (Chapter 9) refers to this as the *missing middle* in enterprise finance. She finds that there is a very real gap in South Asia that some microfinance institutions are trying to fill by offering larger loans and by transforming their operations into banks.

For an MFI to become a bank, an accommodating regulatory regime is required. In 2015, the Reserve Bank of India provided 10 licenses to private entities to start small finance banks; most of these licenses were provided to existing nonbank finance companies that operate as MFIs. The objective is to provide finance to this missing middle of small enterprises and other underserved enterprises. The government also established the Micro Units Development and Refinance Agency (MUDRA) Bank as a subsidiary of the Small Industries Development Bank of India. MUDRA Bank will provide refinance to MFIs, nonbank financial companies, regional rural banks, and others for onlending to microenterprises and smaller SMEs.

Over the past decade, MFIs in Bangladesh have realized the need to provide larger loans to some of their members. MFIs are permitted to offer microcredit to households of up to Tk50,000 (about \$637), but microenterprise loans can be larger. Only the bigger MFIs cater

to this segment, however. In Pakistan, the Strategic Framework for Sustainable Microfinance issued in 2011 acknowledged the importance of microfinance providers offering enterprise loans to promote employment generation. The maximum loan size that microfinance banks could offer was subsequently increased to PRs500,000 (\$6,378).

Whereas Shankar investigates the possibilities for MFIs to scale up, Subhanij (Chapter 8) examines the efforts of commercial banks in *downscaling* to achieve the same objective. She provides two sets of models drawn from global experience. For direct downscaling models, a bank establishes one of the following: an internal microfinance unit, a specialized financial institution, a microfinance service company, or correspondent banking relations (with convenience stores, petrol stations, lottery operators, or other nonfinancial agents). For indirect models, banks partner with existing MFIs. The arrangements can include outsourcing retail operations, providing commercial loans to MFIs, and agreeing to allow MFIs to use the bank's infrastructure or services. In each case, clear agreement is needed on which institution originates the loan and how the credit risk is apportioned.

These models have been developed by banks and MFIs in various countries. However, in Thailand the large number of specialized financial institutions and the existence of the Village and Urban Revolving Fund, which is the world's large MFI, has supported the availability of low-cost credit and reduced the incentives for private banks to downscale.

### 1.4.3 Skilled Workers

SMEs can struggle to attract, train, and retain the skilled workers needed for efficient, high-quality production and service delivery. Education and skills training are clearly public goods that governments should fund by providing schools, training institutes, and colleges and universities. However, in Asia's developing countries, governments are not able to provide an adequate flow of young people from the education system that meet the requirements of employers. The more energetic and skilled workers gravitate to larger companies or the government. Large firms generally offer higher wages and better benefits whereas governments provide greater job security and social security. This leaves small firms hard pressed to secure skilled workers in the domestic competition for talent.

SMEs also find it more difficult to train their workers. On-the-job training of new recruits and junior staff by senior workers can help but may have limited impact as it does not allow new skills to enter the enterprise. Off-the-job training—either at the enterprise or off site—is important to skills upgrading but the absence of workers sent for

training can be disruptive for small production units. Per-worker costs can be high if an outside trainer needs to be hired and the number of workers to be trained is low.

Governments in Asia have experimented with the use of training levies to encourage firms to train. The levy is mandatory and collected from all firms, which can then apply for funds to subsidize their training programs. While not structured to discriminate against small firms, smaller firms tend to use the funds less because they are less aware of how to access the funds and less able to organize training for which the funds can be used. Thus, they are required to pay into the fund but do not benefit from it.

Efforts to lower the levy rate and increase the amount of funds that can be accessed by SMEs have not been very successful. Lee (Chapter 13) describes how the levy system in the Republic of Korea employed these incentives but funds accessed by SMEs have remained much below that of large firms. Recognizing the problem, the government devised a new scheme of training consortiums in the early 2000s that worked with sector associations and SME business organizations to understand training needs and organize specialized training. Training was organized through both government training institutes—the traditional method—but also by private training providers. The program has been highly effective not only in delivering training to SMEs but also in increasing their use of the levy fund. Training through the consortiums was found to reduce waste in the production process and improve productivity.

The positive impact of firm-level training on productivity was also found by Vandenberg and Trinh (Chapter 14) in a study of over 4,000 enterprises in five Asian countries. The level of preemployment education of the workforce is also correlated with higher productivity, suggesting that the hiring process is also important for developing a high level of human capital within the enterprise. Preemployment education and enterprise-based training are not substitutes but each can independently and simultaneously raise productivity. They found that productivity is highest in large firms and lowest in small firms, reflecting the known wisdom.

Micro and small enterprises train less and hire less educated workers than medium-sized and large firms. Vandenberg and Trinh (Chapter 15) document these differences using the same dataset as their preceding chapter and delve further into whether this represents a market failure. They find that smaller firms are also less inclined to view an inadequately trained workforce as a major constraint on their operations; in other words, they may train less because they are satisfied with the skill level of the workers they currently employ. The authors suggest that smaller

enterprises may not appreciate the benefits of training their workers or they may be content to remain in a low-skills equilibrium serving market segments that do not require higher-level skills. However, estimation results suggest that smaller firms are less likely to train even when their perception of whether skills is a constraint is taken into account. Therefore, a size-induced market failure may still exist.

#### 1.4.4 Internationalization and Market Access

The integration of global markets and the creation of value chains have spawned interest in the internationalization of SMEs. Internationalizing can mean that a firm starts to export, but it may also involve supplying local foreign-owned factories that export, or sourcing machinery and inputs from abroad. The costs to develop export markets can be daunting for small firms, with considerable upfront costs (market development, market information, search for partners) and a high risk that the venture may not be successful. Governments have sought to address these constraints by setting up export credit schemes (usually through an export-import bank), providing information about foreign markets, and supporting SME participation in overseas trade fairs.

The conceptual work on firm internationalization has a fairly long history. Johanson and Vahlne (1977) devised what became known as the Uppsala model, which suggested that firms first get established in the domestic market before venturing abroad. The move abroad involves stages of increased integration from first working through a foreign agent to eventually investing overseas. Others soon challenged this approach and devised other models. Johanson and Mattsson (1988) proposed an approach based on networks and how the impetus to develop a foreign presence comes from networked relations with customers, suppliers, and others. McDougall and Oviatt (1994) challenged the idea that all firms build a domestic base before going international. They suggested the idea of “international new ventures” and the case that some firms are “born global.” These firms have the intention, from the start, to operate globally. The same authors later developed the idea of international entrepreneurship in which the driving force of internationalization is the entrepreneur’s capacity to perceive new opportunities in foreign markets and creatively marshal the resources to fill those demands (McDougall and Oviatt 2000).<sup>6</sup>

Interesting research has investigated the links between internationalization and innovation. Theory suggests that causality may run in either direction: (i) firms may innovate as a prerequisite for exporting into competitive markets, or (ii) the competitive pressures

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<sup>6</sup> This short review draws on Masum and Fernandez (2008).

and advanced technologies available from abroad may spur innovation. Empirical analysis has tested both possibilities and found evidence to confirm both cases. However, efforts to capture a bidirectional relationship—internationalization and innovation affecting each other simultaneously—have been more elusive.<sup>7</sup> Nearly all of these studies have focused on developed countries and included all enterprises, large and small.

Trinh (Chapter 5) tests these issues drawing on a rich dataset of SMEs in Viet Nam taken from five rounds of surveys conducted between 2005 and 2013. Firstly, he finds a high level of “persistence:” firms that innovate tend to continue to do so over time and firms that engage internationally tend to stay engaged. The definition of internationalization used here is broad and includes exporting, supplying other firms that export (so-called domestic exports), engaging in foreign partnerships, and sourcing from abroad. Regarding causality, the results show that prior internationalization does lead to process innovation. It may also lead to product innovation but the variable is not statistically significant. The author does not find evidence of impact in the other direction; that is, innovation, either product or process, does not appear to spur internationalization. Furthermore, there is evidence that internationalization and process innovation influence each other simultaneously (i.e., dynamic interdependence). Whether these results are driven by the nature of the data (SMEs, developing countries) requires further investigation.

## 1.5 Conclusion

SMEs make a substantial contribution to the growth and development of economies throughout Asia. They create jobs, invest in productive capacity, generate output, and in some cases export to foreign markets and act as key links in regional and global value chains. While their contributions in these areas may differ by country, by firm size category, and by statistical definition, there is little doubt as to their importance to economic activity. Recognition of their contribution has generated interest from policy makers at both the political and bureaucratic levels. That interest has grown over time in Asia as it has in other regions. Policy makers and the public have for many years cheered the headline investments made by large firms, both domestic and foreign-owned. There is now increasing praise, at annual meetings of SME associations, conferences, and trade fairs, of the collective importance of SMEs.

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<sup>7</sup> Trinh (Chapter 5) provides a review of the theoretical and empirical literature.

However, the contribution of SMEs is only part of the reason—and may not be the most important part—why policy makers should design programs and policies of support. The main reason for policy intervention is that SMEs face market failures that inhibit their survival and growth. These “size-induced” failures should be the focus of government policy, just as market failures faced by large firms (coordination failures, public goods failures, information failures, and innovation failures) are the rightful subjects of government policy. Size-induced failures in the markets for finance, technology, innovation, and human capital and in accessing international markets are appropriate areas for government involvement. We explore these issues in the following chapters.

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\* ADBI recognizes “China” as the People’s Republic of China.

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PART I

# Innovation and Technology

# 2

## Technology and Innovation Policies for SMEs in East Asia

*Patarapong Intarakumnerd and Akira Goto*

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### 2.1 Introduction

East Asian economies are latecomers to industrialization. According to Gerschenkron (1962), while, in general, latecomer economies enjoy the advantage of utilizing the technological and institutional advances created by the forerunner countries, they also face two disadvantages in competing in the global market:

- (i) They lack research, development, and engineering capability, and their poorly developed industrial and technological infrastructure operates in isolation from the world centers of science and innovation.
- (ii) They are dislocated from international markets, whose demands help stimulate technological advances and innovation (Hobday 1995).

Most developing economies before the 1990s experienced these two conditions.

Nonetheless, several firms in latecomer economies in East Asia—especially Japan; the Republic of Korea; Singapore; and Taipei, China—were able to exploit their advantages and overcome their disadvantages by increasing their technological capabilities and designing organization setups. This enabled them to enter and upgrade in the global value chain from original equipment manufacturers to own-design manufacturers, and, in some cases, to own-brand manufacturers. Some small and medium-sized enterprises (SMEs) became large, even global, firms, but most remained weak in technology and innovation.

This chapter aims at examining the effectiveness of technology and innovation policies for SMEs in Asia. We will examine the pros and cons

of different types of technology and innovation policies for SMEs based on the experiences of selected economies.

## **2.2 Types of Technology and Innovation Policies for SMEs**

Technology policies for SMEs can be divided into three groups: supply-side technology policies, demand-side technology policies, and systemic technology policies.

### **2.2.1 Supply-Side Technology Policy**

The aim of supply-side policies for innovation in firms is to increase incentives to invest in innovation by reducing costs. Supply-side policies encourage investments that otherwise might not be undertaken as liquidity constraints caused by capital market imperfections can be substantial when it comes to innovation.

The most commonly employed supply-side technology policy is subsidy in a broader sense for research and development (R&D). It includes tax incentives, grants and subsidies, loans, and direct equity participation (direct government investment as well as support through government-owned or -linked venture capital). These instruments have both pros and cons, which will be discussed in section 2.3. Relatedly, complementary supply-side policy is to help train skilled workers and scientists and engineers.

### **2.2.2 Demand-Side Technology Policy**

Demand-side technology policy is not limited to policies to create markets for products made by SMEs. The most crucial demand-side technology policy is public procurement. Central and/or local governments might procure goods and services from SMEs that meet certain conditions, such as clearing certain technological thresholds or being able to deliver products or services with better functions than existing ones; for example, those that significantly reduce energy usage and carbon dioxide generation, or increase speed and productivity. Importantly, government can provide the first market for innovations that might not be ready for acceptance by private markets due to high risk and the highly uncertain nature of innovations. In essence, public procurement can provide the first business opportunities for firms with innovative products and services. This kind of opportunity is

sometimes even more meaningful for firms than any financial support from government.

In addition to public procurement, government can stimulate the private market to accept innovative products and services through various mechanisms. These include labeling, market promotion, and subsidizing and/or providing tax incentives for buyers of innovative products or adopters of innovative processes. For example, the governments in several countries provide labels or support labeling campaigns on environmentally friendly and healthy products. Feed-in tariffs for electricity from renewable energy sources have been adopted in several developed countries. Financial incentives were provided to private house owners who installed photovoltaic systems on their roofs in Germany.

Governments can also help to create markets for the products of SMEs, who do not have resources for marketing, by facilitating the marketing of their products in other areas and countries. Caution should be exercised as this system has the risk of restricting competition and leading to corruption, and there are World Trade Organization regulations on government procurement.

Here, it should be noted that it is very important to create an environment where firms demand better technology to be successful in the market. In this sense, policies that will incentivize SMEs to demand better technologies are important, although they may be outside of the conventional technology policy. We consider this particularly important because it is often the case that many standard technology policies, such as the provision of subsidies or tax breaks for R&D, or opportunities for closer ties with universities, are not used by firms. This is particularly so in the case of SMEs. Therefore, various policies should be employed to incentivize SMEs to demand better technology. It is important to note that those who successfully obtain better technologies and use them to produce or significantly improve their products or processes are rewarded by markets. It is of vital importance for policy makers to create such an environment through patent policy, antitrust policy, antigraft policy, and so on. These policies create an environment in which those who invested in learning and adopting better technologies are rewarded. These policies may be beyond the scope of technology policy in a narrow sense. Nevertheless, they are extremely important policies. If the only companies who can prosper are those who steal technology, obtain government contracts through bribery or cozy relationships with politicians, or oppress smaller firms through market power—instead of companies who work hard to upgrade their technology—there is little incentive to demand better technology.

### 2.2.3 Systemic Technology Policy

In addition to supply-side technology policy and demand-side technology policy, there is a set of technology policies that aims to improve the performance of innovation systems mainly by promoting better coordination of their actors. SMEs' performance can be improved by working more closely with universities and public research institutes. Various policy measures can be employed to promote closer relationships. For example, a targeted subsidy could be provided for collaboration between SMEs and universities to develop a particular technology or product. Closer ties between university researchers and engineers of SMEs are encouraged through these collaborative projects, networking events, consulting, contract research, and so on. These can be promoted through subsidies and other policy measures.

One interesting policy is to establish local technology centers in various areas in a country. It is not uncommon for countries to establish agricultural extension services to help farmers to choose the right crop or fertilizers for the region, to teach when to apply which fertilizers, and so on. This model can be applied to the manufacturing sector to help local industry. In Japan, such local technology centers were established around the turn of the century, and they helped local companies in industries such as textiles, food, and pottery to upgrade their technology, improve their management, control product quality, and train employees.

These technology centers were usually established by local governments. Therefore, the expertise of the people in local government is important. They should be able to plan and execute effective local industrial policy. They should be able to coordinate local technology centers with local industry associations, vocational schools, and/or universities. They should make all the arrangements so that local technology centers become the hub of the local innovation system.

Another important way for SMEs to learn is to learn from large firms (multinational and domestic) who purchase their products as inputs. Large firms buying intermediate goods, parts, materials, and various services benefit from helping their suppliers, as better parts, materials, and services help their operations. Here, what policy can do is rather limited. Forcing the use of local contents is not a productive idea, as large firms will choose other places with no such requirements. Helping SMEs move closer to large buying firms' plants may be valuable, as geographic proximity is important for transfer of uncodified knowledge. Alternatively, government agencies can act as intermediaries to facilitate technology transfer and other linkages between large firms and SMEs. This will be elaborated upon in the discussion of the Singapore case in section 2.4.2.

## 2.3 Advantages and Disadvantages of Different Policy Instruments

Both supply- and demand-side policies can be deployed by several instruments, such as tax incentives, grants or direct subsidies, low-interest loans and loan guarantees, and government direct equity participation. Though application is needed and the outcome is not guaranteed, an R&D tax incentive has been adopted in many countries since it is much more generic and applies equally to all firms engaged in R&D. This relieves the government of the difficult task of choosing the right firm and monitoring their activities, as all R&D-performing firms are eligible to apply. However, this type of incentive is generally less focused than direct government subsidies, which can target particular activities, clusters, or sectors. The effectiveness of tax incentives also depends largely on the definition of R&D, administration of incentives, eligibility of firms, and type of R&D tax incentives (OECD 2002).

Grants can be more effective than tax incentives in encouraging specific activities, sectors, clusters, or firms, but they require higher government capabilities to select and meet targets. The selection and management processes are also complicated and can be subject to political intervention as well as corruption, cronyism, and nepotism. Loan programs are more popular in countries with problems giving direct grants to the private sector for innovative projects. For these risk-averse countries, providing loans is safer for the government, simply because loans have to be paid and need collateral guarantees. Equity financing can be used selectively, like grants. Recipients can also get the money up front, which means investment risk can be substantially reduced, as funding agencies share the risk with firms from the very beginning of projects. Having government co-invest in a project can increase creditability of recipient firms. Still, writing off bad projects financed by public funds is problematic. Table 2.1 summarizes the advantages and disadvantages of these instruments.

## 2.4 Policy Experiences of Selected East Asian Economies

This section aims to shed light on the effectiveness of policies to enhance technological and innovative capabilities of SMEs by examining the experiences of Malaysia; Singapore; Taipei,China; and Thailand. Two criteria were used to select them:

- (i) SMEs should be economically significant in these economies. Although Japan and the Republic of Korea are technologically successful, their economies are dominated by large firms.
- (ii) Serious industrialization and technological development should have taken place around the same time. The four selected economies started in the 1960s.

**Table 2.1: Technology and Innovation Policy Instruments: Advantages and Disadvantages**

Type	Advantages	Disadvantages
Tax concession	<ul style="list-style-type: none"> <li>→ Nondiscriminatory, open to all</li> <li>→ “Arm’s length” instrument; activities chosen by industry</li> <li>→ Maintenance of firm’s confidentiality</li> <li>→ Speedy processing (where approval is automatic)</li> </ul>	<ul style="list-style-type: none"> <li>→ Of no benefit to unprofitable or start-up firms</li> <li>→ Subsidizes existing activity that would have occurred anyway (unless based on incremental performance, which is hard to police)</li> </ul>
Repayable loan	<ul style="list-style-type: none"> <li>→ Can be targeted widely or focused</li> <li>→ Priorities or scope (type, timing, size) set by government</li> <li>→ Specific proposals can be made by firms</li> </ul>	<ul style="list-style-type: none"> <li>→ Requirements (e.g., collateral) work against small and medium-sized enterprises and start-ups</li> <li>→ Procedures are long and cumbersome</li> </ul>
Grant	<ul style="list-style-type: none"> <li>→ Benefits targeted activities, sectors, clusters, some types of firms</li> <li>→ Allows prioritization and therefore is appropriate for innovative projects</li> <li>→ No need to write it off</li> </ul>	<ul style="list-style-type: none"> <li>→ May be subject to criticism for being unfair</li> <li>→ Government must have the ability to select recipient</li> </ul>
Equity participation	<ul style="list-style-type: none"> <li>→ Benefits targeted activities</li> <li>→ Firms get investment money up front, reducing risks and uncertainty and increasing credibility</li> </ul>	<ul style="list-style-type: none"> <li>→ May be subject to criticism for being unfair</li> <li>→ Government must have the ability to select recipient</li> <li>→ Must write off bad projects</li> </ul>

Source: Authors.

Within these four economies, Singapore and Taipei, China are now high-income economies, while Malaysia and Thailand are still middle-income economies that may be facing a middle-income trap. The differences in innovation policies and the concomitant performance between the two groups will be illustrated later in section 2.4.

We will examine the extent to which these economies are influenced by different technology and innovation policy content and implementation. By adopting a history-friendly and longitudinal approach, the paper will trace any co-evolutions between government

policies and the increase in technological capabilities and innovation in firms in the four economies and determine how they happened. The empirical results draw extensively on *Towards Effective Policies for Innovation Financing in Asia*, a study under the authors' leadership for the International Development Centre of Canada in 2010–2011 (Intarakumnerd and Wonglimpiyarat 2012).

The East Asian economies discussed here started serious industrialization in the 1960s and achieved remarkable growth rates. Singapore saw one of the most impressive economic growth records in the last 4 decades, with 7.6% gross domestic product (GDP) growth per annum over 1960–2009. Singapore's per capita GDP of \$72,724 in 2012 (on a purchasing power parity basis) stands as one of the highest in Asia. Singapore's national innovation system was transformed from one with primary emphasis on technology adoption—particularly the assimilation and diffusion of technology by leveraging inward investments by transnational corporations—to one with a more balanced approach that significantly encourages indigenous innovation capability, including basic and strategic R&D and the creation of local high-tech firms (Wong and Singh 2012). Singapore's innovation financing schemes co-evolved with the development of its national innovation system. Its earliest schemes targeted diffusion of innovation and development of the capability to transfer technology, particularly from transnational corporations. These schemes remain the most common type of innovation assistance program. From the late 1980s, the government also focused on developing applied, and then basic, R&D capabilities, particularly through the use of grants and tax incentives. Start-up support schemes were first implemented in response to the policy focus on high-tech entrepreneurship during the late 1990s. Technology commercialization schemes, which began in the mid-2000s, are the more recent development in innovation policies (Wong and Singh 2012).

Similarly, Taipei,China's average annual growth rate has been an impressive 8% in the past 3 decades. Taipei,China is now a high-income economy, with GDP per capita (on a purchasing power parity basis) of \$39,059 in 2012. It adopted the “second mover” strategy of entering the global high-tech market only after the product matured and exploiting manufacturing and project execution capabilities (Amsden and Chu 2003). The government-sponsored research institutes, especially Industrial Technology Research Institute (ITRI), were important in implementing the strategy, which can be considered as a systemic policy. They assimilated advanced technology from overseas, including from transnational corporations, then rapidly diffused the technology to local firms through spin-offs, R&D consortiums, and the movement of researchers. Starting by licensing technologies from RCA, a leading

American semiconductor firm, ITRI conducted further research to understand, assimilate, and upgrade the technologies. It later spun off several units that became global leaders in the semiconductor industry.

R&D consortiums were also used to diffuse and upgrade existing technologies and build trust among participating firms. A remarkable success story is the case of the notebook PC. ITRI developed draft specifications for a “common machine architecture” and invited the Electrical and Electronic Appliance Manufacturers’ Association to be the joint coordinator. Later no fewer than 46 companies joined the consortium. A prototype was then developed and translated into a series of standardized components that could be mass-produced by manufacturers in Taipei, China. ITRI followed up by providing extensive training to member firms. Many of the ITRI engineers moved across to member firms, which was another form of diffusion of technological capability (Mathews 2002).

The institutes have also increasingly served as the coordinating agency for promoting the creation of indigenous technology via innovation networks and strategic R&D programs (Wong 1999). As a result, although not yet technologically on par with their Western counterparts, many firms in Taipei, China that started as SMEs have enhanced their technological and innovative capabilities and climbed up the global value chain. Like Singapore’s, Taipei, China’s innovation financing policies, together with other government interventions (especially the intermediary role of government research institutes), have been significant in the learning processes of its firms. These programs also co-evolved with the development of Taipei, China’s firms’ technological capabilities and innovation system. The schemes of the 1960s–1980s focused on developing absorptive capacity to take advantage of foreign technologies. During the 1990s, the schemes began to focus more on helping firms develop new products, enhancing R&D capabilities, and encouraging the emergence of start-up companies in emerging sectors such as biotechnology (Liu and Wen 2012).

The experiences of Malaysia and Thailand have been significantly different from those of Singapore and Taipei, China. Although Malaysia and Thailand have made remarkable socioeconomic progress over the past 4 decades (with average annual GDP growth rates of more than 7%) and attained middle-income status, both are stuck in the “middle-income trap”—the inability to produce differentiated and sophisticated products and climb up the global value chain. The national innovation systems of Malaysia and Thailand are weaker and more fragmented than those of Singapore and Taipei, China (Thiruchelvam et al. 2012; Intarakumnerd et al. 2002). Likewise, firms in Malaysia and Thailand have lower technological capabilities and exhibit more “passive”

learning patterns. The innovation financing schemes of these two economies have not co-evolved as much with the development of technological capabilities of firms and national innovation systems. Thailand, in particular, has been unable to quickly modify its schemes. Most policy instruments in Thailand are limited to tax incentives and only for R&D. In Malaysia, however, several grant schemes target firms' different development stages. Such schemes in both economies have been hindered by fragmented policies and government agencies' inability to monitor, evaluate, and learn from policy implementation.

We will now examine in detail the four economies' policy instruments to find similarities and differences in content and execution.

### 2.4.1 Tax Incentives

Malaysia, Singapore, and Thailand have R&D tax incentives based on R&D expenditure (double deduction) while Taipei, China has adopted R&D tax credits. Tax incentives based on R&D expenditure allow firms to deduct more expenses for tax purposes than what they actually spend, while R&D tax credits allow firms to deduct a percentage of their R&D spending directly from companies' final tax liability. Singapore's tax incentive system, like other financial incentives, has evolved according to the country's strategy and level of technological capability, unlike in Malaysia and Thailand. When Singapore wanted to attract the labor-intensive electronics industry from the United States (US) and Japan, its government offered "pioneer status," with attendant tax holidays of up to 15 years and other benefits, to transnational corporations to invest in strategic projects in Singapore (Table 2.2). From the late 1980s to the late 1990s, when the strategy shifted to position Singapore as an R&D hub for transnational corporations, the government launched the Research and Development Tax Deductions Program. Unlike in other economies, this deduction included R&D activities that took place outside Singapore (but were related to and benefited those in Singapore), although the deduction rate was lower than for those of local activities.

It seems that Singapore's government officials have an understanding of how global R&D networks of transnational corporations operate and what constitutes an R&D hub, and that successful innovation needs more than R&D: it needs the support of a combination of several activities. Beginning in the late 1990s, when Singapore emphasized indigenous innovation by high-tech entrepreneurs, the government also initiated the R&D Incentive for Start-Up Enterprises. It was designed to meet the needs of R&D-intensive start-ups, which usually spend the first few years developing products and incurring losses. Tax exemption is therefore not useful to them. The program also made these start-ups

**Table 2.2: Comparison of Tax Incentives in Thailand, Malaysia, Singapore, and Taipei,China**

Year of Operation	Thailand	Malaysia	Singapore	Taipei,China
	1996	1982	1960s	1991
Type	Tax incentives on expenditures	Tax incentives on expenditures	Tax incentives on expenditures	Tax credits
Coverage	R&D (strict definition), training, collaboration with universities	R&D, commercialization of R&D	Pioneer activities, R&D, R&D hub (covering R&D outside Singapore), design, acquisition of intellectual property rights and automation equipment	R&D, training, using certain technologies
Focus (sector, cluster, technology, type of firm)	General	General, specific (biotechnology, information and communications technology, East Coast Development Region), and firm-specific (prepackaged incentives)	Pioneer status (strategic activities and sectors), convertible to grants for start-ups	General and specific (automation, energy saving, pollution control, digital technologies)
Project-by-project approval	Yes	No	No	No
Effectiveness	Number of approved projects increased but still from a limited number of firms	Increase in number of projects but decline in number of applying firms	Increase in number of firms doing R&D in Singapore, especially transnational corporations	Increased number of approved tax deductions in money terms but no significant changes in number of applying firms; increase in employment, gross domestic product, and net tax revenues

R&D = research and development.

Source: Authors.

eligible for cash grants during their initial years equivalent to the benefit they would receive from R&D tax credits once they are profitable. Since 2010, firms have been able to deduct 400% of their expenditure from their income, subject to a cap of S\$800,000, from innovation activities,

including not only R&D but also design, registration and acquisition of intellectual property rights, and acquisition of automation equipment.

Taipei,China's tax credit program covers not only direct R&D activities but also expenditures on critical activities to upgrade firms' activities: automating production, reclaiming resources, controlling pollution, using clean and energy-saving technologies, and using digital information technologies more efficiently. The experience of Taipei,China illustrates that, like Singapore, it understands how to implement government incentives to tackle companies' technological upgrading problems.

Malaysia implemented its double deduction program more than 10 years earlier than Thailand. Malaysia's R&D tax incentive schemes are also much wider in scope than Thailand's, dealing not only with R&D activities but also the commercialization of R&D findings. Apart from double deduction of R&D expenditure, Thailand's Board of Investment initiated a scheme in 2003 to promote "skill, technology, and innovation" by offering 1 to 3 more years' tax exemptions for companies already receiving standard tax privileges if they conducted in-house R&D, in-house training, and R&D collaboration with local universities. Malaysia's tax incentive system is more selective than Thailand's. It has tax incentives for targeted industries such as information and communication technology (ICT) and biotechnology, activities such as medical device testing, and geographic clusters such as the East Coast Economic Development Region. Incentives customized on the merit of each case—the "prepackaged incentives"—have also been introduced recently. Unlike Thailand, therefore, Malaysia has both generic and selective tax incentives.

Regarding the efficiency of tax incentives, only Thailand scrutinizes companies wanting to apply for R&D tax incentives and on a project-by-project basis. Other economies periodically conduct ex-post evaluation of the overall impacts of tax incentives on firms' innovation and impacts on the economy. The application process in Thailand is cumbersome and conflicts with a main advantage of tax incentives, which is supposed to be a fast and almost automatic application process. The level of trust in Thailand's society is low and its government has been worried about false claims. Thus, the Revenue Department (responsible for double deduction of R&D expenses) authorizes the National Science and Technology Development Agency (the largest public research institute) to verify whether submitted applications are R&D projects and whether their proposed expenses are appropriate. Since many proposals are submitted, the average approval period is as long as 5–6 months. Similarly, project-to-project approval is required for firms wanting to take advantage of the Board of Investment's Skill, Technology and Innovation policy. The

number of approved projects, however, has increased over the years. Likewise, in Taipei, China, after 2000, the monetary value of approvals has increased year by year, but the number of companies applying for such incentives has not significantly changed. It is mainly the large firms in Malaysia and Thailand that benefit from R&D tax incentives, not SMEs, which generally do not have R&D capabilities.

Only Taipei, China has conducted a formal study on the impacts of its tax incentives. It found that tax credits for encouraging R&D, training, and automation have induced further R&D investment, leading to more jobs and higher GDP. As a result, there have been significant positive net effects on tax revenue (Liu and Wen 2012). In Thailand, however, although one cannot observe direct causation, results from community innovation surveys illustrate that innovative firms used R&D tax incentives more than non-innovative firms.

## 2.4.2 Grants

In Singapore, grants are the key instruments for financing technological capability development and innovation. Singapore has also had a greater variety of grant schemes targeting all activities in the value chains, which have evolved according to the country's level of development and the technological capabilities and needs of firms. In the 1970s and 1980s, Singapore initiated schemes such as the Local Industry Upgrading Program to promote technological diffusion from transnational corporations to local enterprises (Table 2.3). Under this scheme, the Economic Development Board subsidized for 2 years a percentage of the salary of a manager sent by a transnational corporation to work in a local enterprise. As of 2010, more than 200 transnational corporations and 1,000 local suppliers had been involved in the program. This is an illustration of using systemic policies to leverage transnational corporations' strength to upgrade local SMEs. Without targeted policies like this, the spillover impacts from transnational corporations would be limited.

Grant schemes were also given to individuals and companies to promote critical skills such as ICT. In the 1990s, when firms in the country needed to increase their R&D capability, the government initiated a grant scheme to leverage Israel's R&D capability by funding feasible collaborative R&D projects of firms in the two countries. Since the late 1990s, whenever the government has wanted to promote high-tech entrepreneurship and basic R&D, it has initiated grant schemes. An example is the Technology Innovation Program, which covers 50%–70% of equipment, materials, labor, software, and intellectual property costs of projects operated by individual SMEs and consortiums. Another is

**Table 2.3: Comparison of Grant Schemes in Thailand, Malaysia, Singapore, and Taipei,China**

	Thailand	Malaysia	Singapore	Taipei,China
Year of Operation	1990s	2000s (becoming more unified)	1970s	1980s
Level of significance compared with other mechanisms	Not significant	Very significant	Very significant	Very significant
Coverage	R&D, prototyping, pilot scale	The whole spectrum (pre-R&D, R&D, commercialization, acquisition of other firms' intellectual property rights)	Wide-ranging and evolving according to the needs and capabilities of firms	Wide-ranging and evolving according to the needs and capabilities of firms
Focus (sector, cluster, technology, type of firm)	General	Both general and specific (technologies, sectors, clusters, products)	Both general and specific (sectors, technologies, types of firms)	Both general and specific (sectors, technologies, products)
Effectiveness	Too small to have critical success	Criticism of lengthy approval processes and duplication of schemes	Effective older policies (e.g., Local Industry Upgrading Program, enhancing linkages between transnational corporations and local firms), but only moderate success with recent policy on promoting high-tech start-ups	Inducing substantial R&D investment from recipient firms, supporting creation of new industries or products; small and medium-sized enterprises benefited significantly

R&D = research and development.

Source: Authors.

the Innovation Voucher Scheme, which provides SMEs with grants to pay for consultancy and technical services provided by reputable local and overseas universities and research institutes. The government also uses this scheme to promote interfirm collaboration by allowing up to 10 SMEs to pool their vouchers. Singapore astutely uses government schemes to tackle systemic failures of its national innovation systems, which are linkages among local SMEs, and between local SMEs and public research institutes and universities.

The Technology Enterprise Commercialisation Scheme, based on open call and selection, is a competitive grant scheme that was launched in 2008 to support locally owned technology-oriented start-ups and SMEs at the proof-of-concept stage (to conceptualize ideas) and the proof-of-value stage (to carry out further R&D and develop a prototype). Specific grant schemes commercialize technologies developed by universities, encourage polytechnic institutes to conduct translational research on R&D outputs from universities and research institutes, and bridge the gap between universities' seeds and firms' needs by allowing collaborating firms to license technology once proven, but to be under no obligation if the project fails. Some grant schemes are aimed at strategic service sectors (e.g., aviation and animation) and strategic and future-oriented technologies and capabilities (e.g., logistics capability, environmental technology capability, medical technology capability, marine capability, and tourism technology). These schemes are under the management of responsible sector-specific development agencies.

Some grant schemes have been provided by universities to their students to start their own businesses. These recent government schemes targeting early-stage companies, however, have had only moderate success. For example, only one-fifth of surveyed firms were aware of the Innovation Voucher Scheme. Start-ups that have taken part in the recent schemes gave an average rating of 3 on the 5-point Likert scale on three criteria: meeting firms' immediate objectives, improving their long-term growth prospects, and helping them move to the next growth stage. The bureaucracy involved in the application processes must be lessened and awareness of the various schemes raised.

For many years and in various programs, Taipei, China has been using grants as financial instruments to encourage firms to enhance their technological and innovative capabilities. As in Singapore, programs in Taipei, China have co-evolved with the development of firms' capabilities. Several programs are sector specific or even product specific. For example, when firms in Taipei, China gained production capabilities as subcontractors of transnational corporations and wanted to move up the global value chain by attaining product development capabilities, the Leading Product Development Program was implemented in 1991 to subsidize R&D costs for high-tech products and know-how such as those produced by the ICT, aerospace, pharmaceutical, and semiconductor industries. About 800 of 1,600 cases were approved, about evenly divided between SMEs and large firms. The results of the Leading Product Development Program were impressive, as NT\$1 of grant induced about NT\$10 investment in R&D, NT\$21 investment in production, and NT\$42 in sales. On average, one project generated 3.7 patents and 2.9 derivative products (Liu and Wen 2012). Similarly,

when the government wanted to promote local start-ups, it adopted as a model in 1998 the US Small Business Innovation Research Program, which provided grants to firms in three phases: feasibility studies, R&D, and commercialization. A more generic grant scheme, the Industrial Technology Development Program, was initiated in 1999 to fund the preliminary study and R&D phases of firms aiming to develop forward-looking industrial technologies. NT\$1 of grant induced NT\$2.46 of R&D and NT\$4.89 of capital investment (Liu and Wen 2012). In the 2000s, grants were given specifically to strategic technologies and industries such as conventional technology development, commercialization of biotechnology, and the knowledge-based service industry.

Similarly, Malaysia's Ministry of Science, Technology and Innovation has been providing various types of grants that cover the whole spectrum, from basic and applied research and prototype development (Science Fund) to development of technology for commercialization (TechnoFund) and innovation (InnoFund). The TechnoFund supports the development of pilot plants and upscaling of laboratory prototypes, and field trials and testing. It also has provisions for the acquisition of intellectual property rights from local and overseas entities to be further developed locally during the precommercialization stage. The InnoFund has two categories of grants. The first is allocated to assist individuals and micro and small enterprises in developing new or improving existing products, processes, or services with elements of innovation for commercialization (Enterprise Innovation Fund). The second grant type is used to assist community groups in converting knowledge and ideas into products, processes, and services that improve the groups' quality of life (Community Innovation Fund). This kind of support is for innovation at the bottom of the pyramid. In addition, the Cradle Fund provides support at the pre-R&D phase.

On another front, the Ministry of International Trade and Industry also provides several matching grant schemes to SMEs for business start-ups, product and process improvement, productivity and quality improvement, and the enhancement of *targeted* capabilities in design, labeling, product packaging, and market development and brand promotion (including their activities abroad). Apart from these general grant schemes, some schemes promote strategic technologies, industry clusters, and products. The Multimedia Super Corridor R&D Grant Scheme was set up to assist local companies and joint ventures in developing multimedia technologies and applications that would contribute to the overall development of the Multimedia Super Corridor. The Biotechnology R&D Grant Scheme was established in 2001 under the National Biotechnology Directorate to support biotechnology R&D activities and the commercialization of research findings in specific areas

of national importance to the biotechnology industry. Matching grants for developing halal products are also available. All these schemes can be seen as attempts to promote technological and innovative capabilities in the private sector and to forge relations between industry, universities, and public research organizations. Most funds are devoted to applied and problem-solving research projects under the TechnoFund. Although the administration of these schemes has not been formally assessed, it is problematic because project approval takes a long time (Thiruchelvam et al. 2012).

In administering grant programs, Thailand is an exception. Grant schemes are limited in variety and size. The country relies more on indirect support to private firms through such means as tax incentives. Giving public money to private firms gives rise to allegations of cronyism and corruption. Neoclassical economists, who dominate national economic policy agencies (and academia), do not like the idea of selective government interventions in particular industrial sectors, activities, clusters, and firms, as these appear to be working against the market mechanism. The prospect of loss of public money, if grant projects were to fail, is not acceptable to government authorities, especially those in charge of the budget. As a result, grants are given mostly to public research institutes and universities. Since 2008, R&D grants such as those awarded by the National Science and Technology Development Agency to private firms have been significantly reduced, even practically stopped. The most successful grant giver has been the Industrial Technology Assistance Program, started in 1992, which provides up to 50% financial support for hiring consultants (freelancers or university professors) to help solve SMEs' technological problems. More than 1,000 firms have received financial support from this program. Results, however, have been mixed, as some firms did not carry on developmental activities by themselves after the projects ended. The factors correlated with success appear to be active involvement of executives of firms; clarity of project goals; finding appropriately skilled and devoted experts; and, importantly, the National Science and Technology Development Agency's industrial technology assistants, who act as intermediaries between firms and experts.

Thailand's National Innovation Agency (NIA) also offers a grant scheme to support up to 75% of expenses for prototyping and pilot-scale activities of firms. It gives smaller grants than agencies in other countries (about \$160,000 for 3 years) and gave grants to only 56 projects during 2003–2007. However, the number of supported projects significantly increased to 552 during 2010–2014. Recently, the NIA has focused more on the strategic sectors of bio businesses, design and solutions, and energy and environment. In 2011, the NIA adopted the idea of an “innovation

coupon” that gives grants to private firms equal to 90% of the project cost to hire listed innovation service providers, either for feasibility studies or for pilot project implementation. The Federation of Thai Industries, the largest association of manufacturers, is a partner in the scheme to help the NIA select the right projects. The results are yet to be seen.

### 2.4.3 Loans

Loans are a more prominent innovation financing mechanism in economies such as Thailand. The National Science and Technology Development Agency’s Company Directed Technology Development Program has been providing soft loans of up to 75% of total project cost and less than \$1 million per project for R&D, product and process upgrading, and building, or refurbishing laboratories. The number of approved projects each year has been small (fewer than 20), however, and recently even smaller as selection criteria have become more stringent: activities of firms must be R&D related and employ technologies new to the industry. For example, acquisition of machinery not related to R&D is unlikely to receive a loan. Most Thailand SMEs, therefore, are not qualified since they do not have R&D capabilities, and the problems they face are more production related. Although the NIA provides zero-interest loans of up to B5 million for innovation projects for the first 3 years, setting up the scheme is problematic as loans have to be channeled through commercial banks whose usual selection requirements are not favorable to financing risky innovative projects. As a result, only 38 projects were approved during 2003–2007. Nonetheless, the number of projects increased to 61 during 2010–2014.

In Singapore, loan programs are a much less prominent government financing mechanism than grants and equity. As early as 1976, when Singapore was still trying to exploit technologies generated elsewhere, SPRING’s Local Enterprise Finance Scheme was initiated to provide low-interest loans to automate and upgrade factories and equipment, and to purchase factories (Table 2.4). More recently, a program was set up to help SMEs acquire working capital and machinery. A loan insurance scheme to help SMEs secure loans by providing insurance against default has become available as well.

Taipei, China has several loan schemes, including for purchasing automating machinery for manufacturing and agriculture enterprises, revitalizing traditional industries, purchasing energy-saving equipment, promoting industrial R&D, and purchasing computer hardware and software. Firms in service industries, such as the internet and technical service providers, are also eligible. The loan per company is about \$2 million to \$3 million. From the beginning of the schemes in the 1980s

**Table 2.4: Loan Schemes in Thailand, Malaysia, Singapore, and Taipei,China: A Comparison**

Year of Operation	Thailand	Malaysia	Singapore	Taipei,China
	1990s	1970s	1970s	1980s
Level of significance compared with other mechanisms	Significant	Significant	Not significant	Significant
Coverage	Increasingly focused on research and development	The whole spectrum	Evolving according to needs and capabilities of firms	Wide-ranging and evolving according to needs and capabilities of firms
Focus (sector, cluster, technology, type of firm)	General	General and specific technologies, sectors, and activities	General and specific activities	General and specific sectors, technologies, and activities
Facilities supporting access to loans	SME credit guarantee	SME credit guarantee, SME credit rating agency	SME credit guarantee	SME credit guarantee
Effectiveness	Number of applications in some programs has dropped significantly	Applications increased significantly, especially from SMEs, but 90% of recipient firms are Bumiputra (Malay ethnic)	Not significant	Number of approved projects increased

SME = small and medium-sized enterprise.

Source: Authors.

to April 2010, more than 50,000 cases had been approved. Both loans and approved projects are on a much greater scale than in Thailand. The SME Credit Guarantee Fund is also available to help SMEs secure loans from these government programs.

Malaysia has used loans as financial instruments since the 1970s and implemented many schemes for different purposes. Specific low-interest loan schemes for high-tech enterprises and entrepreneurs have been used to stimulate technology development and innovation. Loans for particular groups such as university graduates are also available. Schemes for strategic sectors (e.g., automotive, food), technology (e.g., adoption of automation technology, ICT), and activities (e.g., international branding) are also in place, as well as more generic

schemes. Credit Bureau Malaysia (formerly known as SME Credit Bureau) was incorporated in 2008 to give independent credit ratings to SMEs, which usually lack “reputational collateral” for access to finance. The ratings are based on information from the central bank and financial institutions. The bureau is popular and trusted, with a membership of 27,000 SMEs and 38 financial institutions. The credit bureau does not directly evaluate firms’ innovation performance, but they take into account indicators such as new business activities and new products that are related to innovation.

#### 2.4.4 Equity Financing

In Thailand the venture capital industry was first set out by foreign venture capital funds in 1987 (Table 2.5). Venture capital investments generally target growth and expansion in the venture life cycle. The major organizations providing venture capital funds to support entrepreneurial development are the Office of Small and Medium Enterprises Promotion, the National Innovation Agency, One Asset Management, Stang Holding, and the Market for Alternative Investment (MAI) Matching Fund. The Matching Fund, a fund of funds with assets of B2,000 million, was set up to increase the number of newly listed companies (including those backed by venture capital) on the MAI. However, the fund ceased operation in 2010 because of a less-than-successful track record. The Revenue Department also provides taxation schemes to support venture capital fund investments. These schemes assist venture capital funds and investors through corporate and personal tax exemption policies. Venture capital funding in Thailand per company is B720 million on average and lasts about 10 years before the exit. Most venture capital funds invest 30% in the early stage and 70% in the growth and mature stages. The leading business angel in Thailand is the Thai–Chinese Business Association. Currently, business angel investment is about B90 million. The deals range from B4 million to B50 million, with no exit strategies (Scheela and Jittrapanun 2010). This means that angel investors in Thailand do not really behave like those in more successful countries like the US, who take a high risk and exit their invested companies when they become successful. Therefore, in practice, innovative Thai businesses at the early and risky stages are not financed by angel investors.

In Malaysia the venture capital industry began in the early 1980s with the establishment of Malaysian Ventures, whose primary aim was to invest in high-tech industries. The Malaysia Venture Capital Association was established in 1995 to develop a venture capital industry to further support technological innovations. The government is a major source of venture capital financing: most venture capital

**Table 2.5: Equity Financing Schemes in Thailand, Malaysia, Singapore, and Taipei,China: A Comparison**

Year of Equity Financing Operation	Thailand	Malaysia	Singapore	Taipei,China
	1987	1984	1983	1983
Stages of VC investment	Expansion and mezzanine	Growth and expansion	Early, growth, and expansion	Established, mass production, and expansion
Specialized funds to support innovative firms through VC	SME VC Fund, Market for Alternative Investment (MAI) Matching Fund	Malaysian Technology Development Corporation (MTDC), Malaysia Venture Capital Management Berhad (MAVCAP)	Platform for Test-bedding, Research and Innovation and New Maritime Technologies (TRIDENT)	Development Fund and SME Development Fund
Sector of VC investment	Food and drink, machinery and equipment, household furnishings, wood products, costumes	Manufacturing, ICT, biotechnology	ICT, biotechnology, medicine, genetic engineering, software, and technology-enabled business services	Optoelectronics, biotechnology, electronics
Formal VC association	Thai VCA established in 1994	Malaysia VCA established in 1995	Singapore VCA established in 1992	Taipei,China VCA established in 1999
Business angel financing	Infancy stage of business angel clubs and networks	Infancy stage of business angel clubs and networks	Has formal business angel network (SPRING)	Has formal business angel network (TWBAN)
Government's direct equity financing	None	None	Several schemes both by government alone and coinvestment with private VC	Large government funds (Development Fund and SME Development Fund)
Effectiveness	Low uptake in government VCs; private VCs are risk averse; fund of funds initiative failed because of insufficient demand; lack of mentoring services	Helped sustain private sector R&D but not yet effective in creating new start-ups.	Surveys show moderate success of new programs but the overall number of high-tech start-ups increased significantly, especially in the past few years	Helped increase high-tech start-ups but not significantly as only 28% of VC funds went to early stages

ICT = information and communication technology, R&D = research and development, SME = small and medium-sized enterprise, VC = venture capital, VCA = venture capital association.

Source: Authors.

funds are channeled to Bumiputra-owned and government-linked firms. The major organizations providing venture capital investment funds to support entrepreneurial activities are Malaysia Technology Development Corporation, established in 1992 to provide financial support for multinational subsidiaries, and Malaysia Venture Capital Management Fund, established in 2001 to support entrepreneurial activities of local high-tech firms. Only 7% of total venture capital funds in 2004, however, were invested in the start-up phase.

In Singapore the government launches innovation financing schemes and programs to support innovative firms, as most venture capital funds are set up with government co-funding (such as Temasek Holdings and Technopreneurship Investment Fund Ventures, which act as funds of funds), and are managed directly by government agencies or government-linked companies (e.g., Economic Development Board Investments, Vertex Management, Economic Development Board Life Science Investment). These government venture capital funds invest in various sectors but mainly in government strategic areas of ICT and, subsequently, biomedical sciences, clean technology, and digital media. To fill the gap in early-stage funding left by private venture capitalists, a government venture capital firm called TDF Management was formed in early 1995. It provides seed funding to entrepreneurs and high-tech start-ups. Apart from funding through venture capital, the government provides “direct” financing, especially to new entrepreneurs and start-ups. For example, the Economic Development Board launched the Startup Enterprise Development Scheme, a cofinancing scheme to take dollar-for-dollar equity stakes in promising start-ups backed by third-party private sector investors in order to fill a market gap in seed-stage funding (Mani 2004). In 2008, the Early-Stage Venture Funding Scheme was founded to match 1 Singaporean dollar of investments in early-stage technology start-ups with one dollar invested by selected venture capital firms. Singapore has also tried to groom its angel investment network, as business angel investors often provide seed funding to support the early stages of new venture development. Business Angel Funds, managed by SPRING, co-funds preapproved business angel groups. Business Angel Funds and the Startup Enterprise Development Scheme complement each other. A start-up that has already received funding from Startup Enterprise Development Scheme can still apply under Business Angel Funds for a follow-up investment up to S\$1.5 million. This is an example of how well financing innovation schemes in Singapore are coordinated, which is not usually the case in other countries. Schemes for promoting start-ups by particular groups of people, such as entrepreneurs under 26 years old, have also been made available. The effectiveness of these recent schemes is moderate.

Results of surveys from around 300 start-ups revealed that about one-fifth have participated in such government assistance schemes, with those in the very early stages of growth (i.e., prerevenue firms) having a higher propensity to participate than those in later-growth stages. Still, since 2006, close to 5,000 new high-tech enterprises have been registered each year, and the growth rate of firm formation of high-tech enterprises has increased in recent years, partly because of government financing policy measures.

In Taipei, China venture capital financing began as early as 1983 with the implementation of the Regulation Governing Venture Capital Business Management to stimulate the development of the venture capital industry. Venture capital investing is mostly done in firms that are established, engaged in mass production, and/or expanding, where the government plays a major role. The Private Equity and Venture Capital Association was established in 1999 to encourage economic development. The Ministry of Economic Affairs supervises the management of venture capital funds. The success of venture capital development in Taipei, China can be tied to the social and economic bridge linking its high-tech industry with the US Silicon Valley. In addition to venture capital enterprises, Taipei, China, like Singapore, also has government direct financing schemes. As early as 1973, the Development Fund was set up to invest directly in innovative companies and invest indirectly through venture capital firms. Strategic sectors such as biotechnology, aerospace, and optoelectronics were the priorities. To stimulate the technological development of SMEs, the SME Development Fund was established in 1994 to invest directly and indirectly through government and private venture capital. These two large funds are the government's main investment arms to promote innovative firms as well as stimulate the growth of the venture capital industry.

The governments of Malaysia, Singapore, Taipei, China, and Thailand play a major role in promoting innovation through venture capital financing schemes that support companies with high growth potential (public sector interventions). Although the venture capital mechanism aims to provide risk capital to firms operating in high-risk environments, venture capital financing programs are not effective in the early stage of entrepreneurial development. Venture capital investment in these four economies tends to come in at the less risky, later stages (expansion), reflecting the funding institutions' aversion to high risk. The angel investment network is not fully developed except in Singapore, where it is a significant source of capital during the early stages of high-tech development. To overcome difficulties in early-stage financing, the governments in Singapore and Taipei, China have initiated "direct' equity" financing programs.

Only a small number of venture capital funds operate in Thailand despite the government policy to promote the venture capital industry. In 2010, only two venture capital funds applied for a venture capital license. The total funds raised by Thailand's venture capital industry represent 0.15% of GDP. In Malaysia, although the government is the main investor in developing technology-based start-ups, the venture capital market's growth is slow because of the lack of human capital and the risk-averse behavior of local venture capital firms. In Singapore, local high-tech companies have effectively used a variety of assistance schemes such as Growing Enterprises through Technology Upgrade, Economic Development Board, SPRING Singapore, International Enterprise Singapore, and the Political Risk Insurance Scheme. The effectiveness of more recent programs targeting start-ups, however, seems to be moderate. The number of firms is not large but has increased over the years. More importantly, the programs helped to create interest among Singaporeans, especially the young, in starting their own businesses instead of working for the government and transnational corporations as before (Wong and Singh 2012). In Taipei, China new venture capital investments grew from 1,155 cases in 1998 to 1,850 cases in 2000 as a result of the government tax credit policies to support venture capital companies. After 2000, however, the number of investments decreased after the tax credits stopped.

## 2.5 Conclusion and Lessons Learned

This section elucidates key findings from the case studies of the four economies and highlights lessons learned for other economies. The factors underlying successful technology and innovation policies for SMEs can be summarized under seven key points.

First, in the more successful economies—Singapore and Taipei, China—policy instruments co-evolved with firms' levels of technological and innovative capabilities. Different levels of technological and innovative capabilities of firms need different policy instruments. The ability to initiate and implement new policy instruments to fit the changing needs of firms at different levels of capability over time is critical. Policy makers must understand the current needs and technological barriers facing firms in the economies under study. Strategies based on copying other economies—which no doubt have different needs and challenges—will not be effective.

Second, Singapore, Taipei, China, and, to a lesser extent, Malaysia have a higher level of flexibility and policy coordination and learning. They offer a much greater variety of policy instruments that cater

selectively to the particular needs of industrial sectors, clusters, technologies, types of firms, or even individual firm demands (the so-called “firm-specific” or “prepackaged” incentives). Incentives should be formulated and executed so that they complement each other and contribute to overall industrial technology development strategy, as illustrated in the cases of venture capital and business angel financing in Singapore, and the mandate of the Ministry of Economic Affairs to give opinions on the prospects of newly listed high-tech firms in Taipei, China’s stock markets regarding their ability to develop technologies, rather than requiring them to meet a certain number of years of establishment and profitability targets, as in other standard stock markets (Liu and Wen 2012). When incentives do not work for some types of firms, they can be adjusted to fit those firms’ demands. For example, Singapore’s R&D tax incentives for start-ups can be converted to grants, since those firms do not make a profit in their initial years.

Third, developing firms’ technological and innovative capabilities takes a long time. The amount, duration, and continuity of government-supported schemes are crucial as they reflect policy priorities and the commitment of governments. The case studies show that the governments of Singapore and Taipei, China are highly committed to fostering firms’ capabilities.

Fourth, policy makers must have a deep understanding of innovations and innovation systems and how they evolve. While Thailand narrowly focused on R&D-led innovation, Singapore and Taipei, China broadened their incentives to other activities important in innovation, both inside and outside a single firm, such as services, business models, and solutions, among others. The difference between incentives to promote Thailand and Singapore as R&D hubs is a good example of how their government officials understand the global R&D processes of transnational corporations.

Fifth, supply-side policies were predominant in all four economies, while demand-side policies were not extensively used. Nonetheless, Singapore and Taipei, China demonstrate the effective use of systemic policies. In the case of Singapore, policies were deployed at various points of time to establish and upgrade linkages between transnational corporations and local firms, especially SMEs. In Taipei, China public research institutes, especially the Industrial Technology Research Institute, played very important roles in diffusing foreign knowledge to local SMEs.

Sixth, innovation financing policies require corresponding policy initiatives that produce qualified human resources, attract foreign talent, and help organizations work together. Examples of this synergy are public research institutes in Taipei, China and entrepreneurial universities in Singapore.

Seventh, institutional factors shape choices and policy implementation. They include laws and regulations, unity and capability of government bureaucracy, trust, entrepreneurship, attitudes toward corruption, and the government's role in supporting private firms. Institutional shortcomings can, to some extent, be corrected. Successful economies can use financing innovation incentives as well as other government mechanisms (such as using public research institutes as intermediaries in innovation systems as in Taipei, China) and initiatives (such as Malaysia's credit rating agencies for SMEs and Singapore's promotion of business angel networks) to overcome or mitigate these shortcomings.

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# 3

## Does Internal and External Research and Development Affect SME Innovation? Evidence from India and Pakistan

*Naqeeb Ur Rehman*

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### 3.1 Introduction

Innovation is an expensive and risky activity. From a firm's perspective, innovation can be defined as a complex process involving new ideas—their development, transformation, and application—using knowledge technologies, capabilities, and resources (Karlsson and Tavassoli 2015; Artz et al. 2010). Similarly, a firm engaged in innovation activities is involved in many complex strategies (e.g., product, process, marketing, and organizational innovation) because innovation plays a key role in the evolution of industries. Studies single out innovation as a primary driver of firm competitiveness and the ultimate source of productivity and growth (Karlsson and Tavassoli 2015; Subrahmanya 2012). Not surprisingly, firms carry out innovation by internal (internal research and development [R&D]) and external (R&D collaboration) efforts and have better technological strength to produce product and process innovations because investment in innovation enhances the technological advancement and minimizes the firm's marginal cost of production (Ganotakis and Love 2011).

Small and medium-sized enterprises (SMEs) are a driving force in developed economies due to their multifunctional contributions to employment, exports, and technological innovation. SMEs' flexibility, adaptability, effective internal communication, and quick decision making can provide them with a competitive edge over large firms.

However, several studies (Conte and Vivarelli 2013; Love and Roper 1999; Subrahmanya 2012) have found that SMEs are more financially and nonfinancially constrained than large firms. A lack of financial assets, weaker competencies, reduced absorptive capacity (to internalize external knowledge), and the absence of economies of scale force SMEs to underinvest in R&D. Likewise, Demirbas et al. (2011) argue that SMEs operating in developing countries often face extra barriers such as lack of technological investment, a low level of R&D, and skills shortages. Presently, the global challenges for SMEs' survival are related to promoting an innovative culture, improving the quality of innovation (i.e., radical innovations that are supported by R&D), and encouraging patenting culture for superior SME performance. Empirical studies suggest that SMEs can use internal R&D coupled with external R&D to significantly improve innovation performance (Ceccagnoli et al. 2013).

Open innovation models suggest that SMEs can achieve innovation through internal or external knowledge and technologies (Spithoven et al. 2013). Internal R&D alone is not sufficient and SMEs' use of external R&D is equally important to achieve higher levels of innovation. Numerous empirical studies have emphasized the importance of internal and external R&D for product and process innovation output (Cohen and Levinthal 1989; Stam and Wennberg 2009; Añón-Higón et al. 2015; Hagedoorn and Wang 2012). Cohen and Levinthal (1989) suggested that internal R&D not only generates product and process innovation but also improves firms' absorptive capacity (i.e., learning effect). Similarly, Lane and Lubatkin (1998) argued that external R&D increases a firm's innovative output and absorptive capacity if these small firms are reluctant to invest alone in R&D.

The major contribution of this chapter lies in the unique data set used, which comprises firm-level cross-sectional data and allows for comparative analysis of Indian and Pakistani SMEs. To the best of the author's knowledge, very few empirical studies are available on the innovation performance of Indian and Pakistani SMEs. This study seeks to fill the research gap. The study investigates, for the first time, the complementary relationship between internal and external R&D among Indian and Pakistani SMEs.

The results show that SMEs engaged in internal and external R&D are more likely to introduce product and process innovations. However, this effect is found to be stronger for Indian SMEs. Pakistani SMEs are less innovative than Indian SMEs in terms of undertaking R&D and generating product and process innovation. In addition, the probit models show that internal and external R&D have a complementary relationship.

## 3.2 Theory and Hypotheses

### 3.2.1 Internal Research and Development

R&D is an important intangible input asset that is significantly associated with firm innovation. Innovation results from investment in R&D (Czarnitzki and Hottenrot 2011) because R&D increases a firm's stock of knowledge and a firm can utilize that knowledge to introduce new products (Artz et al. 2010). Similarly, several researchers have identified R&D as a major innovation input for increasing firms' innovation performance (Conte and Vivarelli 2013; Pellegrino et al. 2014; Karlsson and Tavassoli 2015; Hall and Bagchi-Sen 2002). Regarding the role of R&D, numerous studies state that R&D performs two major functions: (i) it generates new knowledge through product and process innovation, and (ii) it increases the firm's absorptive capacity (Cohen and Levinthal 1989; Stam and Wennberg 2009; Gallie and Legro 2012; Ceccagnoli et al. 2013).<sup>1</sup> In other words, R&D not only introduces technological competencies, but it also helps the firm to absorb knowledge spillovers from external sources. This suggests that R&D is an important indicator for measuring a firm's absorptive capacity (Gallie and Legros 2012). However, R&D is a costly and risky investment and requires a long-term commitment if it is to improve the firm's competitiveness and innovation performance (Pradhan 2011, Ortega-Argiles et al. 2009). SMEs normally carry out informal (or nonpermanent) R&D by using resources from different departments due to lack of financial and technological competencies.

SMEs generally tend to underinvest in R&D because of higher uncertainty in the success of innovative projects and the lack of information between the firm and external suppliers of finance. Further, small firms have limited access to internal and external finance as they cannot use their initial money and profits to invest in risky projects (Czarnitzki and Delanote 2015). Sometimes, it is less expensive to imitate than to innovate because firm size is correlated with the availability and stability of internally generated funds (Ortega-Argiles et al. 2009). It is argued that investment in R&D below the optimal level is very expensive and R&D subsidies and grants can alleviate the underinvestment in innovation activities (Meuleman and Maeseneire 2012). Czarnitzki and Delanote (2015) conducted a study on 3,272 German SMEs and concluded

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<sup>1</sup> Similarly, Ornaghi (2006) states that R&D generates two types of externalities: rent spillovers (e.g., investment in goods, patent licensing, and quality improvements), and knowledge spillovers (exchange of information at conferences and reverse engineering).

that R&D subsidies significantly boost innovation performance. A study by Hottenrott and Lopes-Bento (2012) of 1,973 Belgian SMEs also found that R&D subsidies accelerate R&D spending and have a significant impact on firms' innovation performance. Orteg-Argiles et al. (2009) too suggested that fiscal incentives and subsidies for SMEs may overcome the problems of weaker competencies, reduced absorptive capacity, and the absence of economies of scale. In yet another study, Demirbas et al. (2011) analyzed the barriers to innovation for 224 Turkish SMEs using a logit model. They found that lack of government support for R&D significantly reduces innovation performance. This indicates that R&D is essential input for SME innovation, because it significantly improve the SME innovation output (Parrilli and Elola 2012).

Furthermore, Artz et al. (2010) conducted a panel study of US firms and found that R&D has a positive and significant impact on firm invention (patents) and innovation (new products). Mairesse and Mohnen (2005) examined the positive relationship between R&D and product and process innovation using tobit regression analysis on 2,253 French firms. Similarly, Ganotakis and Love (2011) conducted a study on 412 SMEs in the United Kingdom (UK). They revealed that internal R&D has a strong and positive impact on firms' product innovation. Gallie and Legros (2012) analyzed French firms by using unbalanced panel data and found that R&D has significant and positive impact on firms' innovation output. Further, Fritsch and Meschede (2001) examined the positive relationship between process R&D expenditure and firm size. This indicated that large firms devote a significant portion of their R&D on process innovation because process innovation improves product quality and/or enables introduction of completely new products. Likewise, Ornaghi (2006) investigated Spanish manufacturing firms and found that knowledge spillovers from R&D improve firms' innovation performance. Pradhan (2011) conducted a study of Indian manufacturing firms and found that R&D is an important determinant of SME performance. Interestingly, a number of researchers, including Hagedoorn and Wang (2012) and Berchicci (2013), categorized R&D into internal and external R&D in their studies on innovation performance.

### 3.2.2 External Research and Development

Firms can no longer rely on internal R&D and other internal capabilities (e.g., skills) to cope with the increasing cost of innovation, shorter product life cycles, and higher technological complexities (Berchicci 2013; Bergman 2010). This recent shift from closed to open innovation models has emphasized the role of external R&D activities. Through

such network activities (i.e., R&D alliances with universities, suppliers, and research organizations), firms may increase their competitiveness and improve performance (Minarelli et al. 2013; Ahuja 2000; Cantner et al. 2010; Un et al. 2010). The common goal of external R&D is to develop new products and processes by reducing costs. Moreover, the potential benefits of such external networks are sharing risks and costs, shortening innovation cycles, and exploiting economies of scale (Hagedoorn 1990; Peltier and Naidu 2012; Colombo et al. 2011; Nieto and Santamaria 2010; Pullen et al. 2012). In addition, external R&D cooperation provides exchange of intangible (non-codified) knowledge by means of people-to-people contact and increases the market power of each cooperating partner (Teirlink and Spithoven 2013; Kinkel and Som 2010). Specifically, SMEs can overcome the challenges of resource constraints through R&D cooperation. Interestingly, the study of Teirlink and Spithoven (2013), based on 140 Belgian SMEs, found that micro enterprises rely more on R&D cooperation than other firm sizes.

Several studies concerning SMEs' financial resources suggest that they are more financially constrained than large firms (Abor and Biekpe 2007; Beck and Kunt 2006). Most SMEs typically do not have sufficient internal financial resources to undertake R&D projects directly. This indicates that lack of financial resources reduces the SMEs' innovation activities (Dundas 2006). One way to overcome this problem is through R&D collaboration with competitors, suppliers, and universities, which increases access to R&D spending and firm competitiveness (Hottenrott and Lopes-Bento 2012; De Jong and Vermeulan 2006). The lack of resources is a barrier to SMEs' innovation performance, but at the same time it is the primary motive for SMEs to search beyond their own boundaries for required knowledge and innovative ideas. In particular, participating in R&D alliances allows firms to internalize technology spillovers, exploit economies of scale, combine complementary technological skills, and minimize the cost of R&D (Hottenrott and Lopes-Bento 2012). Moreover, SMEs can enhance their innovation performance by drawing upon external knowledge sources including other firms and research institutions (Chun and Mun 2012). Cooperative R&D agreements provide SMEs with opportunities to increase their absorptive capacity because such collaboration maximizes firms' internal stock of knowledge.

A study by Un et al. (2010) stated that R&D collaboration with universities and suppliers positively influences the firms' product innovation, but such collaboration with competitors appears to have a negative impact on product innovation. This indicates that not all R&D alliances positively influence product innovation. One disadvantage of R&D collaboration is transaction costs, especially to cooperate, manage,

and control R&D activities (Becker and Dietz 2004). Nevertheless, the study of Chun and Mun (2012) on SMEs in the Republic of Korea suggested that R&D cooperation significantly improves the firms' product and process innovation. A similar finding was provided by Kinkel and Som (2010) related to the German mechanical engineering industry. In addition, Mukherjee et al. (2013) investigated R&D alliance formation in 854 German SMEs. They found that inter-firm trust was more likely to encourage R&D alliances because it mainly influence product innovations. Specifically, SMEs face more environmental uncertainty (i.e., uncertain costs and benefits of R&D), and trust between firms can minimize this problem. Likewise, Spithoven et al. (2013) investigated the open innovation practices in 967 Belgian SMEs. They argued that SMEs' reliance on external R&D significantly improved product innovation.

Concerning the link between internal and external R&D, Hagedoorn and Wang (2012) and Berchicci (2013) suggest that internal and external R&D have a complementary relationship at higher levels of in-house R&D intensity, while at low levels of in-house R&D intensity both internal and external R&D have a substitutability relationship. The trade-off between internal and external R&D influences firms' innovation output (Berchicci 2013). Similarly, a study by Bergman (2010) on Swedish firms found that internal and external R&D both have a positive impact on productivity and this may suggest a complementary relationship between the two types of R&D. Similarly, Lokshin et al. (2006) investigated 304 Dutch firms by using a dynamic linear panel model. They found that internal and external R&D have a complementary relationship. Additionally, Ceccagnoli et al. (2013) examined the complementary relationship between internal and external R&D of pharmaceutical firms and found that external R&D promotes innovation by fostering internal R&D activities. This finding suggests that firms with external R&D must also continue to undertake internal R&D. A similar finding is suggested by Piga and Vivarelli (2004) using Italian manufacturing firms. They argued that internal and external R&D have a complementary relationship, which implies that doing more of one increases the return on doing more of other. Likewise, Becker and Dietz (2004) conducted a study on 2,048 German manufacturing firms using simultaneous equations. They found that internal and external R&D have a complementary relationship. Their findings suggest that external R&D drives firms to invest more in the development of innovation. In other words, a firm with a sufficient internal R&D base has the absorptive capacity to benefit from external R&D activities.

The above literature review suggests four main hypotheses:

**H1:** Internal R&D has a positive impact on SMEs' innovation performance.

- H2:** External R&D has a positive relationship with SMEs' innovation performance.
- H3:** Public support for innovation has a positive association with SMEs' innovation performance.
- H4:** Internal and external R&D have a complementary relationship.

### 3.3 Methodology and Data

This section provides information related to the research context of this study. The innovation activities in Indian and Pakistani SMEs are compared, along with data sources.

#### 3.3.1 SMEs in India and Pakistan: Research Context

India and Pakistan are the two major economies of South Asia in terms of gross domestic product (GDP). They share a long border and are active members of the South Asian Association for Regional Cooperation. In 2013, India's GDP was about \$1.9 trillion, while Pakistan's was much less at \$232.3 billion. Despite tense diplomatic relations between the two countries, trade (informal) between them is nearly \$3 billion. SMEs in India contribute 17% to total GDP while the figure for Pakistan is around 40%. Indian SMEs employ nearly 15% of the national workforce (about 60 million people), account for 26 million enterprises, and contribute 45% of manufacturing output. In comparison, SMEs in Pakistan employ 75% of the nonagriculture workforce, account for 3.2 million enterprises, and contribute 30% of manufacturing output. Concerning R&D investment, India has the edge over Pakistan related to overall R&D expenditure, which is equal to 1.0% of GDP compared with 0.3% for Pakistan (World Bank 2012).

R&D investment is essential to expand absorptive capacity and national learning but the poor countries tend to do very little R&D due to their low human capital, lack of research infrastructure and the lower technological capacity of the private sector (Goni and Maloney 2014). For instance, Pradhan (2011) found that R&D intensity among Indian SMEs is very low, and lower than that of large firms. A shortage of funds is one of the important barriers to their technological competitiveness. In addition, Subrahmanya (2012) found that most Indian SMEs carried out incremental innovations that were driven by customer demands and confined to slight changes in product design and shapes. In comparison, a study by Subhan et al. (2014) suggested that Pakistani SMEs need to invest in knowledge-based resources (e.g., R&D, process innovation) if

they hope to improve their innovation performance. Further, Pakistan has not yet developed an effective national system for improving R&D spending and other technological investment, especially in the biotech industry. Moreover, outdated technologies, lack of access to credit, high interest rates on lending, and the lack of government support are the major barriers faced by Pakistani SMEs (Berry 1998). Overall, the facts related to Indian and Pakistani SMEs suggest that a low level of R&D activity results in fewer innovations and that the lack of access to credit and the lack of an innovative culture are the major obstacles to innovation for SMEs.

### 3.3.2 Data Source

The data were obtained from the World Bank Enterprise database for 2013 under the title of “The World Bank Innovation Follow-Up.” This survey was initially launched in 2011 to investigate the innovation performance of developing countries. The innovation data was available for both countries for the same year. The survey gathered information on the key innovation variables including R&D, product and process innovation, sources of financing for innovation, and aspects of organizational and marketing innovation. The survey covered 3,492 Indian firms and 696 from Pakistan. In both countries, over 75% of firms were engaged in manufacturing (textiles, tobacco, chemicals, printing, electronics and machinery, and others) and over 15% in services (IT, wholesale trade, hotel and restaurants, transport, and others).

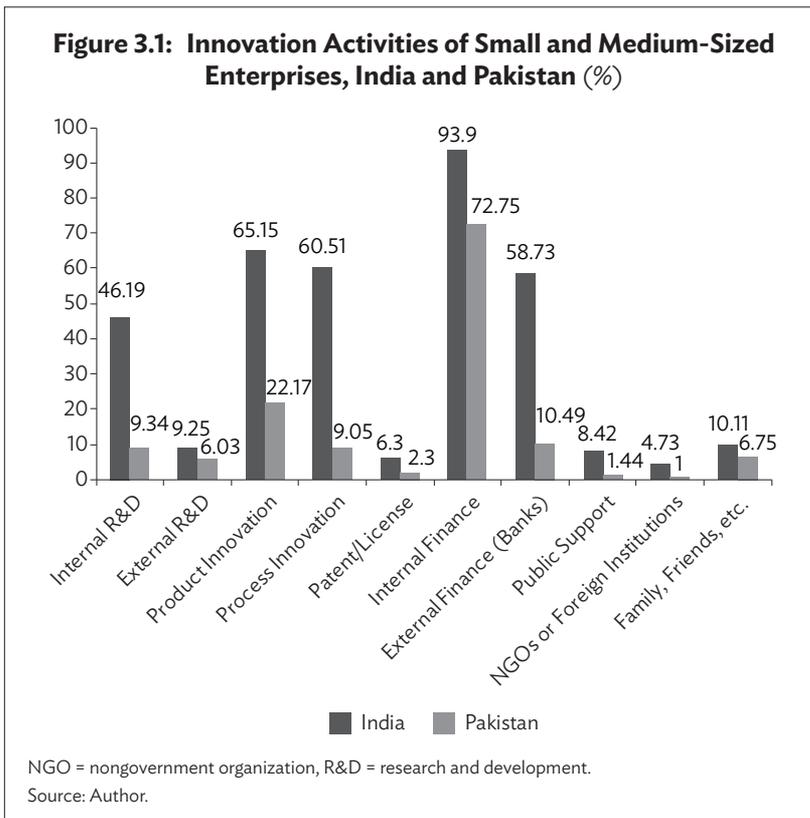
The majority of these firms surveyed were SMEs. This study uses dummy variables for firm size. The definition followed the guidelines from the World Bank Enterprise Survey instead of country-specific definitions. Small firms are defined as having 5–19 workers; medium-sized firms, 20–99 workers; and large firms 100 workers or more. In India, approximately 28% are small firms, 45% are medium-sized, and nearly 27% are large. For Pakistan, 44% are small firms, 35% are medium-sized, and 21% are large. Micro firms with fewer than 5 workers were not used in the analysis. The data were gathered from 23 Indian states and in Pakistan from three provinces—Punjab (54% of firms), Khyber Pakhtunkhwa (20.26%), and Sindh (13.36%)—and the capital city of Islamabad (12.79%).

### 3.3.3 A Comparison of Innovation Activities

India has higher internal R&D investment than Pakistan in plastics and rubber, machinery, chemicals, electronics, basic metals, and other sectors. Alternatively, Pakistani firms had higher R&D than India in food,

textiles, chemicals, vehicles, retail trade, and others. This indicates that the industries in the two countries are different in terms of undertaking internal R&D. However, in both countries the R&D intensity is higher in manufacturing than in services. For comparative analysis, Figures 3.1 and 3.2 provide the innovation activities of Indian and Pakistani SMEs.

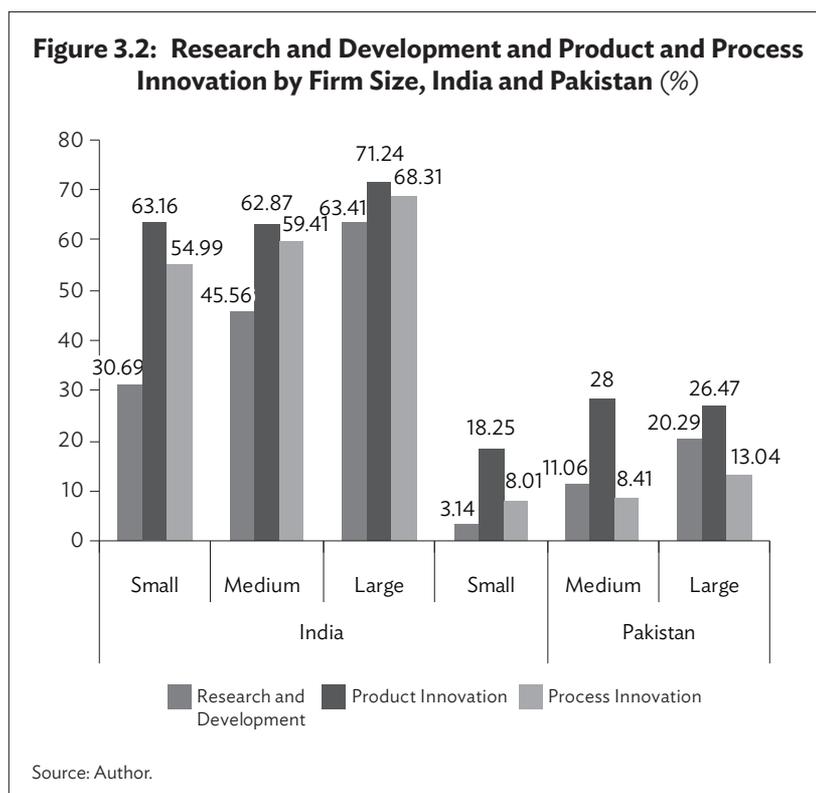
As shown in Figure 3.1, approximately 46% of the 3,492 Indian SMEs surveyed undertook internal R&D compared with just over 9% of 696 Pakistani firms. This suggests that Pakistani SMEs are much less engaged in internal R&D. The level of external R&D undertaking is very low in both countries, suggesting there are poor alliances or collaboration with other firms and research institutions. Further, most (65%) of the Indian SMEs were engaged in product innovation, compared with only 22% of Pakistani SMEs. This information suggests that the low level of R&D by Pakistani enterprises results in low innovation output. A similar trend is found for process innovation; nearly 61% of Indian SMEs introduced process innovation compared with 9% of Pakistani SMEs. However, the patent and license output is low in both countries. This



outcome could indicate that SMEs in both countries predominantly introduce incremental innovations. Overall, Figure 3.1 suggests that Indian SMEs are dominant in terms of carrying out internal R&D and product and process innovation compared with Pakistani SMEs.

SMEs in both countries rely mainly (over 70%) on internal sources of financing for their innovation activities (Figure 3.1). Interestingly, nearly 59% of Indian SMEs also financed their innovation through external borrowing from banks, but only 10% of Pakistani SMEs funded their innovation in this way. This suggests that Pakistani SMEs have substantially less access to external finance than Indian SMEs. Similarly, public support for innovation activities (R&D grants, subsidies, and tax credits) is low in both countries, albeit higher in India (8.0%) than in Pakistan (about 1.5%).

Figure 3.2 provides information on R&D and product and process innovation by firm size. Approximately 31% of small firms in India are engaged in R&D and nearly 46% of medium-sized firms. A much higher share of large firms, 63%, are engaged in R&D. In Pakistan, only 3% of small firms undertake R&D compared with 11% of medium-sized firms



and 20% of large firms. Overall, the link between R&D and firm size indicates that large firms in both countries undertake more R&D than do SMEs. The level of R&D by SMEs is lower in Pakistan than India.

In India, 63% of SMEs have introduced product innovations. However, 71% of large Indian firms generated product innovations and 68% undertook process innovations. In Pakistan, 18% of small firms have introduced product innovations compared with 28% of medium-sized firms and 26% of large firms. Process innovation is low at about 8%. Large firms are more engaged in innovation activities in both countries, which suggests they have better financial and knowledge resources. Pakistani SMEs have lower innovation capabilities than those in India.

### 3.3.4 Variables

The study uses two dependent variables, product innovation and process innovation, which are the key outputs of R&D and related activities (Conte and Vivarelli 2013; Fritsch and Meschede 2001; Pellegrino et al. 2014). Product innovation provides market leadership, broadens a firm's customer base, and increases the price buyers are willing to pay, while process innovation reduces a firm's average cost of production (Wolff and Pett 2006; Cohen and Klepper 1996; De Jong and Vermeulan 2006). While some studies (Hagedoorn and Cloudt 2003; Katila 2000; Liu 2009) used patent counts and applications as a proxy for innovation output, this study prefers product and process innovation over patents as dependent variables for several reasons. First, it is not necessary that every innovation is patented; and second, many firms do not patent because of their reluctance to disclose information and secrecy can help to protect their innovations. Moreover, in developing countries patent usage is not very common due to financial constraints and the low quality of innovations (Ghoneim 2003).

The major independent variables of interest of this study are internal and external R&D. Two additional innovation input variables that are used are internal technology acquisition (investment in machinery, equipment, and software) and external technology acquisition (patents and licenses), which generally have a significant impact on firms' innovation performance (Silva et al. 2012; Crespi and Zuniga 2012). The other independent variables relate to firms' financial resources measured as internal funds, external bank finance, and public support (R&D subsidies and tax incentives). These three explanatory variables investigate the impact of different types of finance on firms' innovation output. Finally, firm size and age are added as control variables, the former as a dummy variable and the latter in logarithmic form.

## 3.4 Econometric Model

### 3.4.1 Model Specification

A bivariate probit model is used to estimate the relationship between R&D and product and process innovations. This estimation method removes the sample selection bias and also presents more accurate parameters through the inclusion of non-innovative firms (Chun and Mun 2012). Alternatively, Heckman (1979) suggested a correction procedure (i.e., Heckit procedure) for sample selection bias by using continuous dependent variables. However, in this study, the dependent variables are predominantly discrete and the use of the inverse Mills ratio is not an appropriate choice. Moreover, the correlation coefficient indicates the possible complementarities between the dependent variables. The model used is as follows:

$$y_{1i} = \begin{cases} 1 & \text{if } x_{1i}\beta_1 + e_{1i} > 0 \\ 0 & \text{otherwise} \end{cases} \quad (\text{a})$$

$$y_{2i} = \begin{cases} 1 & \text{if } x_{2i}\beta_2 + e_{2i} > 0 \\ 0 & \text{otherwise} \end{cases} \quad (\text{b})$$

where  $y_{1i}$  and  $y_{2i}$  are product and process innovations while,  $e_{1i}$  and  $e_{2i}$  are error terms that are jointly normally distributed with correlation coefficient  $\rho = \text{Corr}(e_{1i}, e_{2i})$ . In other words, when  $\rho \neq 0$  the null hypothesis is rejected and a bivariate probit model is the correct choice for estimation.

### 3.4.2 Empirical Results

Table 3.1 provides summary statistics and definitions of the variables used in the estimation (mean and standard deviation) for both countries. In addition, a correlation matrix is used to detect possible problems of multicollinearity (Appendix A3). Multicollinearity arises when some or all explanatory variables are highly correlated with each other and it is difficult to tell which variable is influencing the predicted variable (Koop 2004). However, the majority of correlations between variables are less than 0.5. Only large firms' size category showed higher correlation ( $>0.6$ ) with medium firms and it is dropped in the estimation.

**Table 3.1: Variable Definitions and Descriptive Statistics**

	India		Pakistan		Definition
	$\bar{x}$	$\sigma$	$\bar{x}$	$\sigma$	
Product innovation	0.651	0.476	0.228	0.420	Dummy coded 1 if firm introduced any innovative products or services in the last 2 years
Process innovation	0.605	0.488	0.090	0.287	Dummy coded 1 if firm introduced any innovative method of manufacturing processes or offering services
Internal R&D	0.461	0.498	0.093	0.291	Dummy coded 1 if firm conducted internal R&D for developing innovative products or services
External R&D	0.092	0.289	0.060	0.238	Dummy coded 1 if firm conducted external R&D undertaken by other firms or public or private research organization
Log age	2.743	0.745	2.940	0.627	Log (2014–Age)
Small	0.278	0.448	0.440	0.496	Dummy coded 1 if number of firm employees is 5–19
Medium	0.455	0.498	0.347	0.476	Dummy coded 1 if number of firm employees is 20–99
Large	0.266	0.442	0.211	0.409	Dummy coded 1 if number of firm employees is $\geq 100$
Technology-acquisition1	0.633	0.482	0.178	0.382	Dummy coded 1 if firm spends on purchase of new equipment or software to develop innovative products or services
Technology-acquisition2	0.063	0.242	0.022	0.149	Dummy coded 1 if firm spends on license/patents or other type of knowledge
Internal finance	0.938	0.239	0.727	0.445	Dummy coded 1 if firm finances innovative activities from internal funds
External finance	0.587	0.492	0.104	0.306	Dummy coded 1 if firm finances innovative activities from banks
Public support	0.084	0.277	0.014	0.119	Dummy coded 1 if firm finances innovative activities through public support
Sector	0.780	0.414	0.837	0.369	Dummy coded 1 if firm is from manufacturing sector, otherwise zero

R&D = research and development,  $\bar{x}$  = mean,  $\sigma$  = standard deviation.

Source: Author.

## R&D (Internal and External) and Product and Process Innovation

Table 3.2 provides information on the relationship between undertaking internal and/or external R&D and generating product and process innovation for India. The results suggest that firms undertaking internal R&D increase the probability of product innovation by 37% and process innovation by 21%. This outcome confirms our initial hypothesis and is

**Table 3.2: Bivariate Probit Estimation Analysis, India**

Explanatory Variable	Product Innovation		Process Innovation	
	Coefficient	Z-value	Coefficient	Z-value
Internal R&D	0.3718 <sup>a</sup> (0.0485)	7.65	0.1045 <sup>b</sup> (0.0489)	2.14
External R&D	0.2144 <sup>b</sup> (0.0841)	2.55	-0.0867 (0.0789)	-1.10
Technology acquisition-1	0.3675 <sup>a</sup> (0.0499)	7.38	1.0328 <sup>a</sup> (0.0487)	21.20
Technology acquisition-2	0.1685 <sup>c</sup> (0.0936)	1.80	0.1184 (0.0961)	1.23
Log age	-0.0639 <sup>b</sup> (0.0307)	-2.08	-0.0397 (0.0311)	-1.28
Small firms	-0.1239 <sup>c</sup> (0.0642)	-1.93	-0.1575 <sup>b</sup> (0.0647)	-2.43
Medium firms	-0.2008 <sup>a</sup> (0.0559)	-3.59	-0.1313 <sup>b</sup> (0.0569)	-2.31
Internal finance	0.0264 (0.0947)	0.28	-0.0494 (0.0985)	-0.51
External finance	0.0299 (0.0465)	0.64	0.2147 <sup>a</sup> (0.0476)	4.51
Public support	0.6522 <sup>a</sup> (0.0985)	6.62	-0.1073 (0.0817)	-1.31
Sector	0.3912 <sup>a</sup> (0.0555)	7.04	0.0774 (0.0574)	1.35
Constant	0.3484 <sup>b</sup> (0.1422)	2.45	-0.3249 <sup>b</sup> (0.1447)	-2.24
Rho ( $\rho$ )	-0.3075 <sup>a</sup> (0.0286)	10.75	...	...
Wald chi-square	819.14 <sup>a</sup>		...	...

R&D = research and development.

a =  $\rho < 0.01$ ; b =  $\rho < 0.05$ ; c =  $\rho < 0.10$ .

Robust standard errors are in parentheses.

N = 3,486.

Source: Author.

in line with similar results from Stam and Wennberg (2009) and Gallie and Legros (2012). However, no statistical relationship is found between external R&D and process innovation. One possibility for the latter result is that R&D might not be required for process innovation. This apparently suggests that undertaking external R&D is costly for Indian SMEs with regard to process innovation. The coefficients of technological acquisition show positive association to product innovation and to some extent process innovation as well. Thus, firms' decision to spend on machinery, equipment, licensing, and software generate innovation (Table 3.2). This result is similar to that of Silva et al. (2012).

The coefficient of age shows a negative association to product innovation. This suggests that younger firms are more likely to generate product innovation than older firms. Firm size categories of small and medium present a negative relationship with product and process innovation,<sup>2</sup> which suggests that smaller firms are less likely to engage in innovation than large ones. This finding supports the Schumpeterian hypothesis that small firms are less innovative because of low economies of scale and weak access to skills and financial resources (Conte and Vivarelli 2013; Love and Roper 1999). Further, the parameter of external finance shows a positive relationship with process innovation. However, no statistical link is found between external finance and product innovation.

Public support for innovation activities through R&D grants, subsidies, and tax credits has a positive and significant impact on product innovation but not on process innovation. This result confirms the similar finding of Hottenrott and Lopes-Bento (2012). Lastly, the manufacturing sector is more likely to introduce product innovation.

Table 3.3 shows the results for Pakistan. Surprisingly, internal R&D shows no statistical association with innovation and therefore rejects the initial hypothesis. There are two possible explanations for this outcome. First, Pakistani SMEs do not undertake internal R&D because it is costly and risky. Second, Pakistani SMEs may not have the R&D-related capabilities (workforce skills) to conduct internal R&D. In contrast, external R&D does increase the probability of introducing product innovation by 10% (it was 21% for India). External R&D showed a strong association (nearly 44%) with process innovation (higher than India). This result suggests that Pakistani SMEs may overcome the high costs and risks and skill-related problems through R&D alliances.

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<sup>2</sup> This study has also dropped large firms (as a dummy variable) for two reasons. First, large firms caused multicollinearity with other size bands. Second, this study specifically focuses on the analysis of SMEs. However, in the following models a firm's size is also used as continuous variable for comparison between small and large firms.

**Table 3.3: Bivariate Probit Estimation Analysis, Pakistan**

Explanatory Variable	Product Innovation		Process Innovation	
	Coefficient	Z-value	Coefficient	Z-value
Internal R&D	0.1154 (0.2574)	0.45	-0.0664 (0.3366)	-0.20
External R&D	0.1015 <sup>c</sup> (0.0572)	1.77	0.4433 <sup>b</sup> (0.1663)	2.66
Technology acquisition-1	0.3395 <sup>b</sup> (0.1593)	2.13	1.0154 <sup>a</sup> (0.1749)	5.80
Technology acquisition-2	0.6580 <sup>*</sup> (0.4109)	1.60	0.3973 (0.3552)	1.12
Log age	0.4957 <sup>a</sup> (0.1104)	4.49	0.1954 (0.1267)	1.54
Small firms	0.0359 (0.1704)	0.21	-0.0546 (0.2187)	-0.25
Medium firms	0.3037 <sup>*</sup> (0.1670)	1.82	-0.1721 (0.2091)	-0.82
Internal finance	0.8947 <sup>a</sup> (0.1749)	5.11	0.6304 <sup>a</sup> (0.2057)	3.06
External finance	-0.1996 (0.2055)	-0.97	0.1062 (0.225)	0.48
Public support	0.3141 (0.4828)	0.65	0.0390 (0.5459)	0.07
Sector	0.4040 <sup>b</sup> (0.1982)	7.04	0.2886 (0.2501)	1.15
Constant	-3.3600 <sup>a</sup> (0.4748)	-7.08	-2.8609 <sup>a</sup> (0.5308)	-5.39
<i>Rho</i> ( $\rho$ )	0.6107 <sup>a</sup> (0.0721)	8.47	...	...
<i>Wald chi-square</i>	121.24 <sup>a</sup>	...	...	...

R&D = research and development.

a =  $\rho < 0.01$ ; b =  $\rho < 0.05$ ; c =  $\rho < 0.10$ .

Robust standard errors are in parentheses.

N = 648.

Source: Author.

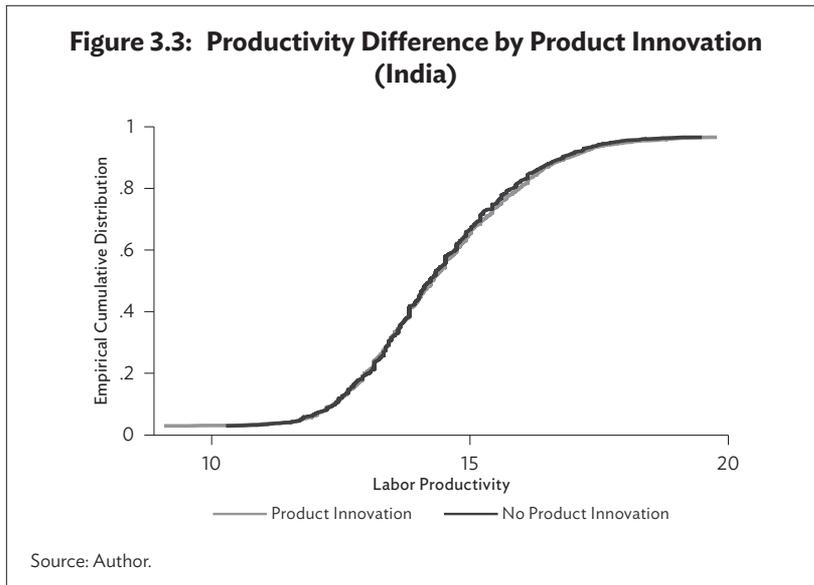
However, this effect is stronger for process innovation than for product innovation.

Technological acquisition has a positive and significant impact on product and process innovation, which is in line with the findings of Crespi and Zuniga (2012). The coefficient of age shows a positive association with product innovation, implying that older firms are more likely to introduce product innovation. Concerning the relationship

between firm size and innovation, medium-sized firms show a positive association to product innovation. No relationship is found between firm's size and process innovation. Regarding internal sources of financing for innovation activities, internal finance is positively correlated with product innovation but it is not significant. For process innovation, the sign is negative and the variable is also insignificant. The parameter of external finance is also insignificant and may indicate that Pakistani SMEs are more externally constrained than Indian SMEs. The manufacturing sector is more likely to introduce product innovations than the services sector.

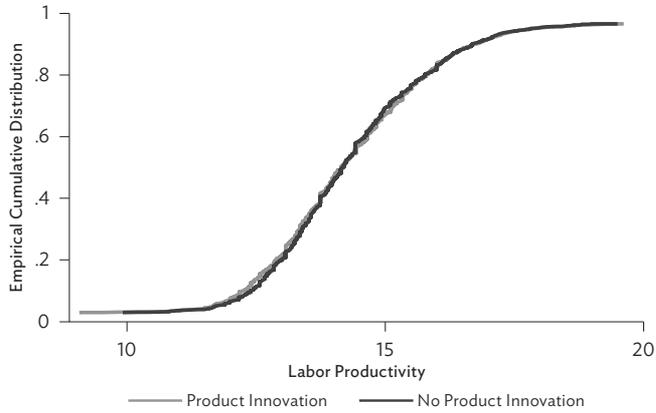
### Productivity and Innovation

A number of researchers have found that innovation has a positive impact on productivity (Masso and Vahter 2011; Cassiman and Golovko 2007). These studies identified an endogenous relationship between innovation and productivity, although that endogeneity is beyond the scope of this study. Figures 3.3–3.6 compare the labor productivity of innovators to non-innovators for India and Pakistan.<sup>3</sup> For Indian firms that are product



<sup>3</sup> Labor productivity is defined as a firm's total sales divided by the number of employees. Labor productivity is logged. Further, OLS regression has been used to investigate the relationship between productivity and innovation. However, a low R-square value (<0.05) and nonsignificant coefficients suggest that the use of the OLS method is not an appropriate choice.

**Figure 3.4: Productivity Difference by Process Innovation (India)**



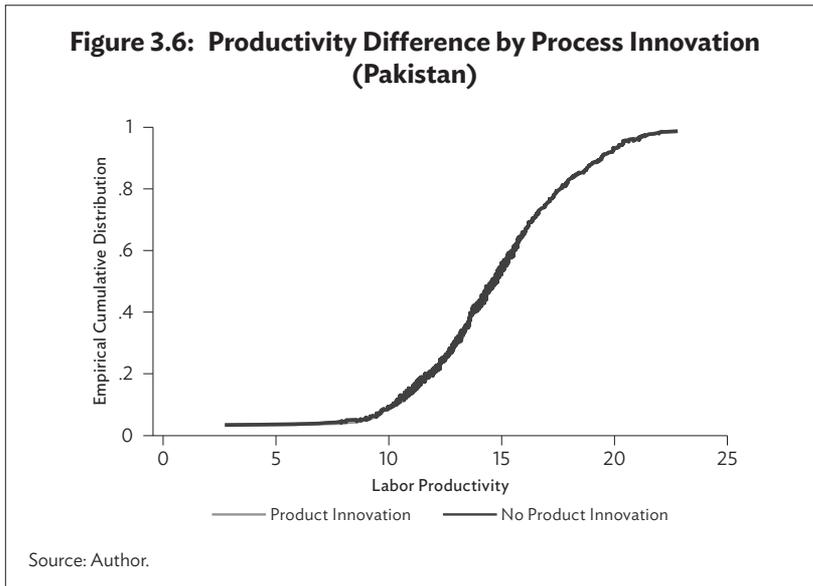
Source: Author.

**Figure 3.5: Productivity Difference by Product Innovation (Pakistan)**



Source: Author.

innovators (Figure 3.3), the labor productivity distribution coincides with that of non-product innovators. For Pakistan, the productivity of product innovators exceeds that of non-product innovators (Figure 3.5).



Labor productivity distribution for process innovators is coincided with non-process innovators for both India and Pakistan (see Figures 3.4 and 3.6). However, in Pakistan, the labor productivity distribution of process and non-process innovators is similar (Figure 3.6). The lack of information on other variables (e.g., materials, capital investment) has prevented the use of total factor productivity, which is a better indicator of productivity. Overall, these figures suggest that the productivity of product innovators has stochastic dominance over process innovators in Pakistan, while Indian firms showed no stochastic dominance for process innovators.

Results of the Kolmogorov–Smirnov test for equality of distribution are provided in Table 3.4, which compares the labor productivity distribution of product and process innovators for the two countries. In the case of Pakistan, the labor productivity of product innovators stochastically dominates the non-product innovators and the null hypothesis of no productivity difference is rejected. This implies that product innovators tend to be more productive than non-product innovators only for Pakistani SMEs.

### Complementary Relationship between Internal and External R&D

To estimate the final hypothesis on the complementary relationship between internal and external R&D, separate probit models have

**Table 3.4: Kolmogorov–Smirnov Test for Equality of Distribution Function**

Innovation	Labor Productivity (Yes = 1)	Labor Productivity (No = 0)
Product innovation (India)	0.0293	-0.0115
Process innovation (India)	0.0198	-0.0351
Product innovation (Pakistan)	0.1209 <sup>a</sup>	-0.0158
Process innovation (Pakistan)	0.1078	-0.0708

<sup>a</sup> Indicates null hypothesis rejected at 10% significance level.

Source: Author.

been estimated (Table 3.4). Several researchers have used R&D as the dependent variable (Pradhan 2011; Ornaghi 2006; Piga and Vivarelli 2004; Becker and Dietz 2004). Specifically, Piga and Vivarelli (2004) found that internal and external R&D are potentially endogenous. Internal R&D is correlated with the error term in the external R&D equation. In order to avoid this endogeneity problem, this study has used separate probit models for each dependent variable (internal and external R&D). This follows the method used by Becker and Dietz (2004) to estimate the complementarity between internal and external R&D. In the current study, internal R&D and external R&D are both discrete variables so the choice of a probit model is appropriate. In addition, firm size is introduced as a continuous variable (in logarithmic form) for two reasons. First, several researchers have used firm size as a continuous variable to avoid the possible multicollinearity between firm size categories (e.g., Demirbas et al. 2011). Second, using the sign of the coefficient of firm size as a continuous variable allows for the comparison between small and large firms.

Table 3.5 reports the results of the probit estimations for India and Pakistan. The link test is used to see whether the model is adequately satisfied without omitted variable bias. The variable prediction squared has accepted the null hypothesis which shows that the model is correctly specified (Table 3.4).<sup>4</sup> In the first model, a 1% increase in external R&D raises the probability of internal R&D by 53%. Similarly, in the second, internal R&D has a positive and significant impact on external R&D. In both specifications, the parameters for internal and external R&D

<sup>4</sup> A link test uses the prediction square of the model and if the prediction square does have explanatory power (i.e., the coefficient has significant value), it means that the model is incorrectly specified. In other words, the choice of explanatory variables is not appropriate for estimation. In this case, the prediction square coefficients have insignificant values, which means the model is well specified.

are highly significant (at the  $\rho < 0.01$  level). This outcome indicates the complementary relationship between internal and external R&D. External R&D motivates firms to undertake more internal R&D and expand the firms' technological capabilities. This result is in line with the findings of Ceccagnoli et al. (2013) and Becker and Dietz (2004) and confirms the prior expectation of their complementary relationship.

**Table 3.5: Probit Model Estimation (Maximum Likelihood Method)**

Explanatory Variables	India			
	Internal R&D (Model 1)		External R&D (Model 2)	
	Coefficient	Z-value	Coefficient	Z-value
Internal R&D	...	...	0.4606 <sup>a</sup> (0.0678)	6.79
External R&D	0.5399 <sup>a</sup> (0.0829)	6.51	...	...
Technology aquisition-1	0.5013 <sup>a</sup> (0.0479)	10.45	-0.0549 (0.0689)	-0.80
Technology acquisition-2	0.3281 <sup>a</sup> (0.0940)	3.49	0.2849 <sup>a</sup> (0.1069)	2.66
Log age	0.0268 (0.0305)	0.88	-0.0458 (0.0413)	-1.11
Log size	0.2571 <sup>a</sup> (0.0221)	11.61	0.2208 <sup>a</sup> (0.0805)	2.74
Internal finance	0.4283 <sup>a</sup> (0.0942)	4.55	-0.0370 (0.1278)	-0.29
External finance	0.0194 (0.0464)	0.42	0.1742 <sup>a</sup> (0.0637)	2.73
Public support	-0.1188 (0.0833)	-1.43	0.0602 (0.1069)	0.57
Sector	0.5440 <sup>a</sup> (0.0575)	9.45	0.0727 (0.0811)	0.90
Constant	-1.0096 <sup>a</sup> (0.1420)	-7.11	-1.4454 <sup>a</sup> (0.1921)	-7.52
<i>Pseudo R<sup>2</sup></i>	0.1148		0.0468	
<i>Model Specification Test</i>				
<i>Predict hat</i>	1.0015 <sup>a</sup>	21.19	0.8241	0.91
<i>Predict hat-square</i>	0.0068	0.10	-0.0669	-0.19

*continued on next page*

**Table 3.5** *continued*

Explanatory Variables	Pakistan			
	Internal R&D (Model 3)		External R&D (Model 4)	
	Coefficient	Z-value	Coefficient	Z-value
Internal R&D	...	...	2.4019 <sup>a</sup> (0.2677)	8.91
External R&D	2.4239 <sup>a</sup> (0.2862)	8.46	...	...
Technology acquisition-1	0.3626 <sup>a</sup> (0.1951)	1.86	0.3203 <sup>a</sup> (0.1228)	2.60
Technology acquisition-2	1.2141 <sup>a</sup> (0.4174)	2.91	0.1126 (0.4392)	0.26
Log age	0.06577 (0.1599)	0.41	-0.2618 (0.2130)	-1.23
Log size	0.2707 (0.2102)	1.29	1.7957 <sup>a</sup> (0.4002)	4.49
Internal finance	0.8533 <sup>a</sup> (0.2148)	3.97	0.2985 (0.2904)	1.03
External finance	0.1149 (0.2756)	0.42	0.2345 (0.3708)	0.63
Public support	0.3758 (0.7127)	0.53	0.6318 <sup>c</sup> (0.3548)	1.78
Sector	-0.0289 (0.2396)	-0.12	0.6041 (0.4252)	1.42
Constant	-2.6540 <sup>a</sup> (0.6191)	-4.29	-1.9740 <sup>b</sup> (0.7919)	-2.49
<i>Pseudo R</i> <sup>2</sup>	0.1468		0.1233	
<i>Model Specification Test</i>				
<i>Predict hat</i>	0.9605 <sup>a</sup>	7.16	0.7357 <sup>a</sup>	3.10
<i>Predict hat-square</i>	-0.0436	0.41	-0.1942	-1.21

R&D = research and development.

a =  $p < 0.01$ ; b =  $p < 0.05$ ; zc =  $p < 0.10$ .

Robust standard errors are in parentheses.

N = 3,488 for India and N = 648 for Pakistan.

Source: Author.

In addition, technology acquisition shows a positive association with internal R&D in the case of India (Table 3.5, model 1). This outcome indicates that firms' innovation expenditure is likely to increase the probability of undertaking internal R&D. However, in model 2 only one form of technology acquisition shows a positive association to external R&D. Overall, firm size shows a positive relationship with both internal

and external R&D. This outcome suggests Indian and Pakistani SMEs are less likely to engage in R&D than large firms. This finding accords with the Schumpeterian notion that large firms are more innovative than small firms due to their economies of scale advantage.

Similarly, a positive relationship is found between internal and external R&D for Pakistan (Table 3.5). The relationship is much stronger for Pakistani firms than for those in India. Overall, the outcomes between internal and external R&D in Table 3.4 suggest that both variables have a complementary relationship. Increasing internal (or external) R&D by a factor of 1 increases the probability of increasing external (or internal) R&D by a similar magnitude. Furthermore, technology acquisition increases the probability of engaging in internal R&D. However, only model 4 shows a positive relationship between firm size and undertaking external R&D. This outcome implies that large firms are more likely to undertake external R&D. The coefficient of internal finance shows that a 1% increase in internal finance is likely to raise internal R&D by 85%. This indicates that the majority of Pakistani SMEs rely on internal sources of finance for their innovation activities. Lastly, public support to innovation activities (e.g., R&D subsidies and grants) is likely to raise external R&D.

### 3.5 Conclusion

This study indicates that Indian SMEs undertake more internal and external R&D and introduce more product and process innovations than Pakistani SMEs. However, SMEs in both the countries exhibit weak R&D collaboration with other firms or research institutions. Moreover, SMEs were mainly engaged in incremental innovations due to the low level of patent protection. Similarly, public support for innovation activities in the form of R&D grants, subsidies, or tax credits are low for SMEs in both the countries. Furthermore, Pakistani SMEs are more constrained in terms of access to external finance than those in India. The majority of Pakistani SMEs relied on internal source of financing for innovation output (product/process). However, internal financing was not sufficient to undertake internal and external R&D. In comparison, Indian SMEs used both internal and external financing for accelerating their innovation output and were found marginally better in terms of undertaking R&D.

Regarding the estimation results, this chapter reveals that SMEs engaged in both internal and external R&D may have significantly better innovation performance. This outcome was found stronger for Indian SMEs because Pakistani SMEs are reluctant to undertake internal

R&D due to the high costs and risks associated with innovation efforts. Overall, the negative relationship between firm size and innovation output suggests that SMEs in both countries may be facing resource constraints. This result supports the finding of Schumpeter (1942) that small firms are less innovative—they have lower levels of R&D, are less capital intensive, and are more risk averse than large firms. In addition, the positive relationship between internal and external R&D implies a complementary relationship between these two types of R&D. This suggests the likelihood that investing in internal R&D would increase the probability of also engaging in external R&D, and vice versa. This result confirms the findings of other researchers.

The study provides important policy implications. First, the relationship between external R&D and innovation output indicates that small firms in both the countries require linkages with other firms and research institutions. Network relations are a good source for gaining complementary skills and absorptive capacity. Pakistani SMEs are at a specific disadvantage in terms of investment in internal and external R&D, and the lack of an R&D culture reduces firms' innovation performance. Policy instruments such as R&D grants from government agencies are more beneficial in increasing R&D investment and innovation output than R&D financing. It is difficult for SMEs to obtain R&D financing due to its risky nature (i.e., research can take a long time to generate results). Overall, the negative relationship between firm size and innovation output suggests that SMEs face resource constraints.

The results imply that specific policy measures might be provided through such institutions as the Small Industries Development Bank of India, other state financial institutions in India, the Small and Medium Enterprises Development Authority of Pakistan, and banks serving SMEs in Pakistan to remove the barriers to improving SMEs' innovation performance. In addition, such instruments as R&D grants and subsidies, a stronger R&D culture, the availability of external finance requiring less collateral, and university–industry linkages may encourage SMEs to improve their innovation performance. The complementary relationship between internal and external R&D implies that business managers can utilize a balanced combination of R&D to increase innovation performance.

This study has several limitations. The unavailability of information on R&D expenditure, technological acquisition expenditure, and borrowing for Pakistani SMEs required the use of less precise dummy variables. Further, longitudinal data would have captured the effects of R&D more appropriately than cross-sectional data, as R&D is most often a long-term investment. A lower number of observations for Pakistan than for India also affected the accuracy of the estimates. The study can be extended to other South Asian countries to broaden the analysis of the innovation performance of SMEs.

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Appendix A3: Correlation Matrix of All Variables (India)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Product innovation	1.00													
2 Process innovation	(0.17)	1.00												
3 Internal R&D	0.14	0.13	1.00											
4 External R&D	0.07	0.00	0.14	1.00										
5 Log age	0.00	(0.01)	0.04	0.00	1.00									
6 Size 1	(0.02)	(0.07)	(0.19)	(0.06)	(0.06)	1.00								
7 Size 2	(0.04)	(0.02)	(0.01)	(0.01)	(0.01)	(0.50)	1.00							
8 Size 3	0.07	0.09	0.20	0.08	0.08	(0.37)	(0.61)	1.00						
9 Technology acquisition-1	(0.08)	0.40	0.22	0.02	(0.02)	(0.08)	(0.02)	0.10	1.00					
10 Technology acquisition-2	0.04	0.06	0.10	0.06	0.02	(0.05)	(0.01)	0.06	0.10	1.00				
11 Internal finance	0.02	(0.00)	0.07	0.00	(0.02)	(0.03)	0.05	(0.02)	(0.00)	(0.02)	1.00			
12 External finance	0.03	0.11	0.06	0.05	0.03	(0.10)	0.02	0.08	0.10	(0.07)	0.06	1.00		
13 Public	0.13	(0.06)	(0.03)	0.01	0.04	(0.02)	0.02	(0.00)	(0.13)	0.00	0.02	0.13	1.00	
14 Sector	0.14	0.08	0.20	0.04	0.14	(0.05)	0.05	0.01	0.04	0.12	0.07	0.02	0.07	1.00

() = negative number, R&D = research and development.

Size 3 showed higher correlation (>0.6). For Pakistan, the correlation matrix showed values lower than 0.5.

Source: Author.

# 4

## Barriers to Innovation in Indian SMEs

*Anshul Pachouri and Sankalp Sharma*

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### 4.1 Introduction

India is ranked very low in the global innovation index (81 out of 141 countries), which in a way reflects the low innovation capacity of Indian firms and Indian small and medium-sized enterprises (SMEs) in particular. The Government of India classifies SMEs as a part of the MSME (micro, small, and medium-sized enterprise) sector. According to the Ministry of MSME, there are approximately 49 million enterprises in the MSME sector that employed around 111.4 million people in 2014. The importance of the MSME sector to the Indian economy can also be understood by the fact that it contributed 37.5% to India's GDP in the fiscal year beginning in 2012 (FY2012). Out of this, manufacturing sector MSMEs contributed approximately 7% and services sector MSMEs contributed 30.5% to India's GDP in FY2012.

MSMEs also play a critical role in the manufacturing sector and the export performance of India. The share of the MSME sector in total manufacturing output for FY2012 is estimated to be 37.3%. However, the share of the MSME sector in India's total exports for FY2013 is 42.4%, which clearly shows the importance of this sector to the country's industrial and economic growth.

Given the importance of the MSME sector, it is critical to ensure that SMEs in India remain competitive both nationally and globally. One of the principal determinants of SMEs' competitiveness is innovation. Developing economies such as India face a formidable challenge in this regard due to limited government capacity to foster innovation support mechanisms. Modern concepts such as cluster development are often underutilized or ignored.

Government policy—which touches upon virtually every aspect of innovation including access to finance, technology, market knowledge,

and building of research and development (R&D) and educational institutions—remains one of the most crucial factors in SME innovation.

India updated its Science, Technology and Innovation Policy in 2013. It is important to note that the policy has provided a big impetus to build an innovation ecosystem and to enhance the role of the private sector to do the same. The Government of India, under the Ministry of MSME, runs various schemes and programs to support technological innovation in Indian SMEs. The support extended by the government includes financial subsidy and incentives to buy machinery, file trademarks, and gain access to tools training, and expert advice, among others.

The low innovation capacity of Indian firms, especially SMEs, has widely been discussed and debated. In spite of this, it is worthwhile to highlight that there are very few systematic studies that have tried to understand innovation in Indian SMEs. Considering this in particular, the chapter tries to answer the following key questions:

1. What is the current state of SME innovation in India including different types of innovation activities, sources, and funding for innovation?
2. What are the key barriers that hinder SMEs in pursuing innovation and their likely impact?
3. How is the current science, technology, and innovation (STI) ecosystem and government policy placed in India to support SME innovation? Is government policy favorable or unfavorable?
4. Are there any enablers that support or help SMEs innovate?

The chapter starts by explaining the methodology to showcase the current state of innovation and barriers being faced by Indian SMEs. It then discusses the existing innovation policy framework and presents the key challenges and enablers of SME innovation. It concludes by presenting key policy recommendations to improve the national innovation system and overall ecosystem for SME innovation in India.

## 4.2 Methodology

This chapter has adopted a mix of empirical analysis and literature review methodology. Empirical analysis was used to assess the current state of innovation in SMEs in India along with the key barriers and enablers. A comprehensive review of public policies and government support programs was done in the context of the identified barriers and enablers to devise effective policy suggestions or recommendations.

The empirical data used in this chapter is sourced from the Indian National Innovation Survey published by the Department of Science and Technology in 2014. The survey covers 9,001 firms across 26 states

and 5 union territories of India. These 9,001 firms are taken from a wider database of 208,415 firms covered in a 2009–2010 survey of industries of India that was primarily focused on the manufacturing sector. As a result, the National Innovation Survey mostly includes manufacturing firms and hence does not adequately reflect the innovation scenario in primary and tertiary sectors of the Indian economy.

SMEs in India are mainly classified on the basis of investment in plant and machinery or equipment, and not on the employee count (Table 4.1).

**Table 4.1: Definition of Micro, Small, and Medium Enterprises, India**

	Manufacturing Sector (Investment in Plant and Machinery)	Services Sector (Investment in Equipment)
Micro enterprise	Does not exceed Rs2.5 million	Does not exceed Rs1 million
Small enterprise	More than Rs2.5 million but does not exceed Rs50 million	More than Rs1 million but does not exceed Rs20 million
Medium enterprise	More than Rs50 million but does not exceed Rs100 million	More than Rs20 million but does not exceed Rs50 million

Rs = Indian rupees.

Source: Government of India, Ministry of Micro, Small and Medium Enterprises.

The Indian National Innovation Survey, however, does not collect information or classify firms on the basis of the investments in plants and machinery. It classifies and defines the firms by workforce size. The firms with fewer than 100 employees are defined as small firms, those with 100–499 are defined as medium firms, those with 500–999 are defined as medium-large firms, and those with 1,000 or more employees are defined as large firms. Out of the total 9,001 firms, 88.1% were small firms, 10.2% were medium firms, 1.1% were medium-large firms, and 0.6% were large firms (Table 4.2).

For the purpose of this chapter, only small and medium-sized firms (fewer than 500 employees) are considered to reflect upon the current state of innovation among SMEs in India. This means that only 8,846 firms are being considered out of 9,001 (Table 4.2). The data is segregated by small and medium firms to help identify key differences in the innovation behavior between the two. It is important to note that firms with fewer than 100 employees also include the micro firms. However,

**Table 4.2: Sample Size in Indian National Innovation Survey by Size of Firm** (employee size)

Firm Size	% of Sample	Number of Firms in Sample
Small firms (below 100 employees)	88.1%	7,928
Medium firms (100–499)	10.2%	918
Medium to large (500–999)	1.1%	96
Large firms (1,000 and above)	0.6%	59
Total firms	100%	9,001

Source: Government of India, Department of Science and Technology. 2014. *Indian National Innovation Survey*.

for the purposes of this chapter it is assumed that micro firms, especially in manufacturing, do not engage in significant innovation activities.

The Indian National Innovation Survey does collect information on barriers faced by SMEs pertaining to innovation by different types of firms. The small and medium firms (employee size <500) only are considered to study the barriers to innovation in order to truly reflect the SMEs characteristics and behavior. Simple percentages are used to illustrate the impact of various barriers on innovative small and medium firms. It is important to note that the majority of the data analysis discussed in the subsequent sections is focused only on the innovative firms. In the case of institutional access, though, all the innovative firms (small, medium, and large) are included because of data availability challenges.

The National Innovation Survey followed the guidelines for collecting and interpreting innovation as published in the Oslo manual (OECD 2005). The survey adopted the subjective approach, which is based on the firm's or production unit's identification of changes made in the product and process. The definitions of innovation, innovation activities, and innovative firms in the innovation survey have been directly adopted from the Oslo manual and are referenced below:

**Innovation:** “An innovation is the implementation of a new or significantly improved product (good or service), process, new marketing method or new organizational method in business practices, workplace organization or external relations.”

**Innovation/Innovative activities:** “It includes all scientific, technological, organizational, financial and commercial steps which actually or are intended to, lead the implementation of innovation.”

**Innovative firm:** “A firm which implements an innovation is called as innovative firm.”

## 4.3 Current State of Innovation among Indian SMEs

As per the Indian National Innovation Survey, innovative firms are defined as follows: “Firms that report different changes in their production, organizational and marketing practices and are engaged in innovative activities.”

The different types of innovations reported by the survey respondents include product innovation, process innovation, product quality and standardization, savings or more efficient use of inputs, use of alternative material in production, and installation of new machines. Around 35.2% of SMEs are found to be innovative in the survey and are engaged in different innovation activities (Table 4.3). Medium-sized firms are found to be more innovative than small firms, possibly due to their larger size and capacity to undertake innovative activities.

**Table 4.3: Innovative Firms by Employee Size**

Firm Size	Number in Sample	Innovative Firms	% of Innovative Firms in the Sample
Small firms (below 100 employees)	7,928	2,736	34.5
Medium firms (100–499)	918	376	40.1
<b>Total SMEs</b>	<b>8,846</b>	<b>3,112</b>	<b>35.2</b>

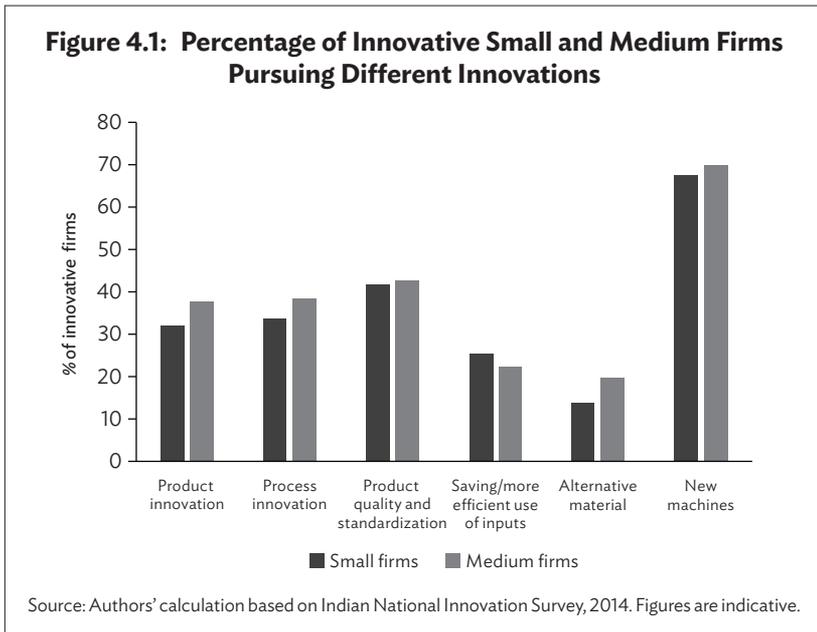
SME = small and medium-sized enterprise.

Source: Government of India, Department of Science and Technology. 2014. *Indian National Innovation Survey*.

The majority of the innovative SMEs are found to be buying new machines, followed by practicing product quality and standardization as a part of their innovation process (Figure 4.1). It is also very evident from the fact that the majority of the firms in the Innovation Survey are manufacturing firms. Medium firms are found to be performing marginally better than small firms in almost all form of innovations.

Firms undertake innovation in pursuit of some specific outcomes. These may include increased productivity, enhanced competitive position, reduced costs, and meeting regulatory compliance in a more effective manner, among others. Each type of innovation is generally linked to specific gains, which serve as the main motivation and reason for the SMEs to innovate.

More than 70% of the innovative small and medium firms gained in terms of increased range of goods and services and improvements in



quality as a result of product innovation. However, innovative medium firms benefited more in comparison with innovative small firms for entering new markets or increasing market share (Figure 4.2).

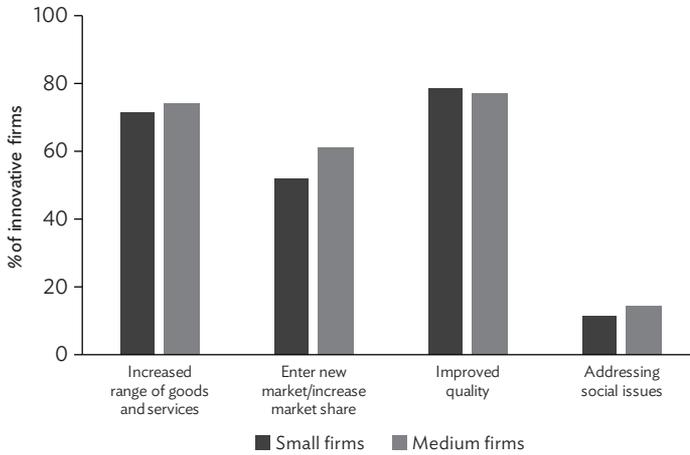
Talking about the gains from process innovations, innovative medium firms are found to be better placed than small firms to increase capacity and flexibility in production and to reduce input costs. The highest impact of process innovation is however seen in terms of enhanced production capacity (Figure 4.3).

The above figures clearly point out that the gains from innovations for SMEs can be multifold and cross-sectional. For instance, any process improvement can result in more productivity and lower waste generation, resulting in reduced costs and environmental hazards. Hence, there is a clear business case for SMEs to be more innovative.

The changes implemented by the firms in pursuit of innovation are attributed to different innovation activities. Such activities pursued by SMEs can be of two types: research and development (R&D) innovation activities and non-R&D innovation activities. R&D-based innovation activities can be either intramural or extramural. Non-R&D innovation activities include acquisition of technology or new machinery, external knowledge, introduction of products to markets, and workforce training.

SMEs generally lack the financial capacity and staff to undertake structured and sophisticated R&D and hence are more likely to engage in

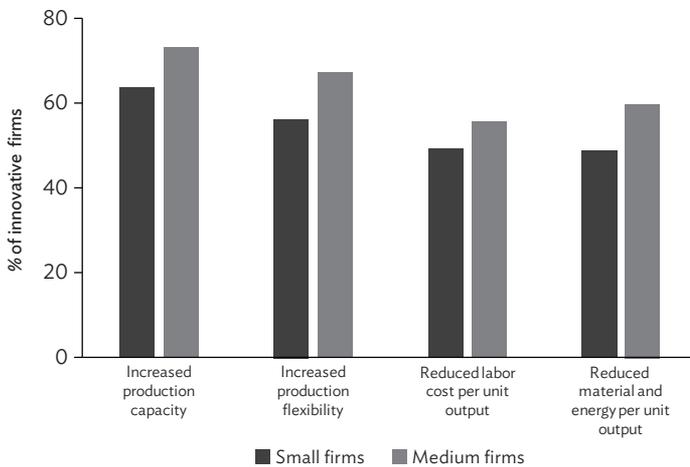
**Figure 4.2: Product Innovation Outcomes—  
Percentage of Innovative SMEs**



SME = small and medium-sized enterprise

Source: Authors' calculation based on Indian National Innovation Survey, 2014. Figures are indicative.

**Figure 4.3: Process Innovation Outcomes—  
Percentage of Innovative SMEs**



SME = small and medium-sized enterprise

Source: Authors' calculation based on Indian National Innovation Survey, 2014. Figures are indicative.

non-R&D innovation. This is especially the case in developing economies such as India. More than 50% of innovative small and medium firms are engaged in non-R&D innovation. Medium firms are found to be more engaged in intramural R&D as compared with small firms. However, the performance in extramural R&D is dismal for both small and medium firms, showcasing the lack of access and interaction with research institutions, laboratories, and public and private universities (Table 4.4). This infers and also points toward the biggest challenges SMEs face to access the formal R&D innovations.

**Table 4.4: Innovation Activities by Innovative Small and Medium Firms**

Firm Size	Non-R&D Innovation (%)	Intramural R&D (%)	Extramural R&D (%)
Small firms	65	33	11
Medium firms	54	45	12

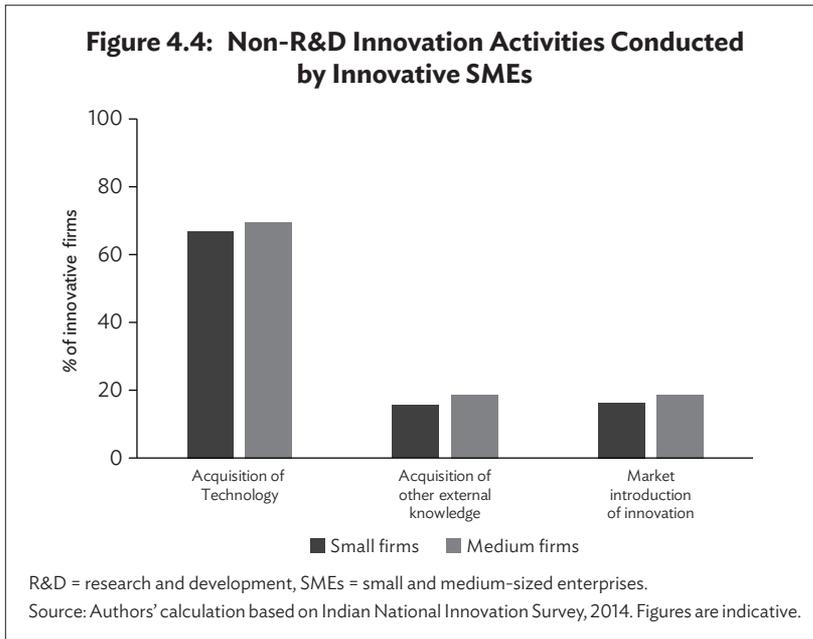
R&D = research and development.

Source: Authors' calculation based on Indian National Innovation Survey, 2014. Figures are indicative.

It is evident from Table 4.4 that non-R&D innovations are the most common innovation phenomena among Indian SMEs. More than 66% of innovative small and medium firms are engaged in the acquisition of technology, mostly in the form of new machines. Manufacturing firms are more likely to invest in technology upgrades in their production process to help expand their market while reducing input costs. Medium firms perform marginally better than smaller firms in acquiring external knowledge and introducing innovative products and services to market. However, these forms of innovation are much less common than technology acquisition among the innovative SMEs (Figure 4.4).

In terms of non-R&D innovative activities, medium-sized innovative firms perform marginally better than small innovative firms (Table 4.5). The acquisition of external knowledge mainly comes in the form of patented technology, know-how, and trade secrets, among others.

There is a much lower but still significant percentage of innovative SMEs that are engaged in introducing their innovative products in the markets. There seems to be a close link between the acquisition of external knowledge and market introduction of innovations, as the former can be used to launch the new products. The acquisition of external knowledge tends to have a significant impact on SMEs as it is directly coupled with the overall product and market strategy of the



firm. Much of the external knowledge apart from patented information remains informal in nature but does act like an invisible hand.

Nontechnological innovations can also be looked at from the perspective of organizational and marketing innovation.<sup>1</sup> Medium-sized firms again performed better in terms of pursuing both these types of innovation, which is most likely due to their better management expertise and ability to hire quality talent (Table 4.6).

To understand the functioning of an innovation system completely, it is very important to ascertain the sources of the innovation. The source of a product or process innovation can be internal, external, or a hybrid, which typically includes collaboration with other firms, institutions, universities, and laboratories. The majority (approximately 80% and

<sup>1</sup> Organizational innovation: A new method related to the firm's ongoing business activities which covers implementation of new or significantly improved management systems and change in the firm's operating structure including integration of different department and business activities. It also includes new or substantial changes in the firm's relationships with other firms and institutions through alliances, partnerships, or any other commercial agreement.

Marketing innovation: Business activities and initiatives taken by the firm to enter new markets. It includes new or significant improvement in designs, extension of the marketing function, and targeting or creating a new market altogether.

**Table 4.5: Non-R&D Innovation Activities by Small and Medium Innovative Firms**

Firm Size	Acquisition of Technology (%)	Acquisition of Other External Knowledge (%)	Market Introduction of Innovation (%)
Small firms	67	16	16
Medium firms	69	18	19

R&D = research and development.

Source: Authors' calculation based on Indian National Innovation Survey, 2014. Figures are indicative.

**Table 4.6: Nontechnological Innovation by Small and Medium Innovative Firms**

Firm Size	Organizational Innovation (%)	Marketing Innovation (%)
Small firms	41	45
Medium firms	52	57

Source: Authors' calculation based on Indian National Innovation Survey, 2014. Figures are indicative.

above) of the innovative small and medium firms use internal sources to develop the innovation (Table 4.7).

Nearly one-third of the innovative small and medium firms use external sources and a very small proportion use collaboration with other enterprises and institutions to source innovations. It can be inferred that Indian SMEs mainly use indigenous methods to develop innovations and are relatively much less dependent on external sources. The miniscule use of collaboration with other institutions points to very low integration of public innovation systems and SMEs, and this remains an area of concern. It is a widely established fact that collaboration with other enterprises and institutions does greatly help SMEs in coming up with new innovations, but this resource remains underutilized in India.

Smaller firms tend to use more domestic sources to acquire technology than do medium-sized firms. Only 4%–6% of the innovative small and medium-sized firms source their technology from either a collaborator or a foreign market. This shows that SMEs in India do not have sufficient access to the foreign market and collaborators to acquire technology. It also suggests that Indian SMEs' exposure to global technological advancements and innovation systems remains

**Table 4.7: Sourcing of Innovation and Technology by Innovative Firms**

Firm Size	Acquisition of Technology (%)	Acquisition of Other External Knowledge (%)
<b>Source of Innovation</b>		
Internal	79	84
External	36	39
Hybrid (with other enterprises, and with institutions such as universities and government labs)	2	1
<b>Acquisition of Technology</b>		
Domestic market	14	11
Acquired from collaborator	5	5
Foreign market	4	6

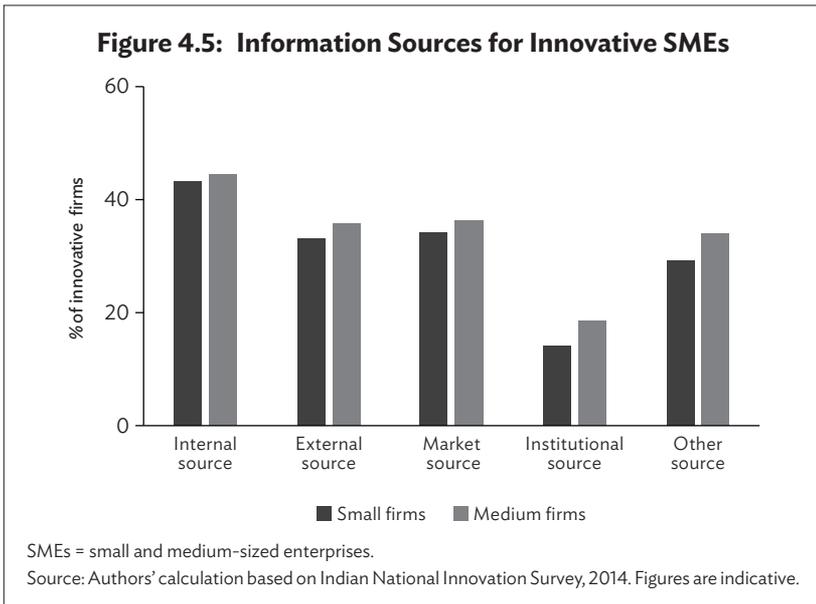
Source: Authors' calculation based on Indian National Innovation Survey, 2014. Figures are indicative.

very limited, unlike in the case of developed economies. The main limiting factors for Indian SMEs to acquire global technologies seem to be financial and human capacity constraints and lack of information.

It is also interesting to see the sources that SMEs use or could use for getting advice, ideas, and general guidance to pursue different innovations. Medium-sized firms perform marginally better than smaller firms in making use of different information sources used in the innovation process. Sources of information for SMEs can be internal, external, market, and institutional, among others. Internal, external, and market sources emerge as the top information sources for innovative SMEs in India (Figure 4.5). Market sources include suppliers, customer feedback, other enterprises, consultants, and private labs and R&D institutes.

The other sources, such as conferences and trade fairs, journals and technical publications, and industry and professional associations, are used by approximately 30% or more of innovative small and medium firms. However, the institutional sources such as universities, colleges, and government and public research institutions are not frequently referred to as sources of information, reaffirming the weak linkage between Indian SMEs and the overarching institutional architecture of innovation support systems.

Financing for innovation remains a critical challenge for SMEs, especially in developing economies such as India. It can be inferred from Table 4.4 that due to financial constraints, SMEs do not pursue

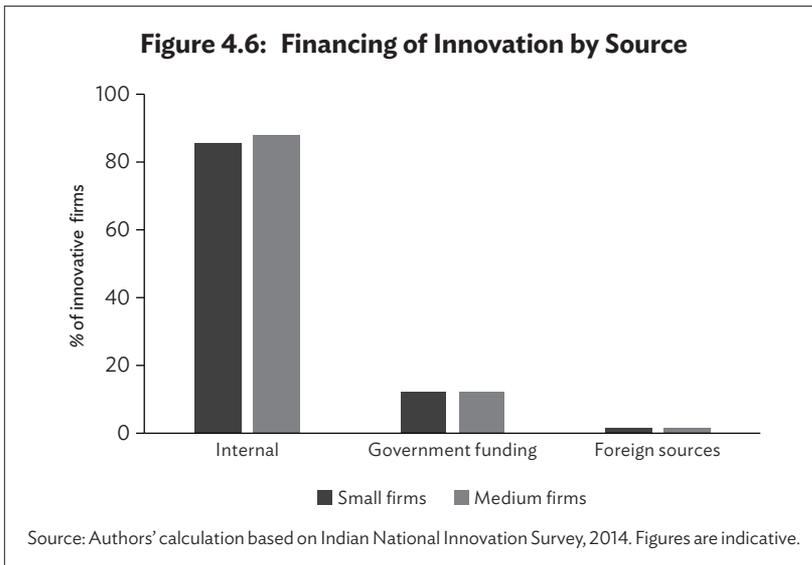


sophisticated R&D innovations and remain focused on non-R&D and incremental innovations. Funds for innovation typically come from three sources: internal (the firm's own financial resources), government, and foreign sources. More than 86% of the innovative small and medium-sized firms use internal financial resources to pursue innovation (Figure 4.6).

Only about 13% of innovative small and medium firms use government funding for innovation. Government funding can come in the form of tax rebates, grants, and subsidized loans. The use of funds from foreign sources is miniscule, which once again reflects the weak linkages of Indian SMEs with the outside world. The funding challenges faced by SMEs remain unique, and large firms are better positioned to exploit the financial opportunities arising from government funding and foreign sources.

#### 4.4 Barriers to Innovation in Indian SMEs

To improve the innovation performance of SMEs, it is very important to understand the key barriers in the innovation ecosystem. The barriers to innovation are classified in six categories: people, financial, information, government policy, infrastructure, and market constraints. The Indian



National Innovation Survey captures the response of the innovative firms for different barriers and sub-barriers. The responses show the factors that firms typically consider to be barriers to pursuing innovation. The barriers are analyzed in the context of innovative small and medium firms; non-innovative firms as classified in the survey are not included.

#### 4.4.1 People and Skills as a Barrier to Innovation

Development and implementation of any innovation demands skilled labor. The need for specialized skills in the form of scientists, technicians, or engineers is more apparent in the case of R&D innovations. Non-R&D innovations, such as organizational and marketing innovations, also require specialized skills and staff who are well versed in management and marketing practices. More than 85% of innovative small and medium firms see unavailability of skilled workers as a barrier to innovation, making it one of the foremost challenges in SME innovation (Appendix A4.1).

SMEs are generally unable to recruit a highly skilled workforce due to financial constraints and lack of adequate infrastructure. This includes internal management. The lack of the right internal management can adversely impact both the firm's innovation capability and its overall performance due to lack of direction, rising inefficiencies, and absence of market focus, among others. More than 38% of innovative small and medium firms perceive internal management as a barrier to innovation.

The situation demands more targeted capacity building programs focused on a company's internal management and its relevance to innovation. There also seems to be a need for a system where SMEs have access to a pool of skilled people for conducting specialized work while addressing concerns about trade secrets.

#### **4.4.2 Finance as a Barrier to Innovation**

The financial barriers mainly involve the availability of internal and external finance and the cost of innovation. More than 87% of innovative small and medium firms see limited availability of finance from both within the enterprise and external sources as a barrier to innovation. The cost of innovation is a key barrier for more than 75% of the innovative small and medium firms (Appendix A4.1). This clearly shows that financial constraints remain one of the biggest barriers to SME innovation.

SMEs in India face a multifold and vicious circle of financial challenges in pursuing innovation. Firstly, the cost of innovation itself is high; secondly, SMEs lack the financial resources to implement innovation; and lastly, access to finance from external financial institutions seems to be limited, creating further bottlenecks. Therefore, there is an urgent need to address this formidable challenge by bringing down the cost of innovation and increasing the availability of innovation capital through banks and other support mechanisms.

#### **4.4.3 Information as a Barrier to Innovation**

Timely access to valuable information is critical for SMEs to gain strategic advantage in pursuing innovation. The inability to access key market information can seriously impair a firm's performance. The information barriers refer to access to information on technology and markets. More than 75% of the innovative small firms and 86% of the medium firms face barriers pertaining to technology information and information on markets in India (Appendix A4.1).

This points toward another serious challenge, the need to upgrade Indian SMEs' access to information about markets and technology. The inability to access such information not only affects SMEs' global competitiveness and exports but also limits their domestic market share. There is a need for the government to take adequate steps, maybe in partnership with local industry associations, to disseminate key market and technology information while focusing on strengthening SME-market linkages.

#### 4.4.4 Government as a Barrier to Innovation

Government policy and the government itself exert a strong influence on the innovation capacity of SMEs. The government has a critical role to play in every sphere of innovation including access to finance and technology, capacity building and human resources, market linkages, availability of research facilities, and access to key information, among others, via different policies and schemes. It would not be wrong to say that the government is the single biggest factor governing the innovation ecosystem of SMEs, especially in the case of developing economies such as India.

Nearly 68% of the innovative small firms and approximately 75% of the innovative medium firms see government policy and meeting government regulatory requirements as a barrier to innovation in India (Appendix A4.1). The perception of the government as a barrier, rather than a facilitator, for such a large number of innovative SMEs is a very serious issue. The Indian innovation survey does not give any detail about the exact responses and reasons for this perception.

India is still ranked 130th globally in the World Bank's ease of doing business index for 2015, which reflects the burdensome regulatory environment in which SMEs operate. The high costs involved in meeting a large number of regulatory requirements tend to negatively affect the innovation capacity of the firms. The role of the government and the likely impact of its MSME policies on SMEs' innovation is discussed in detail in the forthcoming sections.

#### 4.4.5 Infrastructure as a Barrier to Innovation

Availability and access to infrastructure is crucial for R&D-based innovations. The ability of a firm to use laboratories and research facilities inside and/or outside the premises exerts a significant influence on its capability to develop R&D innovations. Close to approximately 50% and approximately 60% of the innovative small and medium firms, respectively, do not have access to adequate infrastructure and test labs (Appendix A4.1) and see it as a barrier to innovation. The limited availability of shared testing laboratories and research facilities is also seen as a barrier to innovation by more than approximately 35% of innovative small and medium firms.

This points toward the acute shortage of research infrastructure, including testing laboratories, for SMEs in India. It is unlikely that SMEs would have sufficient financial muscle to invest in the development of quality in-house research and testing laboratories. Therefore, it is imperative for government and industry to facilitate the development

of more shared research and testing laboratories, especially in key manufacturing clusters.

#### **4.4.6 Market Factors as a Barrier to Innovation**

Market factors have an important role to play in innovation. Market characteristics such as competition, protectionist nature, dominance and monopoly, and demand, among others, affect a firm's ability to innovate, especially product- and market-related innovations. Of the innovative small and medium firms, 50%–58% see protectionist measures for introducing new products and processes and lack of new opportunities to enter niche markets as barriers to innovation (Appendix A4.1).

More than half of the innovative small and medium firms also face the barrier of uncertain demand for innovative products and services. Given the uncertain demand, SMEs would be reluctant to invest their resources in developing new products and would focus instead on improving their production and quality processes. Innovative products generally are aimed at a niche market that is often not clearly visible or present, and hence tackling these market-related challenges becomes very important. This also greatly hampers product and design innovation, which at times plays a critical role in elevating the exports and global market share of the SMEs.

The uncertainty in demand again points toward the weak market linkages and thin integration of Indian SMEs in the global value chain. The protectionist nature of the market, due to either a monopolistic nature or intellectual property rights (IPR) issues, presents a tough challenge for SMEs. IPR in general remains an area of concern and development among Indian SMEs. There is a need to focus on capacity building programs to train SMEs to identify market potential and devise an appropriate entry strategy while addressing the IPR issues.

### **4.5 Institutional Access and SME Innovation in India**

Innovation does not occur in silos. It happens with close interaction between a firm that wants to pursue innovation and the support systems that assist the firm in securing technology, skilled staff, and knowledge and market opportunity. The whole innovation process works like an ecosystem involving firms and support mechanisms provided by government, foreign players, and other entities.

The strength of the innovation ecosystem often reflects the innovation capacity of the firms. Good institutional support is a critical part of the wider ecosystem for supporting SME innovation. However, it is important to understand that just offering institutional support alone will not foster innovation. It is equally crucial to ensure that the operating firms are aware of different institutional support mechanisms and are able to access them. “Institutional support” is primarily referring to the entities that are engaged in extending assistance to SMEs, such as government bodies, universities, R&D institutions, and banks. The role of institutional linkages is very relevant to India.

The Indian National Innovation Survey showcases the use of institutional support among innovative firms operating in different states and union territories. The data show a wide disconnect between the innovative firms and institutional support. “Innovative firms” here refers to all innovative firms covered in the Indian National Innovation Survey irrespective of their size. Educational institutions as an institutional source of knowledge are used by an average of 31% of innovative firms across different states and union territories in India. In about 20 of the 30 states and union territories, less than 30% of innovative firms access educational institutes as a knowledge source (Appendix A4.2). The situation is a bit better in the use of R&D institutions. Around 40% of innovative firms on average use R&D institutions as a knowledge source across different states and union territories covered in the survey. There is a huge opportunity to increase firms’ innovation capacity by promoting and increasing the use of institutional sources for gathering required information and knowledge on both technological and nontechnological aspects of innovation.

The situation is more challenging in terms of accessing institutional sources of finance and training by SMEs in India. Less than 20% of innovative firms access institutional sources of finance in India, except in the state of Madhya Pradesh. This reaffirms the formidable challenge of innovation financing for SMEs in India. Access to institutional sources for training is also in the same deplorable state, with less than 20% of innovative firms using it across all states and union territories covered in the survey (Appendix A4.2). On average, less than 7% of innovative firms access institutional sources for both finance and training across different states and union territories in India.

It is important to note that these percentages only reflect the use of institutional sources by innovative firms, which make up just one-third of the total firms. The state of affairs looks even more dire if viewed from the perspective of total firms. Clearly, there seems to be an urgent need to improve SMEs’ access to institutional sources for their different needs. This can be done by both promoting existing institutions and opening

new ones supporting SME innovation. The government policy needs to be cognizant of the current situation and frame the institutional support mechanisms accordingly.

## 4.6 Science, Technology, and Innovation in the Indian Context

The use of the word “innovation” in the national science and technology policy lexicon is rather new. India’s Scientific Policy Resolution 1958 sought the “cultivation of science and scientific research in all its aspects.” The focus was on “early and large scale development of science and technology” for the wealth and prosperity of the nation.

The 1983 Technology Policy Statement focused on the need for technology competence and self-reliance. It also mentioned technology acquisition and transfers, as well as a critical facet that was hitherto missing from policy debate in India—implementation.

The idea of innovation was inserted in the Science and Technology Policy 2003 with a view to strengthening the national R&D infrastructure and creating a “national innovation system.” Innovation implies science- and technology-based solutions that are successfully deployed in the economy or the society. Also mentioned was the need to develop and leverage India’s traditional knowledge, as well as to generate and manage India’s intellectual property resources. Monitoring for speedy implementation of the policy was also given weightage.

The most recent Science, Technology and Innovation (STI) Policy 2013 in India is the most comprehensive policy statement from the point of view of India’s STI policy framework. It mentions the deepening of the science and technology system in India, and recognizes that the “instrument of policy” has not given due importance to innovation. India accordingly declared 2010–2020 as the “decade of innovation” and took the important step of establishing the National Innovation Council. It also alludes to the need to understand that science, technology, and innovation are not disconnected from each other—they need to be integrated for new value creation. In addition, the policy focuses on creating an innovation ecosystem that is inclusive, and it promotes mechanisms like “small idea–small money” and “risky idea funds” to support incubators. The policy also talks about “STI driven entrepreneurship” with viable and scalable business models. Another important point is the policy’s focus on promoting academic and industry linkages. In terms of the manufacturing sector, it emphasizes high-tech exports while recognizing the low R&D intensity among SMEs.

Several positive changes that were envisaged in the STI Policy 2013 have been realized. These include an increase in India's gross expenditure in research and development from under 1% of GDP in 2013 to 2% of GDP, which had been a national goal for some time before the policy was in place.<sup>2</sup> For this to happen, the policy expects private sector R&D investment to at least match public sector R&D investment, compared with a ratio of around 1:3 in 2013. India's considerable progress is reflected in global rankings; it ranks 9th in the number of scientific publications and 12th in the number of patents filed. While these show considerable maturity of the science and technology ecosystem, the fact remains that the Ministry of Science and Technology understands the technology landscape in quite broad terms. The major policy resolutions and their impact on small-scale industries are provided in Appendix A4.3.

## 4.7 Present MSME and Science, Technology, and Innovation Systems

### 4.7.1 Present STI System

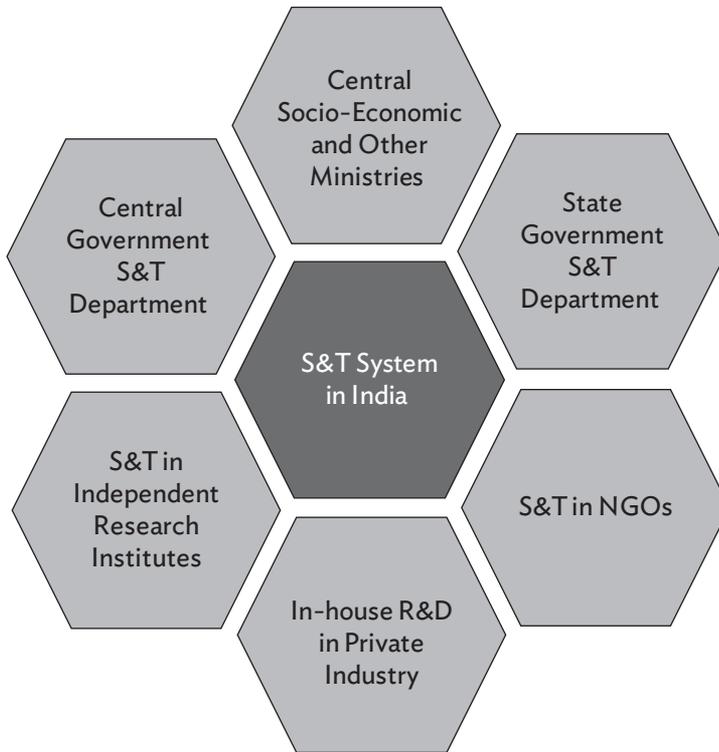
At present the science and technology ecosystem in India is defined in quite broad terms. The science and technology system in India comprises the broad institutions shown in Figure 4.7.

Among these central departments, the Department of Science and Technology has the primary task of formulating science and technology policy and promoting thrust areas for research. It is also entrusted with science and society programs as well as with international collaborations. The Council of Scientific and Industrial Research with its 40 institutions and laboratories is the major organization coming under the Department of Scientific and Industrial Research. The council's major aim is to strengthen and support R&D through industrial programs and other activities. Apart from these, the research infrastructure for scientific research is present in a large number of universities (Figure 4.8).

Under the Department of Science and Technology in FY2014, the Technology Information, Forecasting and Assessment Council (TIFAC) did some work pertaining to bringing innovations from lab to market. TIFAC has also done MSME cluster mapping and completed 22 technology gap analyses so far. The Department of Scientific

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<sup>2</sup> The policy does not indicate specifically the year in which the 2% target is to be achieved, but it implies that it should be reached by 2018.

**Figure 4.7: Present Science and Technology System in India**

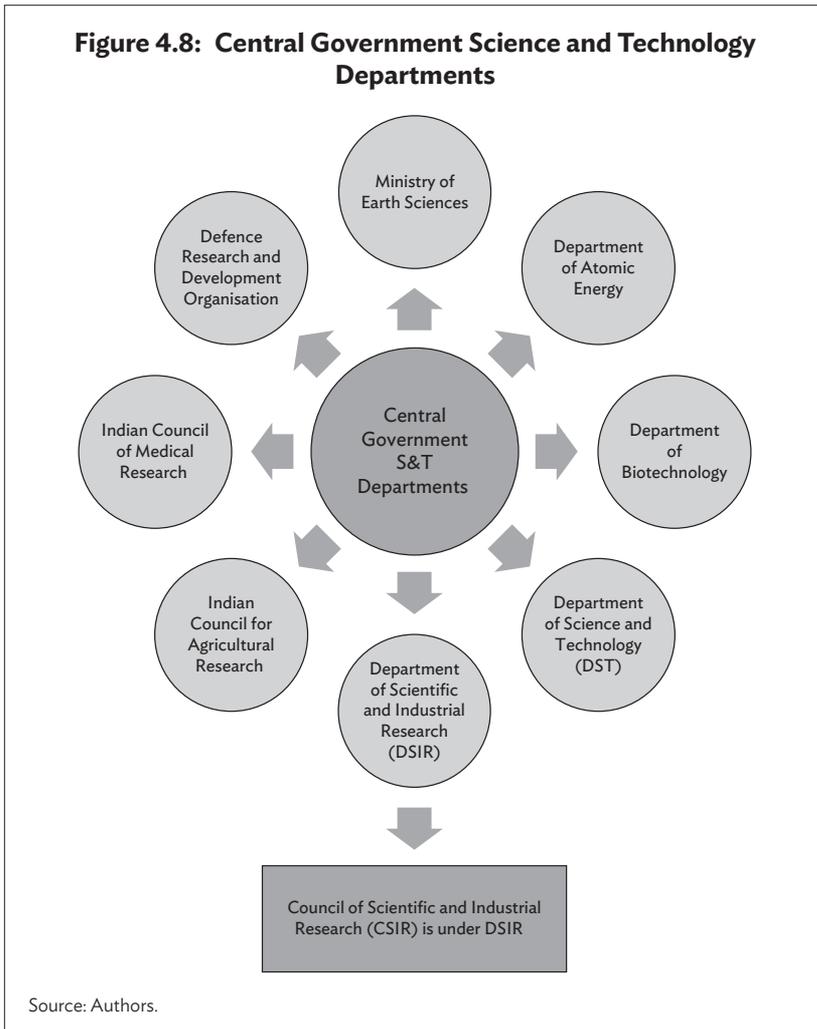
NGO = nongovernment organization, R&D = research and development, S&T = science and technology.

Source: Government of India, Department of Science and Technology. S&T System in India. [www.dst.gov.in/st-system-india](http://www.dst.gov.in/st-system-india)

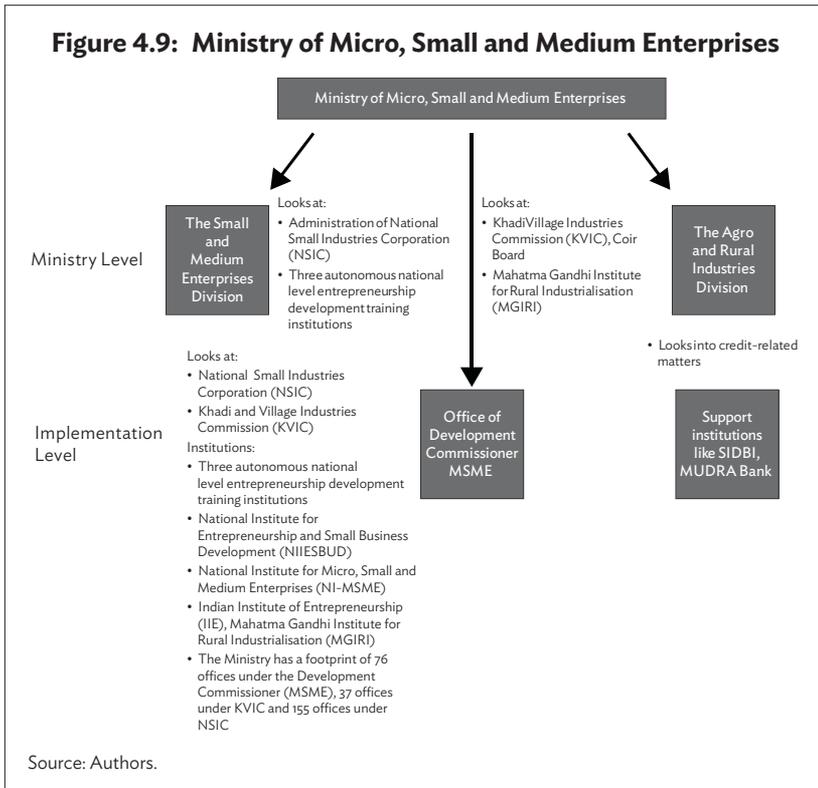
and Industrial Research also launched a new program, Promoting Innovations in Individuals, Start-ups and MSMEs (PRISM), during India's Twelfth Five Year Plan and the department supported 17 projects in FY2014.

#### 4.7.2 Present MSME System

The Government of India looks at small and medium enterprises (SMEs) under the Micro, Small and Medium Enterprises Development Act 2006, which seeks to develop and enhance the competitiveness of MSMEs as a



whole. In the act, for the first time the concept of “enterprise” included both manufacturing and services firms. Also described in the act for the first time is the concept of “medium” enterprises. The MSME ecosystem is administered through the Ministry of Micro, Small and Medium Enterprises, which has, broadly speaking, two major divisions. These include the Small and Medium Enterprises division and the Agro and Rural Industries division. A description of the present MSME system is given in Figure 4.9.



## 4.8 Reasons for Perception of Government Policy as a Barrier

Despite this overarching framework for MSMEs and STI, several problems are seen within the government policy context:

According to the Fourth All India Census of Micro, Small and Medium Enterprises,<sup>3</sup> roughly 96% of MSMEs are unregistered, which results in their exclusion from most programs and schemes of the government. Most MSMEs are unregistered because of long delays in the registration process. This may partially explain why MSMEs view government policy as a barrier rather than an enabler. The government is working toward easing this and has created a simplified procedure for registering an MSME unit online through the Udyog Adhaar Scheme.

<sup>3</sup> The census took FY2006 as the base or reference year. The data was collected until 2009 and the results were published in 2012.

Second, within the central government's policy on STI, the thrust of the institutions is still very much on high-end technical and technological research, which may be of use to multinational and public sector enterprises but does not find consonance with the demands of the MSME sector, especially the unorganized sector. Though both the Council of Scientific and Industrial Research and the Indian Institute of Science have worked with MSMEs, the scale of operations is far less than what is required. The case is similar with technology business incubators. A few have been operational but there is much more potential to be harnessed in terms of industry interactions and improvement of functioning as well as establishing new technology business incubators.

Third, within the government policy pillar is the low collaboration within as well as among government departments, universities, and MSME entities. Within the government departments, the goals of the research institutions and the unorganized MSME sector often do not match. The national labs often end up producing patents and high-end technical inventions which the unorganized MSME sector is simply incapable of buying or sourcing. At present too much focus is put on R&D. The majority of the innovations in SMEs are non-R&D innovations, which institutions often ignore. And even when MSMEs have the buying capability, usability can be an issue.

Fourth, another major point hindering innovation is that within the government policy framework, some of the previous institutions are simply defunct, which in turn causes the policy and implementation to flounder. Two examples that come to mind from a policy viewpoint are the National Innovation Council and the National Manufacturing Competitiveness Council. Both of these institutions have seen resignations and no new appointments have been made since the new government was elected. The functioning of these institutions is important for innovation to take root in the MSME policy. The challenge of innovation within MSMEs is also with respect to continuity in government policy. These institutions must see new appointments and new members to carry out their crucial role on the innovation and policy front. There is also a need for greater government transparency and accountability for addressing the sector's issues pertaining to innovation.

Fifth, access to financing is again to an extent determined by the government policy. A recently established institution for solving the problem in the MSME space is the MUDRA Bank, but it is too early to talk about the relative merits and demerits of its functioning. In the case of access to finance, the Reserve Bank of India issues guidelines to the banking sector for lending to priority sectors. MSME is a priority sector precisely because it is employment intensive. The Reserve Bank of India's directive to the banking sector includes implementing the recommendations of the Prime Minister's task force on the MSME

sector submitted in 2010. It mentioned the need for the banks to achieve 20% year-on-year growth in credit to micro and small enterprises, 10% annual growth in the number of microenterprise accounts, and 60% total lending to the MSE sector to be channelled to microenterprises. The public sector banks have also been advised to open specialized branches for MSMEs. As of March 2014, there were 2,887 specialized branches for MSMEs. Also, collateral-free loans are mandated for MSMEs up to a limit of Rs1 million. Cluster financing is also available. The problem thus does not seem to pertain to policy in this regard but to its implementation. If MSMEs find it difficult to avail themselves of loans, it is due to either a lack of awareness among MSMEs or the fact that banks find loopholes in these directives. Another major point within the MSME ecosystem for promoting technology development and access to finance is that seed and angel funding is still not as mature as later stages of venture capital and private equity in India, which inhibits growth of start-ups.

Sixth, as noted in the National Innovation Survey Report (CSIR 2014), another major challenge on the government policy front is that MSMEs' access to institutional facilities that support innovation, like institutional finance and institutional training programs, is generally very low, indicating a disconnect between the innovation infrastructure and the production system.

Seventh, another major challenge within the government policy pillar pertains to the regulatory architecture and the transaction costs for MSMEs. According to the list given in the Ministry of Labour and Employment's annual report for 2014–2015, there are presently 44 central laws pertaining to labor regulation in India. In addition, there are some 160 state-level enactments containing supplementary provisions (Papola 2013). Most times it makes the functioning too problematic and the transaction costs are very high. This leads to a perception of government as an inhibitor rather than a supporter. For example, the laws pertaining to the factory sector (defined in India as a firm having more than 10 workers) often require considerable legal documentation and process. That is how the government policy causes MSMEs to remain small and outside the registration ambit. It also acts as a hindrance to the growth of innovation in MSMEs as economies of scale bring addition resources for innovation.

## 4.9 Enablers of SME Innovation

Innovation has many enablers that are related to both internal and external environments. The internal environment covers the company's operations, market strategy and vision, skills, creativity, and quest

for innovation, among others. The external environment includes industry factors, policy environment, support mechanisms, availability of skilled labor, etc. The intensity of the effect of internal and external environmental factors on innovation is likely to vary depending on the stage of economic development of the country, industry maturity and sophistication, and direction of government policy.

The data from the India Innovation Survey suggest that the internal environment of SMEs is the key enabler of innovation. The majority of the innovative SMEs use internal sources for pursuing innovation. The acquisition of new machines as the most dominant form of innovation can be seen as a result of SMEs' internal push and motivation to improve productivity. Among non-R&D innovations, the significant use of organizational and marketing innovation showcases the entrepreneurial spirit among Indian SMEs. To add to that, internal financing remains the major source of innovation financing among SMEs in India.

These facts and observations infer that the intrinsic zeal to innovate and remain competitive in the market plays a major role in innovation for India's SMEs. The role of internal factors becomes even more crucial in a scenario where government policy in itself is seen as a major barrier to SME innovation, as it is in India. This also suggests that innovation may always persist in some form or other independent of the external environment.

On the external front several challenges are observed. These include access to requisite information, policy gaps between requirements and what is offered, and the magnitude of the challenge from the government's viewpoint. Enablers on the government policy front include designing systems and schemes that enable upgrading of the existing firms or cluster of firms and helping them compete in the domestic and international economy. These schemes have to be routed through institutions that have the scale to enable proper institutional support to MSMEs. Platforms like the National Innovation Foundation, which seeks to map innovations and work with innovators to help them scale up their innovation, thus is a good model for addressing this anomaly by bringing together the investor and the innovator on the same platform.

## **4.10 Recommendations for the Removal of Barriers to Innovation**

The creation of an action plan for SMEs is required to achieve broad innovation objectives. Detailing the contours of overall MSME

innovation policy is critical. Several barriers and the policy context act as reasons for the perception of government as a barrier to innovation. Below are several recommendations for embedding innovation in the country's SME ecosystem, clustered under five broad categories.

#### 4.10.1 People and Skills

- Change the laws and regulations that cause negative impacts for the overall growth of the MSME sector and its innovation, such as specific labor regulations pertaining to factories.
- Promote capacity development programs and vocational education and training which have innovation as part of their curriculum.
- Utilize the architecture of SMEs presently in place to train people on innovation and how to avail themselves of the benefits of innovation schemes.
- Because management skills are largely missing, establish a dedicated SME university for skill development, which has courses for education on issues pertaining to innovation in SMEs.

#### 4.10.2 Finance

- Ensure credit flow is maintained through government schemes and market mechanisms through the banking channels in the country. The schemes need to expand to meet the demand of the sector.
- Ensure adequate support mechanisms exist for entrepreneurs who are willing to establish small enterprises. The Start-up India plan is a step in the right direction.
- Create an innovation fund under the Ministry of MSME which can help provide financing to SMEs, especially for supporting innovation.
- The recently started Micro Units Development & Refinance Agency Ltd. (MUDRA) should have a dedicated fund for innovation in SMEs.
- The definition of innovation has to be clearly defined and low-interest loans should be provided by the banks for innovation activities. The Reserve Bank of India can issue guidelines in this regard.

### 4.10.3 Support for Marketing Activity

- Set up industry associations and tie up the marketing side of SME clusters with government to create value across the value chain.
- Utilize existing centers for providing access to information on Indian and external markets for innovative products and on how SMEs can benefit from this information. Reports can also be made publicly available to inform people of the potential of a particular product market in India and abroad.
- Sponsor dedicated days when SME owners can discuss their products with experts and consultants who can help them better understand consumer demand and emerging trends.
- Move toward demand-driven and market-driven models of SME innovation rather than just R&D-focused innovation models. What is required for innovation is not just R&D but a gamut of activities, such as finding linkages to suitable markets.
- Promote cluster development mechanisms in line with successful cluster development programs elsewhere. This will help boost the marketing side of innovation.

### 4.10.4 Government Framework and Institutional Access

- Establish a center of excellence for innovation in the Ministry of MSME or its attached offices to help promote a culture of innovation.
- Ensure that adequate numbers of policies are in place; the scale and benefits of the policies may be reviewed from time to time keeping in view the requirements of the sector.
- Reduce the information asymmetry between different government departments and enable collaboration at all levels—from the ministry and department level down to the institutional, cluster, and firm levels. This means more collaboration between government research departments, the private sector, people engaged in production processes, and entrepreneurs at the grassroots level.
- Set up more institutions, such as the National Institute for Micro, Small and Medium Enterprises and the Entrepreneurship Development Institute in Ahmedabad, that can help in scaling up current programs for greater scope and depth in helping individual firms and clusters.

#### 4.10.5 Technological Development and National Innovation Architecture

- Look at institutions and programs that can help promote science, technology, and innovation in the existing context.
- Cluster development programs: Develop R&D centers for particular clusters. The government has already carried out a large number of cluster requirement studies. A common facility or center can support R&D as well as capacity building for members of the cluster. Clusters can also be virtually connected to other clusters and avail themselves of information on intellectual property rights.
- Take measures for upgradation of machines, funding of technology by banks, and technology development by national labs and align innovation requirements of SMEs with the Department of Scientific and Industrial Research.

### 4.11 Conclusions

Despite the numerous challenges, the SME sector in India has performed well. There are distinct barriers to innovation, the most important of which seems to be government policy. This leads to the adage that “entrepreneurs grow not due to the government in India, but despite the government.” However, a deeper analysis leads one to conclude that the government is trying to facilitate the growth of SMEs by promoting various schemes and programs to facilitate innovation in the sector through its distinct institutions. The Science, Technology and Innovation Policy 2013 has had an impact but the institutional functioning of the government, Council of Scientific and Industrial Research labs, and individual firms often does not match. The scale of operations in both the public labs and the private research institutions need to be ramped up for greater reach and support to SMEs. Another major finding is that some programs, like the Cluster Development Program, can be expanded to provide greater access to more individual firms within the cluster. Modernization and technology upgrading along with innovative methods of capacity building and marketing of products are necessary. A holistic and separate innovation policy for the SME sector can also be made to promote innovation. The policy, institutions, and supporting framework have to be improved to remove SMEs’ perception that government is limiting their success. Over time, this can be done with the proactive participation of experts and policy makers to benefit India’s SMEs.

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### Appendix A4.1: Barriers to Innovation Faced by Innovative Small and Medium Firms (%)

	Innovative Small Firms	Innovative Medium Firms
<b>Financial</b>		
Finance from own enterprise	87	89
Finance from outside source	69	70
Innovation cost	75	77
<b>People and skills</b>		
Availability of skilled labor	89	86
Management/People	38	46
<b>Information</b>		
Technology information	76	87
Information on markets	76	87
<b>Government</b>		
Government policy	68	74
Meeting government regulatory requirements	68	74
<b>Infrastructure</b>		
Availability of infrastructure/test labs within enterprise	48	58
Available facility sharing of test labs/research labs	35	45
<b>Market</b>		
New opportunities to enter niche market	50	58
Protection barriers for new products/processes	50	57
Uncertain demand of innovative goods/services	53	57

Source: Authors' calculation based on Indian National Innovation Survey, 2014. Figures are indicative.

## Appendix A4.2: Access of Institutional Support by Innovative Firms (%)

	Educational institution as source of knowledge	Research and development institution as source of knowledge	Access to institutional source of finance	Access to institutional source for training
Andhra Pradesh	6.1	15.5	14.1	0.5
Assam	71.7	79.3	5.7	7.7
Bihar	19.0	19.0	1.0	20.0
Chhattisgarh	29.6	29.6	0.0	20.0
Delhi	19.8	20.9	6.6	2.2
Goa	12.2	36.6	8.5	3.7
Gujarat	89.6	87.5	2.3	16.7
Haryana	11.0	11.3	1.4	3.4
Himachal Pradesh	25.9	25.2	6.2	16.0
Other	45.8	43.8	14.6	6.3
Jharkhand	3.3	4.8	1.5	15.1
Karnataka	4.3	18.6	0.4	3.9
Kerala	4.8	16.3	0.0	1.2
Madhya Pradesh	76.0	80.0	30.0	0.0
Maharashtra	59.6	62.3	17.7	12.3
Meghalaya	80.0	70.0	0.0	0.0
Nagaland	33.3	33.3	0.0	0.0
Odisha	18.1	33.0	0.0	10.0
Punjab	37.7	47.2	5.7	7.6
Rajasthan	15.3	12.9	8.1	0.8
Sikkim	63.8	76.6	0.0	18.6
Tamil Nadu	2.6	4.5	1.3	0.1
Tripura	45.9	80.0	0.0	0.0
Uttar Pradesh	67.6	75.7	18.9	2.7
Uttarakhand	30.0	30.0	6.7	0.0
West Bengal	22.9	28.0	14.3	9.9
A & N. Island	0.0	60.0	0.0	0.0
Chandigarh	25.0	25.0	0.0	0.0
Dadra & N Haveli	17.1	47.4	1.1	1.3
Daman & Diu	6.0	18.1	1.1	5.3
Puducherry	16.4	22.6	0.6	6.9

Source: Government of India, Department of Science and Technology, 2014. *Indian National Innovation Survey*.

### Appendix A4.3: Industry Policy Statements and Their Impact on Small-Scale Industries

Industrial Policy Resolution, 1948	The policy resolution mentioned the factors that could help build local self-sufficiency and improve small-scale industries (SSIs). These included factors like provision of raw materials, cheap power, technical advice, organized marketing of their products, and, if necessary, safeguards against intensive competition by large-scale manufacturers, as well as worker education in the use of the best available technique.
Industrial Policy Resolution, 1956	The policy stressed the role that cottage, village, and small-scale industries could play in the development of the national economy. Also mentioned were the advantages that SSIs offered like large-scale employment, equitable distribution of resources, and restricting unplanned urbanization.
Industrial Policy Statement, 1977	Increased the items reserved for production by SSIs from 180 to 500 and called for establishment of district industries centers, which would assist in the development of household industries as distinct from SSIs. Also stressed (i) development and application of appropriate policies in India, and (ii) development of indigenous technology as far as possible.
Industrial Policy Statement, 1980	The policy emphasized the need for creating ancillary units and redefined the investment limits for small-scale units. Also stressed the need for better access to finance for small enterprises, continued the reservation under the 1977 resolution, and extended marketing support to SSIs.
Post 1991 period	The period saw several changes in the way MSMEs function. These include coming to terms with the fact that SMEs have to remain competitive in the face of increasing competition. Technological prowess of SMEs started to increase due to the increasing competition. Some important legislation during the period focuses on removal of items from the list of those reserved for production solely by SSIs, among others. The liberalization of industrial policy along with the liberalization of trade and opening of sectors paved the way for greater de-reservation of items previously reserved for SSI's. Several papers and committee reports suggested that a policy of de-reservation should be followed.

MSMEs = micro, small, and medium-sized enterprises; SSI = small-scale industries.

Source: Government of India, Ministry of Micro, Small and Medium Enterprises. India's Industrial Policies from 1948 to 1991. [www.dcmsme.gov.in/policies/iip.htm](http://www.dcmsme.gov.in/policies/iip.htm)

# 5

## Dynamics of Innovation and Internationalization among SMEs in Viet Nam

*Long Q. Trinh*

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### 5.1 Introduction

Innovation and exports are related to national competitiveness at the macro and micro levels (Cassiman and Martínez-Ros 2007). At the macro level, innovation is an important measure for industry and country-level growth and exports are an indication of national competitiveness. At the micro level, economic theory suggests that innovation is the driving force behind export activity. A growing body of literature is exploring firm internationalization and innovation activities. However, most of the current studies usually consider one of these activities to be determinant of the other (Esteve-Pérez and Rodríguez 2013).

Empirical evidence has shown that exporting firms are more productive than non-exporting firms (Wagner 2007; Greenaway and Kneller 2007). Some recent literature suggests that this difference is partly explained by the greater engagement of exporting firms in innovation activities. Moreover, evidence also shows that innovative firms are likely to internationalize. Grossman and Helpman (1991) and Aw et al. (2008 and 2011) have provided a theoretical foundation for the interdependence of internationalization and innovation at the firm level. Empirically, there are a growing number of studies that examine this relationship (e.g., Cassiman and Martínez-Ros 2007; Nguyen et al. 2008; Damijan et al. 2010; Becker and Egger 2013; Löff et al. 2014). Most of these studies use data from developed economies; we have limited knowledge on this issue in developing countries in general and among small- and medium-sized enterprises (SMEs) in these economies in particular.

This chapter examines the dynamics of internationalization and innovation at SMEs in a developing country. More specially, we address whether there is persistence (i.e., over time) in the innovation and internationalization decisions of SMEs and whether this persistence, if any, is “true” or spurious. We also examine whether the persistence of one activity determines the persistence of the other activity when the persistence is present in both activities. Following Cassiman and Martínez-Ros (2007), Becker and Egger (2013), and Damijan et al. (2010), we distinguish two types of innovation: product innovation and process innovation. For internationalization, we consider a firm to be internationalized if it either exports goods to foreign markets or sells output to foreign investment firms (so-called domestic export). To this end, in this chapter we use a large SME firm-level dataset, collected biannually from 2005 to 2013 in Viet Nam.

Our results show a high persistence in carrying out process and product innovations and in engaging in international activities. Furthermore, we find that, for non-micro firms (i.e., with six or more full-time, permanent workers), past internationalization has a positive effect on process innovation but past process innovation does not have a significant effect on internationalization. For these firms, we also find signs of cross-dependence between process innovation and internationalization. Our results, however, do not show dynamic interdependence between internationalization and product innovation. For micro firms, we do not find any evidence of interdependence between internationalization and either type of innovation. However, past internationalization does have a negative effect on process innovation of these micro firms. The result also indicates a cross-persistence in these activities, although such cross-persistence is not high.

This chapter makes a contribution to the literature in three ways. First, although there are a growing number of studies that examine the dynamic interdependence of innovation and export decisions, there is rather little evidence on this issue for SMEs in developing countries. In previous studies, SMEs are usually ignored (Monreal-Pérez et al. 2012). This is due to (i) the conventional view that SMEs do not have adequate resources to conduct and manage innovation activities, and (ii) a lack of firm-level data on SMEs (Majocchi and Zucchella 2003; Wignaraja 2008). Our data can be used to examine the dynamic interdependence of innovation and internationalization among SMEs in the context of developing economies.

Second, our data also allows us to determine bidirectional causality between internationalization and product and process innovation. Product innovation and process innovation are two different concepts

and play different roles (Cohen and Klepper 1996; OECD 2005). While process innovation reduces the cost of production and enhances productivity, product innovation gives firms a competitive advantage by introducing new or improved goods to the market (OECD 2005). And thus, the relationship between each type of innovation and exporting may be different. A large share of the literature views innovation in terms of expenditure for research and development (R&D) and thus cannot distinguish the roles of process and product innovation. Other studies look separately at either product innovation or process innovation, and very few look at the relationship of both with internationalization.

Finally, we use a broader interpretation of internationalization than most studies. We define a firm as internationalized if it not only exports products but also sells products to foreign direct investment firms operating in the country. Firms that have technical cooperation with foreign firms or import their inputs are also defined as internationalized. Ottaviano and Martincus (2011) and Bøler et al. (2012) suggest that innovations are not only linked to exports but other internationalization activities such as sourcing from abroad. While exporting incurs large sunk costs that may discourage many domestic firms, especially smaller firms, selling to multinational corporations operating in the country can be a channel that helps firms improve productivity and encourages them to innovate. Using this broader definition of internationalization has significant policy implications. The results may help governments design appropriate policies to integrate SMEs into the global value chains, not only directly by exporting but also indirectly by joining chains domestically.

In general, the approach we use in this chapter is similar to the one used in Higon and Driffield (2011) and Esteve-Pérez and Rodríguez (2013). But there are some aspects that distinguish our chapter from these papers: we look at innovation output and use a broader definition of internationalization in the context of a developing country. Finally, our chapter uses panel data, which allows us to examine the dynamics of these two decisions, while Higon and Driffield (2011) use cross-sectional data for the UK. This chapter is complementary to Nguyen et al. (2008), which also examines the bidirectional causality of exporting and innovation; however, that paper uses cross-sectional data,<sup>1</sup> thus they could not examine dynamic interdependence.

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<sup>1</sup> The first cross-section of data in our sample (2005) is the same as Nguyen et al. (2008).

## 5.2 Theoretical Foundation and Related Literature

### 5.2.1 Theoretical Foundation

For a long time, various macroeconomic models suggested a bidirectional causality between internationalization and innovation. Traditional trade theory such as Vernon (1966) and Krugman (1979) suggested a positive relationship between innovation and exports and that innovation is the driving force behind a firm's internationalization. Trade theory models argue that because internationalization incurs a high entry cost, only those firms that are more productive, have lower costs, and have higher profit margins are able to internationalize. Innovation is considered the major source of productivity differences between internationalized and non-internationalized firms. Meanwhile, endogenous growth models predict that the causality runs from internationalization to innovation (Grossman and Helpman 1991). There are a number of reasons that explain the causality between innovation and internationalization. First, exposure to international markets and selling to multinational corporations may increase the pool of knowledge and technology of local firms. This facilitates the innovation process of the internationalized firms. Second, stronger competition in international markets forces firms to innovate and adapt to market conditions (Wagner 2007). Third, innovating firms have incentives to expand to other markets to earn higher returns (Teece 1986). Fourth, internationalization could reduce the cost associated with innovation by providing access to the cheapest available sources of R&D inputs (Kotabe et al. 2002).

Recent heterogeneous firm theories further strengthen the argument that the relationship between internationalization and innovation is bidirectional. For example, the model by Costantini and Melitz (2008) shows that innovation and exporting are the result of the endogenous choices of firms. Their drivers are a priori unclear: firms may innovate in anticipation of exporting or may start exporting after successfully innovating. In the latter case, innovation is one of the steps for embarking on export activity, which gives rise to observed self-selection effects.

### 5.2.2 Empirical Literature

#### From Innovation to Export

A large number of empirical studies have examined the effect of innovation on exporting. While some studies do not find a positive and significant impact of innovation on export performance (Wakelin 1998 for the United Kingdom (UK) and Alvarez 2007 for Chile), most of them

do. For example, using firm-level data from the United States, Bernard and Jensen (1999) find substantial evidence that successful product innovations lead to exporting. Cassiman et al. (2010), using probit models and instrument variables to deal with endogeneity of innovation, find that product innovation increases the probability of exporting. Van Beveren and Vandebussche (2010), using instrumental variable estimators, also show that firms self-select to innovate before exporting. Similar evidence is found among German and UK firms (Roper and Love 2002, Ebling and Janz 1999) and Spanish firms (Cassiman and Martinez-Ros 2007).

Some studies find that the causal relationship from innovation to export may depend on the type of innovations or firm characteristics. Becker and Egger (2013) analyze the effects of new product innovation versus process innovations on export propensity at the firm level. They find that both types of innovation raise a firm's propensity to export, but product innovation is quantitatively more important. Hwang et al. (2015), using Korean Innovation Survey data from 2005, 2008, and 2010, find that firms can improve their export performance if they carry out product and process innovations simultaneously.

### **From Export to Innovation**

Fewer studies explore the impact of export on innovation and find weak support for the learning-by-exporting hypothesis. According to Love and Ganotakis (2013), detecting learning by exporting effects at the firm level is not straightforward. A large number of studies examine the learning-by-exporting hypothesis using productivity as the outcome variable (Wagner 2007; Greenaway and Kneller 2007) for literature reviews of papers using productivity as the outcome. However, firm productivity is extremely heterogeneous, even among firms operating in similar sectors (Bartelsman and Doms 2000) and is subject to many influences unrelated to exporting. In addition, firms learn from many external and internal sources which have nothing to do with exposure to export markets, thus it is not always easy to identify the learning-by-exporting effect. As a result, estimates of the effects of learning-by-exporting on firm performance have generated very mixed results (Wagner 2007).

Recent literature examines the learning-by-exporting hypothesis using other variables that are more likely to represent firms' learning process than productivity. These variables include R&D expenditure (i.e., innovation inputs), patent counts, and types of innovation (i.e., innovation outputs). For example, Salomon and Shaver (2005) examine exporting behavior and ex post innovative outcomes among Spanish manufacturing firms. They find that exporting is associated with ex post increase in product innovation and patent count. Salomon and Jin (2008,

2010) also find direct evidence of the positive effects of exporting on innovation for both technically leading and lagging firms in Spain. Hahn (2010), using firm-level data of manufacturing firms in the Republic of Korea, finds some evidence supporting the learning-by-exporting hypothesis (i.e., exporting promotes new product innovation). Girma et al. (2008), using a bivariate probit model, find positive evidence of the effect of exporter status on the decisions of Irish firms to invest in R&D. Criscuolo et al. (2010) find that globally engaged firms (including multinational corporations and exporters) innovate more, because they learn from worldwide intra-firm pools of information and from international customers and universities. Liu and Buck (2007) use subsector-level data for high-tech industries in the People's Republic of China and find a positive and significant effect of different types of internationalization on product innovation. Fafchamps et al. (2008) use a panel of Moroccan manufacturers and find that product innovation is positively related to the length of exporting experience.

The effect of learning-by-exporting, however, is also inconclusive. Moreover, the literature does not provide answers for the question of which modes of innovation benefit from internationalization. For example, Aw et al. (2011) find that past export experience is not an important factor in determining a firm's decision to carry out R&D. Damijan et al. (2010) find a positive effect of a firm's export status on process innovation, but not on product innovation. Meanwhile, Lileeva and Trefler (2010) and Bustos (2011) find trade liberalization impacts both types of innovation. Bratti and Felice (2012) do not examine the effects of export status on process innovation, but view it as the pathway for exporting to affect product innovation. However, they do not find process innovation to be the major factor that explains the positive association between innovation and export status.

As Salomon and Jin (2008) point out, we still know relatively little about how exporting affects performance at the firm level. More specially, Salomon and Jin (2010) argue that little is known about how different groups of firms learn from exporting and whether any differences exist between them in the effects of learning-by-exporting. This is extremely true for SMEs.

### **Bidirectional Causality of Innovation and Internationalization**

Following the implications from economic theories and empirical evidence, the recent literature attempts to examine bidirectional causality between internationalization and innovation. Using a structural model of the producer's decision to invest in R&D, Aw et al. (2008) find that self-selection of high-productivity plants mainly drive participation in both activities, and that both R&D and exporting have a

positive effect on a plant's future productivity, reinforcing the selection effect. Hahn and Park (2012) examine bidirectional causal relationships among export, innovation, and productivity for Korean manufacturing firms and find a significant positive effect of exporting on new product innovation, but do not find a statistically significant effect of innovation on exporting. Higon and Driffield (2011) examine the interdependence of innovation and internationalization. While they find an apparent causal relationship running from innovation to internationalization, after correcting for endogeneity, the causal relationship leading from exporting to innovation is not robust. According to Higon and Driffield (2011), process innovation seems to have little impact on exporting decisions. Overall, their results point to the importance of product innovation relative to process innovation, at least in terms of the internationalization of firms.

In the context of developing economies, Nguyen et al. (2008) examine the causation of several types of innovation (i.e., product and process innovation and product modification) on export using SME data for Viet Nam and find that there is a statistically significant positive correlation between innovation and exporting. However, the study uses cross-sectional data and thus does not capture the dynamic interdependence of innovation and export decisions. Bravo-Ortega et al. (2014) using plant-level data from Chile find that firms that invest in R&D are considerably more likely to export, but the reverse is not true. They argue that the factors that determine a firm's decision to conduct R&D and to internationalize are not the same and that the operational mechanism is that a firm invests in R&D to increase productivity in order to be able to export.

Some studies find the effects are limited to a specific sample or cohort of firms. Damijan et al. (2010) apply propensity score matching techniques, where firms are classified either by their propensity to innovate or their propensity to export and are matched to compare their likelihood to export or to innovate. Using a bivariate probit model, they find that export increases the probability of process innovation. However, they do not find empirical support for learning-by-exporting. They also find that the effects are only found among medium-sized and large firms. Lööf et al. (2014) examine how differences in innovation strategy among exporting firms influence their total factor productivity growth and find that among firms that are permanently present in export markets, persistent innovators grow faster than firms that switch between being an active and an inactive innovator. However, firms that start or stop their innovation activity within the sample period still have a higher annual growth rate than non-innovators. A similar pattern is found among nonpersistent exporters, but the estimates are

nonsignificant or only weakly significant. Similarly, Love and Ganotakis (2013) investigate the learning-by-export hypothesis by examining the effect of exporting on the subsequent innovation performance of a sample of high-tech SMEs in the UK. They find that exporting helps the UK's SMEs in high-technology industries innovate subsequently. However, only firms that are consistently exposed to export markets are able to overcome the innovation hurdle. And as Halilem et al. (2014) put it, internationalization and innovation are linked by different sets of relations.

## 5.3 Data and Empirical Strategy

### 5.3.1 Data

The data were jointly collected by the University of Copenhagen and two research institutes in Viet Nam (Central Institute for Economic Management and Institute for Labor Studies and Social Affairs) in 2005, 2007, 2009, 2011, and 2013. The surveys were conducted in 10 provinces in Viet Nam. In each province, the sample was stratified by the form of ownership to ensure that all types of nonstate enterprises, including formal and informal firms, were represented. Subsequently, stratified random samples were drawn from a consolidated list of formal enterprises and an on-site random selection of informal firms was made. After each survey round, to replace exited firms or a small number of firms which declined to continue the survey, some firms were randomly selected from a list of formal firms compiled by the government statistics office in the previous year and an on-site selection of informal firms. The sample size for each round of the survey was about 2,500 firms.

Although the sample has been slightly adjusted over time, the questionnaires are nearly the same. Information collected includes production, sales, markets, and other characteristics of the firm and of the owner or manager. The questionnaire also contained questions about innovation activities of the firm that were undertaken in the previous 2 years, i.e., between surveys.

### 5.3.2 Empirical Strategy

We model two binary indicators, internationalization and innovation, for firm  $i$  at time  $t$  ( $t = 1..5$ ). The set of dependent variables  $y_{it}$  are modeled in terms of a set of continuous latent variable  $y_{it}^*$  as given by Equation 1. Each latent variable  $y_{it}^*$  is a function of a vector of lagged

observable explanatory variable  $x_{it-1}$ , lagged dependent variables  $y_{it-1}$  {s; unobservable time invariant firm-specific random effects  $\mu$ , and a time-varying idiosyncratic random error term  $u_{it}$ .

$$y_{it} = x_{it-1}\beta + y_{it-1}\gamma + \mu_i + u_{it} \quad (1)$$

In our dynamic probit model, it is assumed that  $u_{it}|y_{i1}, y_{i2}, \dots, y_{it-1}, x_{it}$  is independently and identically distributed (i.i.d.) as  $N(0,1)$  and  $u_{it}$  is uncorrelated with  $y_{i1}, x_{it}$  or  $u_{it}$ . The conventional dynamic probit random effects estimator assumes that the individual effects ( $u_i$ ) are independent of the observed characteristics ( $x_{it}$ ). This assumption, however, seems unrealistic. To account for this issue, we follow Mundlak (1978) and Chamberlain (1984) to assume that  $\mu_i = \bar{x}_i \alpha + \epsilon_i$ , of which  $\epsilon_i$  is i.i.d. as  $N(0,1)$  and independent of  $x_{it}$  and  $u_{it}$  for all  $i$  and  $t$ .

Additionally, for estimation of dynamic models such as Equation 1, we need to deal with two important problems: (i) persistence and unobserved individual heterogeneity ( $u_i$ ) and (ii) the treatment of initial conditions ( $y_{i1}$ ). The first problem could be solved by using a random effects dynamic probit model to distinguish the unobserved heterogeneity from true state dependence. Meanwhile, the second problem usually arises in a longitudinal binary process when the process has a first-order Markov property and contains unobserved heterogeneity. This implies that the first observation  $y_{it-1}$  is generated by the same process as other observations and therefore is endogenous. To deal with the initial conditions, Wooldridge (2005) proposes an approach that is based on conditional maximum likelihood for serially independent errors. Wooldridge (2005) assumes that  $y_{i1}$  is random and specifies the distribution of  $u_i$  conditional on  $y_{i1}$  and  $\bar{x}_i$  as follows:<sup>2</sup>

$$\mu_i = \alpha_0 + \alpha_1 y_{i1} + \alpha_2 \bar{x}_i + \epsilon_i; \epsilon_i \sim iid \text{ and uncorrelated to } y_{i1} \text{ and } \bar{x}_i \quad (2)$$

Therefore, Equation 1 becomes:

$$y_{it} = x'_{it-1}\beta + y_{it-1}\gamma + \alpha_0 + \alpha_1 y_{i1} + \alpha_2 \bar{x}_i + \epsilon_i + u_{it} \quad (3)$$

<sup>2</sup> Heckman (1981) also proposes another approach to deal with the initial conditions. According to Esteve-Pérez and Rodríguez (2013), the econometric literature shows that the Heckman (1981) and Wooldridge (2005) estimators produce quite comparable results.

Given that internationalization and innovation decisions are highly serially correlated and that these two decisions are interdependent, we estimate the two decisions simultaneously by estimating a dynamic bivariate binary choice model.<sup>3</sup> Following Esteve-Pérez and Rodríguez (2013), we extend the univariate model in Equation 3 to a bivariate context:

$$y_{it}^{1j} = x_{it-1}\beta_{1j} + y_{it-1}^1\gamma_{11j} + y_{it-1}^2\gamma_{12} + \mu_i^{1j} + u_{it}^{1j} \quad (4)$$

$$y_{it}^2 = x_{it-1}\beta_2 + y_{it-1}^1\gamma_{21j} + y_{it-1}^2\gamma_{22} + \mu_i^2 + u_{it}^2 \quad (5)$$

$$y_{it}^k = \begin{cases} 1 & \text{if } y_{it}^{k*} > 0 \\ 0 & \text{if } y_{it}^{k*} \leq 0 \end{cases}$$

where  $k=1, 2$ ;  $t=1, \dots, T$

of which

- $y_{it}^{1j}$  and  $y_{it}^2$  are dependent variables. The first is a dummy variable indicating whether firm  $i$  carries out a type of innovation in time  $t$ . In this chapter, we alternatively examine two types of innovation: product and process. The second dependent variable,  $y_{it}^2$ , is also a dummy variable, indicating whether or not firm  $i$  exports and/or sells to foreign direct investment firms in year  $t$ .
- $y_{it}^{1j*}$  and  $y_{it}^{2*}$ : corresponding latent variables for  $y_{it}^{1j}$  and  $y_{it}^2$ .
- $x_{it-1}$ : vector of (lagged) observable explanatory variables, including owner/manager education, firm age, size, ownership, and either innovation status (for internationalization equation) or internationalization status (for innovation equation).
- $y_{it-1}^{1j}$  and  $y_{it-1}^2$ : state dependence (i.e., lagged innovation and internationalization indicator in innovation and internationalization equations).
- $\mu_i^{1j}$  and  $\mu_i^2$ : random individual effects ( $j=1, 2$ );  $(\mu_i^{1j}, \mu_i^2)$  are assumed to be bivariate normal distribution. The distribution

<sup>3</sup> We thank the reviewer of this chapter, Pornpinun Chantapacdepong, of the Asian Development Bank Institute, for pointing out that the Wooldridge (2005) approach may not be suitable for bivariate dynamic probit models. However, it has been employed recently in several studies including Esteve-Pérez and Rodríguez (2013) and Ganter and Hecker (2013). The reviewer suggests the use of Raymon et al. (2010) and/or Miranda (2010) for the estimators of bivariate dynamic probit models. We may use these approaches in subsequent work.

of  $\mu_{it}^{1j}$  and  $\mu_i^2$  are conditional on  $y_{it}^{1j}$  and  $y_{it}^2$  and  $\bar{x}_i$  as discussed above (see Equation 2).

- $u_{it}^{1j}$  and  $u_i^2$ : error terms;  $u_{it}^{1j}, u_i^2$  are assumed to have a bivariate normal distribution and independence over time.

### 5.3.3 Variable Construction

#### Measuring Innovation

In previous studies, longitudinal data on firm innovation activity usually indicated patent registration and R&D expenditure and focused on developed economies (Ayyagari et al. 2011). Although original innovations (that is, new-to-the-world innovations) are important, innovation in the form of adopting new production technology improving the quality of the products, or introducing new products to a country, are more relevant to firms in developing regions, where most firms are engaged in activities far from the technological frontier (UNCTAD 2007). We follow Ayyagari et al. (2011) and others in the context of developing economies in adopting the definition of “new-to-the-firm” innovation. We use two indicators: product innovation and process innovation. Product innovation takes the value of one if a firm either (i) introduces a new product or upgrades existing products in last 2 years, and zero otherwise. Process innovation is also a binary variable, which takes the value of one if a firm has upgraded its production process in the last 2 years, and zero otherwise.

#### Measuring Internationalization

As Ottaviano and Martincus (2011) and Bøler et al. (2012) argue, international activities include not only export activities, but other activities that facilitate the learning process of domestic firms. This chapter uses a broader definition of internationalization by considering not only exporters but also those firms that sell to foreign firms that produce in Viet Nam and that export from there. Our definition of internationalization also includes using imported inputs or having long-term partnerships with foreign firms. Indeed, such activities are part of the integration of domestic firms into global value chains.

#### Explanatory Variables

The following explanatory variables are used in the estimations:

- Size: We divide firms in our sample into two categories: one is micro firms, which are firms with five or fewer full-time employees, and the other is non-micro firms. Non-micro firms usually have more advantages in supporting innovation activities.

- Age: The age of the firm is the log of the number of years of operation at the time of the survey. This variable is to capture the learning-by-doing effects of innovation. However, a flat learning curve and being risk averse may hinder a firm's innovation.
- Owner or manager's education level: An owner or manager having a college degree and/or who has graduated from a technical training school is the indicator used to capture the human capital of the firm. They reflect the potential of either employees or owners in innovation activities.
- Ownership form: A dummy variable is used for the form of ownership and takes the value of one if the firm is incorporated as a partnership, a limited shareholding company, or a joint stock company. It takes a value of zero if the firm is a household firm or private sole proprietorship. Incorporated firms tend to serve more competitive markets than household firms, which mostly serve local customers. Thus, incorporated firms are more likely to engage in innovation activities.
- We also control for the firm's location and industry and include time dummies.

## 5.4 Descriptive Analysis

Our sample consists of 8,357 firms, of which about half (52.3%) are micro firms with five or fewer full-time permanent workers. The other half are non-micro firms with more than five workers. Table 5.1 presents descriptive statistics. In general, 35.9% of firms in our sample have engaged in product innovation. The figure is lower for micro firms (25.9%) than for non-micro firms (47.2%). Some 6.2% of micro firms and 19.5% non-micro firms carried out process innovations in the 2 years prior to each survey. Regarding internationalization, although we use a rather broad definition, only 8.5% of firms have one or more internationalization activities. Similar to innovation activities, micro firms are not very international: only 1.0% of micro firms engaged in international activity compared with 16.8% of non-micro firms. Micro firms also have a lower value of production assets, have lower labor productivity, and are less likely to have an owner or manager with a college or technical college degree.

Table 5.2 presents the transitional probability matrix. It can be seen that there is a general pattern of strong persistency in innovation and internationalization. Most of the diagonal elements are near or above 50%, except for process innovation. We can infer that 56.5% of firms that have international activities at  $t - 1$  continue to carry out such activities

**Table 5.1: Descriptive Data**

	All	Micro	Non-micro
Product innovation	35.9%	25.9%	47.2%
Process innovation	12.5%	6.2%	19.5%
Internationalization	8.5%	1.0%	16.8%
Micro firms	52.9%		
College	19.9%	7.2%	34.2%
Capital intensity	10.36 [1.45]	10.27 [1.52]	10.45 [1.37]
Labor productivity	9.44 [0.82]	9.20 [0.82]	9.71 [0.72]

Note: Standard errors in brackets where applicable.

Source: Author.

**Table 5.2: Transition Probability Matrix**

		Internationalization at $t-1$ (%)		Product Innovation at $t-1$ (%)		Process Innovation at $t-1$ (%)	
		No	Yes	No	Yes	No	Yes
		Internationalization at $t$	No	96.0	43.5	94.6	88.4
	Yes	4.0	56.5	5.4	11.6	6.4	17.2
Product innovation at $t$	No	91	79	75.4	52.3	67.4	50.0
	Yes	9	21	24.6	47.7	32.6	50.0
Process innovation	No	88.9	73.3	91.4	83.5	90.4	75.7
	Yes	11.1	26.7	8.6	16.5	9.6	24.3

Note: Standard errors in brackets where applicable.

Source: Author.

at time  $t$ . Meanwhile, about 4% of firms that do not have international activities at  $t - 1$  engaged in internationalization at time  $t$ . Thus, the probability of engaging in internationalization at  $t + 1$  was 52.5 percentage points higher for internationalized firms at  $t$ . This is a measure of unconditional state dependence (since we have not yet controlled for observed and unobserved firm characteristics). Similarly, the probability of engaging in international activities by a firm that carries out product innovation at time  $t$  was 6.2 percentage points higher than that of non-innovative firms. For process innovation it was 10.1 percentage points higher. Table 5.2 also indicates that firms with international activities at time  $t$  also had a higher probability of carrying out innovative activities, either in the form of product innovation or process innovation, at time

$t + 1$  than non-international firms. The probability of having a product innovation at time  $t + 1$  is 12 percentage points for those firms that have international activities at time  $t$ . For process innovation it was 15.6 percentage points higher. However, this table also suggests that the persistence is also observed among non-internationalized firms and non-innovative firms (i.e., very few non-internationalized firms and non-innovative firms shifted their status in the subsequent period).

Table 5.3 presents probabilities of internationalization and innovation engagement over the sample period. Column 1 reports the unconditional probabilities of internationalization, product innovation, and process innovation. Columns 2 and 3 show the probabilities of internationalization, product innovation, and process innovation conditional on the past activities of firms. We see that the persistence

**Table 5.3: Unconditional and Conditional Probabilities of Innovation and Internationalization**

Internationalization at $t$		Unconditional (%)	Internationalization	No
			at $t - 1$ (%)	Internationalization at $t - 1$ (%)
All firms		8.9	56.5	4.0
Micro firm	No	16.9	59.4	8.2
	Yes	1.1	19.2	0.8
Incorporated firm	No	2.8	34.0	1.6
	Yes	27.3	62.6	13.6
Product Innovation		Unconditional (%)	Product Innovation	No Product
			at $t - 1$ (%)	Innovation at $t - 1$ (%)
All firms		35.9	47.7	24.6
Micro firm	No	47.2	54.1	36.5
	Yes	25.9	38.8	17.8
Incorporated firm	No	31.7	44.8	21.2
	Yes	49.0	53.9	40.4
Process Innovation		Unconditional (%)	Process Innovation	No Process
			at $t - 1$ (%)	Innovation at $t - 1$ (%)
All firms		12.5	16.5	8.6
Micro firm	No	19.5	29.4	15.5
	Yes	6.2	11.3	5.6
Incorporated firm	No	8.6	17.1	7.3
	Yes	24.2	33.2	19.3

Source: Author.

is much higher among the non-micro firms and incorporated firms. For example, 59% of non-micro firms and 62.6% of incorporated firms would continue having international activities at time  $t + 1$  if they did so at time  $t$ , while these figures were only about 20% for micro firms. The same patterns are also seen in product innovation and process innovation activities.

The transitional probability matrixes presented in Tables 5.2 and 5.3 suggest a state dependence and interdependence of innovation and internationalization decisions. However, such matrixes do not provide us with adequate information on the sources of such dependency. In the following section, we attempt to figure out the sources of such relationships.

## 5.5 Empirical Results

### 5.5.1 Univariate Results

Tables 5.4 and 5.5 present our univariate probit estimations, using Wooldridge's (2005) initial condition correction approach. The dependent variables in Table 5.4 are production innovation in columns 1–3 and process innovation in columns 4–6. The estimates for the whole sample are presented in columns 1 and 4, for the sample of micro firms in columns 2 and 5, and for the sample of non-micro firms in columns 3 and 6. In all specifications, we include variables indicating whether the firm has any international activities in the previous period.

The estimates show that past product innovation has a positive and statistically significant effect on the firm's current product innovation decision. The same is true of the effect of past process innovation on current process innovation. The statistical significance of the value of dependent variables at time  $t = 1$  (initial period) indicates that there is a true state dependence in process and product innovation decisions among the micro firms. We find that firms engaged in international activities in the last period are more likely to have product innovation, although this relationship is not statistically significant. The effect of internationalization on process innovation is different between micro and non-micro firms. It has a positive and statistically significant effect on process innovation for non-micro firms, while for micro firms, this effect is negative and significant, implying that micro firms are less likely to carry out the process innovation if they engaged in internationalization in the last period. A potential explanation for this negative relationship is that some firms may not have been successful in international activities

**Table 5.4: Effects of (Past) Internationalization on Product Innovation and Process Innovation Decisions**

Sample	(1)	(2)	(3)	(4)	(5)	(6)
	All Firms	Micro Firms	Non-micro Firms	All Firms	Micro Firms	Non-micro Firms
Dependent Variables	Product Innovation			Process Innovation		
Lagged product innovation	0.085*** [0.014]	0.073*** [0.016]	0.065*** [0.021]			
Lagged process innovation				0.041*** [0.009]	0.023** [0.010]	0.051*** [0.017]
Lagged internationalization	-0.023 [0.021]	-0.082 [0.064]	-0.014 [0.025]	0.019* [0.011]	-0.083* [0.044]	0.033* [0.017]
Having college degree (lagged)	-0.016 [0.016]	0.007 [0.025]	-0.031 [0.020]	0.018** [0.009]	0.010 [0.012]	0.021 [0.015]
Non-micro firm (lagged)	0.093*** [0.013]	0.060*** [0.017]	0.079*** [0.020]	0.036*** [0.008]	0.011 [0.008]	0.035** [0.016]
Labor productivity (lagged)	-0.030*** [0.010]	-0.026* [0.013]	-0.026* [0.014]	-0.018*** [0.006]	-0.013* [0.007]	-0.022** [0.010]
Being incorporated firm	0.070*** [0.017]	-0.056 [0.041]	0.071*** [0.021]	0.055*** [0.009]	-0.001 [0.017]	0.066*** [0.015]
Firm age	-0.036*** [0.010]	-0.032*** [0.012]	-0.015 [0.015]	-0.011* [0.006]	0.002 [0.006]	-0.020* [0.011]
Product innovation at $t = 1$	0.095*** [0.014]	0.067*** [0.017]	0.106*** [0.022]			
Process innovation at $t = 1$				0.037*** [0.009]	0.016* [0.009]	0.052*** [0.016]
Number of firms	3,227	1,928	1,834	3,227	1,928	1,834
Total observations	8,357	4,418	3,939	8,357	4,418	3,939

Note: Standard errors in brackets; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The estimates presented in this table are marginal effects. In all specifications, we use the Wooldridge correction approach. We also control for firm's industry, location, and year dummies. Estimations are based on Gauss-Hermite quadrature approximations using 12 quadrature points. We also use 16 and 24 quadrature points to check the accuracy.

Source: Author.

in the past period and thus had to reduce their production process. In fact, in our sample of micro firms, only 1% of them had international activities in the last period. Among them, nearly 40% used to be non-micro in the last period.

The results also indicate that non-micro firms are more likely to carry out innovation. This is consistent with the findings of other studies. Being incorporated also increases a firm's probability of carrying out innovation activities. Our results also indicate that older firms seem to be risk averse as the probability of innovating declines with age.

Table 5.5 presents estimates for the effect of product innovation and process innovation on internationalization. Similar to Table 5.4, we also use the Wooldridge initial condition correction approach to

**Table 5.5: Effects of (Past) Product Innovation and Process Innovation Decisions on Internationalization**

Sample	(1)	(2)	(3)	(4)	(5)	(6)
	All Firms	Micro Firms	Non-micro Firms	All Firms	Micro Firms	Non-micro Firms
Dependent Variables	Internationalization					
Lagged internationalization	0.057*** [0.007]	0.0004561 [0.000]	0.165*** [0.018]	0.056*** [0.007]	0.000 [0.000]	0.164*** [0.018]
Lagged product innovation	0.002 [0.003]	-0.000098 [0.000]	0.003 [0.011]			
Lagged process innovation				0.004 [0.004]	-0.000 [0.000]	0.008 [0.011]
Having college degree (lagged)	0.013*** [0.004]	0.000116 [0.000]	0.036*** [0.012]	0.013*** [0.004]	0.000 [0.000]	0.035*** [0.012]
Non-micro firm (lagged)	0.021*** [0.004]	0.0001221 [0.000]	0.052*** [0.013]	0.020*** [0.004]	0.000 [0.000]	0.051*** [0.013]
Labor productivity (lagged)	-0.003 [0.003]	0.0000107 [0.000]	-0.010 [0.008]	-0.003 [0.003]	0.000 [0.000]	-0.010 [0.008]
Being incorporated firm	0.038*** [0.005]	0.000445* [0.000]	0.088*** [0.012]	0.037*** [0.005]	0.000* [0.000]	0.087*** [0.013]
Firm age	0.002 [0.003]	0.0000472 [0.000]	0.009 [0.009]	0.003 [0.003]	0.000 [0.000]	0.009 [0.009]
Internationalization at t=1	0.038*** [0.006]	0.000866 [0.001]	0.099*** [0.017]	0.038*** [0.006]	0.001 [0.001]	0.099*** [0.017]
Number of firms	3,227	1,928	1,834	3,227	1,928	1,834
Total observation	8,357	4,418	3,939	8,357	4,418	3,939

Note: Standard errors in brackets; \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01. The estimates presented in this table are marginal effects. Estimations are based on Gauss-Hermite quadrature approximations using 12 quadrature points. We also use 16 and 24 quadrature points to check the accuracy.

Source: Author.

identify whether there is a state dependency in internationalization. We also control for the firm's industry and location and the year. Columns 1 and 4 contain results for the whole sample, columns 2 and 5 for micro firms, and columns 3 and 6 for non-micro firms. The results indicate that past engagement in international activities has a positive effect on internationalization in this period. Combined with the positive and statistically significant effects of the initial condition (i.e., internationalization decision at  $t = 1$ ), this result indicates that there is a true state dependence in internationalization among firms. Our results, however, do not indicate a significant effect of either product innovation or process innovation on the firm's internationalization.

However, the results show that there is a large difference between micro firms and non-micro firms relating to factors determining the internationalization decision. There is a rather large state dependence with regards to the internationalization decision of non-micro firms, reflected by a large coefficient on the lagged decision to internationalize and the significance of the initial conditions. The same pattern is not seen among micro firms. Other variables, except for being an incorporated firm, do not have a statistically significant effect on micro firms' internationalization decision. These results may be due to the fact that only 1% of micro firms engaged in internationalization and therefore the probit estimation could not provide a good and consistent estimation. For non-micro firms, we find that large firms, incorporated firms, and firms with an educated owner or manager have a higher probability of being engaged in internationalization.

## 5.5.2 Bivariate Results

The univariate dynamic random effects estimated in the previous section assessed the relative importance of unobserved heterogeneity and true state dependence in explaining persistence in internationalization and innovation decisions. As the literature suggests, there may be interdependence between innovation and internationalization. Therefore, a bivariate model may provide a suitable estimation method since it allows for correlations between the error terms in the internationalization and innovation equations.

Table 5.6 reports the results from the dynamic pooled bivariate models. Panel A presents the bivariate estimation results of internationalization and product innovation equations. The estimation results of internationalization and process innovation equations are presented in Panel B. Estimation results in Panel A confirm the true state dependency of product innovation and internationalization decisions. However, similar to Table 5.4, we do not find the dynamic independence

**Table 5.6: Interdependence of Innovation (Product Innovation and Process Innovation) and Internationalization Decisions**

Dependent Variables	(1) All Sample		(2)		(3) Micro Firm		(4) Micro Firm		(5) Product Innovation		(6) Non-micro Firm	
	Product Innovation	Internationalization	Product Innovation	Internationalization	Product Innovation	Internationalization	Product Innovation	Internationalization	Product Innovation	Internationalization	Product Innovation	Internationalization
	Panel A											
Lagged product innovation	0.238*** [0.038]	0.041 [0.055]	0.246*** [0.054]	-0.098 [0.134]	0.168*** [0.052]	0.026 [0.062]						
Lagged internationalization	-0.063 [0.059]	0.920*** [0.090]	-0.274 [0.216]	0.458 [0.333]	-0.033 [0.062]	0.929*** [0.093]						
Having college degree (lagged)	-0.042 [0.043]	0.204*** [0.064]	0.023 [0.085]	0.116 [0.194]	-0.078 [0.050]	0.195*** [0.068]						
Non-micro firm (lagged)	0.257*** [0.037]	0.334*** [0.065]	0.205*** [0.057]	0.125 [0.132]	0.197*** [0.050]	0.290*** [0.076]						
Labor productivity (lagged)	-0.082*** [0.027]	-0.047 [0.044]	-0.088* [0.045]	0.010 [0.145]	-0.064* [0.034]	-0.060 [0.047]						
Being incorporated firm	0.194*** [0.046]	0.607*** [0.066]	-0.190 [0.140]	0.451** [0.216]	0.177*** [0.052]	0.497*** [0.071]						
Firm age	-0.099*** [0.028]	0.035 [0.047]	-0.108*** [0.041]	0.048 [0.127]	-0.036 [0.039]	0.050 [0.052]						
Product innovation at $t = 1$	0.255*** [0.040]		0.226*** [0.057]		0.256*** [0.056]							
Internationalization at $t = 1$		0.601*** [0.093]		0.890** [0.370]		0.550*** [0.091]						
$\rho$	0.166		-0.045		0.184							
Chi-square	23.409		0.255		22.996							

*continued on next page*

Table 5.6 continued

Dependent Variables	(1)		(2)		(3)		(4)		(5)		(6)	
	All Sample	Product Innovation	Internationalization	Product Innovation	Micro Firm	Product Innovation	Internationalization	Product Innovation	Micro Firm	Product Innovation	Internationalization	Non-micro Firm
	<b>Panel B</b>											
Lagged process innovation	0.233** [0.052]	0.233** [0.052]	0.072 [0.059]	0.212** [0.097]	-0.117 [0.205]	0.201** [0.064]	-0.117 [0.205]	0.201** [0.064]	0.047 [0.064]	0.201** [0.064]	0.047 [0.064]	0.047 [0.064]
Lagged internationalization	0.110* [0.062]	0.110* [0.062]	0.913** [0.091]	-0.740* [0.412]	0.473 [0.337]	0.129** [0.065]	0.473 [0.337]	0.129** [0.065]	0.923** [0.094]	0.129** [0.065]	0.923** [0.094]	0.923** [0.094]
Having college degree (lagged)	0.102** [0.050]	0.102** [0.050]	0.202** [0.065]	0.093 [0.113]	0.121 [0.196]	0.083 [0.057]	0.121 [0.196]	0.083 [0.057]	0.196** [0.068]	0.083 [0.057]	0.196** [0.068]	0.196** [0.068]
Non-micro firm (lagged)	0.203** [0.046]	0.203** [0.046]	0.328** [0.064]	0.100 [0.073]	0.113 [0.134]	0.136** [0.061]	0.113 [0.134]	0.136** [0.061]	0.284** [0.075]	0.136** [0.061]	0.284** [0.075]	0.284** [0.075]
Labor productivity (lagged)	-0.101** [0.032]	-0.101** [0.032]	-0.047 [0.044]	-0.121* [0.062]	0.028 [0.147]	-0.085** [0.039]	0.028 [0.147]	-0.085** [0.039]	-0.058 [0.047]	-0.085** [0.039]	-0.058 [0.047]	-0.058 [0.047]
Being incorporated firm	0.309** [0.052]	0.309** [0.052]	0.607** [0.066]	-0.008 [0.158]	0.477** [0.213]	0.254** [0.058]	0.477** [0.213]	0.254** [0.058]	0.494** [0.071]	0.254** [0.058]	0.494** [0.071]	0.494** [0.071]
Firm age	-0.060* [0.033]	-0.060* [0.033]	0.041 [0.047]	0.018 [0.054]	0.054 [0.129]	-0.079* [0.044]	0.054 [0.129]	-0.079* [0.044]	0.052 [0.052]	-0.079* [0.044]	0.052 [0.052]	0.052 [0.052]
Process innovation at $t = 1$	0.200** [0.048]	0.200** [0.048]	0.144* [0.083]	0.144* [0.083]	0.144* [0.083]	0.194** [0.060]	0.144* [0.083]	0.194** [0.060]	0.556** [0.092]	0.194** [0.060]	0.556** [0.092]	0.556** [0.092]
Internationalize at $t = 1$	0.605** [0.093]	0.605** [0.093]	0.850** [0.370]	0.850** [0.370]	0.850** [0.370]	0.850** [0.370]	0.850** [0.370]	0.850** [0.370]	0.850** [0.370]	0.850** [0.370]	0.850** [0.370]	0.850** [0.370]
$\rho$	0.203	0.203	0.372	0.372	0.163	0.163	0.372	0.163	0.163	0.372	0.163	0.163
Chi-square	27.38	27.38	11.242	11.242	15.454	15.454	11.242	15.454	15.454	11.242	15.454	15.454
Number of firms	3,227	3,227	1,928	1,928	1,834	1,834	1,928	1,834	1,834	1,928	1,834	1,834
Total observations	8,357	8,357	4,418	4,418	3,939	3,939	4,418	3,939	3,939	4,418	3,939	3,939

Note: Standard errors in brackets; \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ . The estimates presented in this table are marginal effects. Estimations are based on Gauss-Hermite quadrature approximations using 12 quadrature points. We also use 16 and 24 quadrature points to check the accuracy.

Source: Author.

between product innovation and internationalization for all groups of firms. Past product innovation does not have statistically significant effects on current internationalization, and past internationalization does not have significant effects on current product innovation. The statistical significance of  $\rho$  in the estimation for the whole sample confirms that firms jointly determine the internationalization and product innovation decisions. As reported in Panel B, for the whole sample and non-micro firms, past internationalization still has positive and statistically significant effects on process innovation. For micro firms, the effect is still negative and significant at the 10% level. Other control variables show similar effects to the ones in Table 5.5. The statistical significance of  $\rho$  also indicates that there is a cross-dependence between process innovation and internationalization. It should be noted that in both Panel A and Panel B, the estimates of the impact of the lagged dependence variables obtained in the bivariate probit model are higher than those obtained from estimating a dynamic random effects probit. This is because individual heterogeneity is not controlled in the bivariate models. Esteve-Pérez and Rodríguez (2013) suggest that the estimates from the dynamic random effects probit may be more appropriate for state dependence.

To facilitate the interpretation of results from the bivariate probit estimation, following Esteve-Pérez and Rodríguez (2013), we calculate the predicted probabilities of engaging in internationalization and carrying out process innovation given four combinations of past internationalization and process innovations. Because the interdependence between innovation and internationalization is partly found in the joint estimation of process innovation and internationalization, we calculate these predicted probabilities for the case of non-micro firms. Panel A of Table 5.7 reports the predicted probabilities. We find that the predicted probability of engaging in international activity in this period for those firms engaged in these activities in the past period is nearly 50 percentage points higher than those not engaged in international activities in the last period, regardless of whether firms carried out process innovation or not. Meanwhile, the predicted probability of a past process innovator implementing process innovation in this period is 8 percentage points higher than for those who did not engage in process innovation in the previous period. The result also indicates a cross-persistence in these activities, although such cross-persistence is not high. For example, for the firms that did not engage in process innovation in the last period, the probability of carrying out process innovation in this period is 22.8% if the firm had international activities last period, while this figure is only 14.4% if the firms did not have international activities.

**Table 5.7: Predicted Probability and Marginal Effects Given Past Internationalization and Innovation on Current Internationalization and Innovation**

Panel A: Predicted Probability		
International at $t - 1$ , Process Innovation at $t - 1$	Internationalization at $t$	Process Innovation at $t$
(1,1)	0.613 (0.174)	0.359 (0.113)
(1,0)	0.576 (0.177)	0.228 (0.093)
(0,1)	0.104 (0.097)	0.273 (0.102)
(0,0)	0.073 (0.075)	0.144 (0.071)
Panel B: Marginal Effects		
	Internationalization at $t$	Process Innovation at $t$
Internationalization at $t - 1$		
No	0.114 (0.007)	0.189 (0.007)
Yes	0.332 (0.025)	0.223 (0.016)
Process innovation at $t - 1$		
No	0.165 (0.006)	0.178 (0.008)
Yes	0.173 (0.009)	0.231 (0.014)

Notes: Calculated based on the results presented in columns 5 and 6 of Panel B, Table 5.6.

Source: Author.

We also calculate the average treatment effect of the previous internationalization and process innovation status on internationalization and process innovation in this period. The results are reported in Panel B of Table 5.7. They show that if, in the previous period, a non-innovator shifted to become an innovator, the probability of carrying out a process innovation in this period increases by about 5%, but the probability to internationalize increases only slightly at less than 1%. This implies a rather weak cross-dependency between past process innovation and current internationalization. The cross-dependency between past internationalization and current process innovation is slightly higher. These results are in line with our previous results.

### 5.5.3 Robustness Check

Table 5.8 presents our robustness checks.<sup>4</sup> We use several approaches to check the sensitivity of our estimations. First, we limit our sample to those firms that are either micro firms or non-micro firms during the

<sup>4</sup> We only report the results of the dynamic random effects bivariate probit model between internationalization and process innovation.

entire period of the sample surveys from 2005 to 2013 (i.e., without any changes in their firm category). A firm's propensity to innovate or to internationalize may cause or be affected by its decision to reduce the number of workers (to become a micro firm) or increase the workers to become a non-micro firm (Panel A, Table 5.8). Second, we use different measures of innovation. Instead of considering firms that just engage in innovation to be innovators, we view firms as innovators if they engaged in innovation and their innovation (process innovation and product innovation) are successful (Panel B, Table 5.8). Thirdly, we also re-estimate our model using Heckman's correction procedure to deal with initial conditions (Panel C, Table 5.8). The estimation results using these various procedures are quite similar to the results presented above, which reinforces our findings presented in the previous subsections 5.5.1 and 5.5.2.

## 5.6 Conclusion

This chapter aims to examine empirically the dynamic interdependence of internationalization and innovation decisions by SMEs in a developing economy. More specially, the chapter investigates whether there is persistence in innovation and international decisions among SMEs and whether this persistence, if any, is a true or spurious persistence. We also examine whether the persistence of one activity determines the persistence of the other activity when persistence is present in both activities. We also distinguish two types of innovation: product innovation and process innovation. We consider a firm to be internationalized if it exports, sells to foreign investment firms (so-called domestic export), has business relationship with foreign partners, or purchases inputs from abroad. We use a large and rich set of firm-level data on SMEs, collected biannually from 2005 to 2013 in Viet Nam. Dynamic random effects probit and bivariate probit models are employed to examine the dynamic interdependence of internationalization and innovation decisions.

Similar to Esteve-Pérez and Rodríguez (2013), our results show high persistence in carrying out process and product innovations and engaging in international activities. Furthermore, we find that, for non-micro firms, past internationalization has a positive effect on process innovation in the subsequent period. However, past process innovation does not have a significant effect on internationalization of these firms. For this group of firms, we also find signs of cross-dependence between process innovation and internationalization. Our empirical results, however, do not show dynamic interdependence between

Table 5.8: Robustness Check

	Panel A			Process Innovation	Process Innovation	Internationalization	Process Innovation	Internationalization
	Process Innovation	Internationalization	Process Innovation					
Lagged process innovation	0.233*** [0.052]	0.085 [0.068]	0.205 [0.147]	0.154** [0.072]	-0.213 [0.287]	0.058 [0.070]		
Lagged internationalization	0.110* [0.062]	0.930*** [0.099]	-5.023*** [0.383]	0.132* [0.068]	0.456 [0.656]	0.930*** [0.098]		
Having college degree (lagged)	0.102** [0.050]	0.197*** [0.072]	0.149 [0.148]	0.086 [0.064]	0.434* [0.246]	0.181** [0.073]		
Non-micro firm (lagged)	0.203*** [0.046]	0.319*** [0.074]	0.020 [0.106]	0.123* [0.075]	-0.046 [0.184]	0.225*** [0.085]		
Labor productivity (lagged)	-0.101*** [0.032]	-0.047 [0.051]	-0.067 [0.088]	-0.074* [0.042]	-0.295 [0.240]	-0.033 [0.052]		
Being incorporated firm	0.309*** [0.052]	0.640*** [0.076]	0.205 [0.458]	0.244*** [0.065]	-5.035*** [0.371]	0.514*** [0.080]		
Firm age	-0.060* [0.033]	0.026 [0.053]	-0.009 [0.075]	-0.049 [0.050]	-0.050 [0.197]	0.051 [0.057]		
N	5928	5928	3097	2831	3097	2831		

continued on next page

**Table 5.8** continued

	Process Innovation		Internationalization		Panel B		Process Innovation		Internationalization	
	Innovation	Internationalization	Innovation	Internationalization	Innovation	Internationalization	Innovation	Internationalization	Innovation	Internationalization
Lagged process innovation	0.160*** [0.062]	0.045 [0.064]	0.053 [0.114]	-0.078 [0.217]	0.176** [0.076]	0.019 [0.068]				
Lagged internationalization	0.148** [0.069]	0.918*** [0.091]	-0.492 [0.419]	0.440 [0.336]	0.169** [0.072]	0.927*** [0.094]				
Having college degree (lagged)	0.086 [0.054]	0.202*** [0.064]	0.068 [0.121]	0.109 [0.198]	0.079 [0.062]	0.197*** [0.068]				
Non-micro firm (lagged)	0.156*** [0.050]	0.335*** [0.064]	0.035 [0.079]	0.123 [0.134]	0.113* [0.065]	0.291*** [0.076]				
Labor productivity (lagged)	-0.091*** [0.034]	-0.045 [0.044]	-0.130* [0.068]	0.037 [0.145]	-0.064 [0.042]	-0.057 [0.046]				
Being incorporated firm	0.235*** [0.057]	0.613*** [0.066]	0.111 [0.166]	0.462** [0.215]	0.180*** [0.063]	0.497*** [0.071]				
Firm age	-0.047 [0.036]	0.039 [0.047]	0.054 [0.059]	0.044 [0.129]	-0.071 [0.048]	0.052 [0.052]				
N	8,357	8,357	4,418	4,418	3,939	3,939				

Note: Standard errors in brackets; \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01. The estimates presented in this table are marginal effects. Estimations are based on Gauss-Hermite quadrature approximations using 12 quadrature points. We also use 16 and 24 quadrature points to check the accuracy.  
Source: Author.

internationalization and product innovation. For micro firms, we do not find any evidence relating to the interdependence of internationalization and both types of innovation.

We find that non-micro firms that had both international activities and process innovation activities in this period have the highest probability of continuing to have international activities in the subsequent period. Moreover, the probability of non-micro firms that had either international activities or implemented process innovation in the last period to continue such activities in the next period is 50 percentage points and 8 percentage points higher, respectively, than those that did not. Our result also indicates a cross-persistence in these activities, although such cross-persistence is not high.

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\* ADBI recognizes “China” as the People's Republic of China.

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PART II  
**Finance**

# 6

## The Impact of Finance on the Performance of Thai Manufacturing SMEs

*Yot Amornkitvikai and Charles Harvie*

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### 6.1 Introduction

Small and medium-sized enterprises (SMEs) are the lifeblood of the Thai economy, contributing significantly to social and economic development (Brimble et al. 2002). They accounted for 99.2% of business establishments and 79.1% of total employment between 2007 and 2013. SME production also represented 37.5% of gross domestic product (GDP) during the same period (Table 6.1). However, SME contribution to the country's GDP has gradually declined from 38.2% in 2007 to 37.4% in 2013. Thai manufacturing SMEs played a leading role in the economy, accounting for 19.6% of business establishments, 27.1% of total employment, and 11.6% of GDP from 2007 to 2013 (Table 6.1). SMEs also assist large enterprises in regional production networks, since they link all key units of industry and fill gaps in industrial clusters that may not be completed by large enterprises alone (Regnier 2000, Mephokee 2004). As suggested by Tapaneeyangkul (2001), SMEs are key sources of supply of goods, services, information, and knowledge for large enterprises, and play a pivotal role in the production process of export goods.

Harvie (2002), however, also pointed out that there are five main difficulties obstructing SME development: (i) access to markets, (ii) access to technology, (iii) access to human resources, (iv) access to financing, and (v) access to information. Similarly, Payasavatsut (2008, p. 294) also mentioned that SMEs confront common constraints in their operations such as limited access to market information and promotional support from government agencies, shortage of financial support, lack of management capabilities, inadequate skilled labor, and uncertainties in government support programs. Charoenrat et al. (2013)

**Table 6.1: Contribution of Manufacturing SMEs to the Thai Economy, 2007–2013**

Enterprises	2007	2008	2009	2010	2011	2012	2013
<b>Business numbers</b>							
SMEs (% of total firms)	99.6	99.7	99.8	99.6	99.8	98.5	97.2
Manufacturing SMEs (% of total firms)	28.2	19.2	18.9	18.6	17.8	17.4	16.9
<b>SME employment</b>							
SMEs (% of total employment)	76.0	76.2	78.2	77.9	83.9	80.4	80.96
Manufacturing SMEs (% of total employment)	29.6	29.6	26.8	25.9	24.8	26.3	26.6
<b>GDP of SMEs</b>							
SMEs (% of total GDP)	38.2	38.1	37.8	37.1	36.6	37.0	37.4
Manufacturing SMEs (% of total GDP)	11.7	11.8	11.5	12.0	11.4	11.4	11.1
<b>SME exports</b>							
Total exports (% of total GDP)	61.9	64.5	57.4	60.5	63.6	62.3	58.1
SMEs (% of total exports)	30.1	28.9	30.1	27.3	29.4	28.8	25.5
SMEs (% of total GDP)	18.7	18.6	17.3	16.5	18.7	18.0	14.8

GDP = gross domestic product, SMEs = small and medium-sized enterprises.

Source: Office of Small and Medium Enterprises Promotion, 2007–2013. *The White Paper on Small and Medium Enterprises of Thailand and Trends*. Bangkok.

also revealed that SMEs face rigid barriers to their future growth and development in areas including access to finance, exporting, marketing, information technology, innovation, management skills, and government bureaucracy and regulations.

The financing challenges faced by SMEs have brought considerable attention from researchers and practitioners, since limited access to financing limits the economic growth and productivity of SMEs which sustains the large productivity gap between large and small firms, wage and income inequality, and poverty (Punyasavatsut 2011; International Trade Centre 2015, p.15). SMEs face a “financing gap,” since they have considerable difficulty relative to large enterprises in receiving formal financing, and therefore rely heavily on internal financial sources, which can constrain their growth<sup>1</sup> (OECD 2006; Harvie et al. 2013). As SMEs

<sup>1</sup> This is consistent with the so called “pecking order hypothesis” where SMEs utilize internal sources of finance first, as it is the least expensive, before accessing external sources such as in the form of debt.

also have fewer financing alternatives than large enterprises, they are impacted more by changes in market credit conditions (OECD 2015). In addition, most banks in Thailand will not apply the national definition of SMEs in their lending policy, where an enterprise is categorized as an SME if it has fewer than 200 employees and fixed capital of less than B200 million for production. Instead, each financial institution applies its own definition of an SME, such as sales less than B500 million and/or a credit line less than B200 million (OECD 2005). This makes access to finance even more difficult for those SMEs that do not align with the definitions used by banks. Definitions for SMEs are different across financial institutions. SME loans as indicated in Table 6.2, therefore, are based upon the various definitions of SMEs used by banks.

According to the Office of Small and Medium Enterprises Promotion (2013), there were 2.8 million SMEs in Thailand in 2013, constituting 97.2% of total enterprises. Even though SMEs dominated enterprises in Thailand in 2013, their business loans, equal to approximately \$72.2 billion, accounted for only 38.7% of total business loans. This problem has been exacerbated by systemic volatility in financial markets in the past, such as the Asian financial crisis in 1997 and the recent global financial crisis. According to OECD (2005), these financial crises have changed the lending behavior of Thai banks. Banks now consider credit risk besides considering adequate capital alone (OECD 2005). The percentage of SME nonperforming loans decreased from \$3 billion in 2007 to \$2 billion in 2013 (Table 6.2). In terms of the percentage of total business loans, nonperforming loans decreased from 7.9% in 2007 to 3.1% in 2013. However, with extreme risk aversion pervading bank lending behavior in Thailand, the value of collateral required has increased dramatically, from 1.7% of total SME loans in 2007 to 16.6% in 2012.

Short-term loans have become an increasingly important source of finance for SMEs; they increased by 179.6%<sup>2</sup> over the period 2007–2013. Long-term loans increased by 35.9%<sup>3</sup> over the same period. SMEs are charged higher interest rates than are large enterprises, with an average 1.6% difference in interest rates for loans to SMEs and large enterprises over the period 2007–2013. This implies that banks consider the business operations of SMEs riskier than those of large firms. Punyasavatsut (2011) acknowledged that Thai SMEs are likely to use their own or family funds to start and operate their businesses. Nevertheless, external

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<sup>2</sup> The growth of short-term loans is calculated by considering Thai baht, but this figure would be 214.4% if we use US dollars instead.

<sup>3</sup> The growth of long-term loans is calculated by considering Thai baht, but this figure would be 52.0% if we use US dollars instead.

Table 6.2: SME Loans for Thailand, 2007–2013

Indicators	Definitions	2007	2008	2009	2010	2011	2012	2013
<b>Debt</b>								
Business loans, SMEs	\$ billion	38.5	43.7	45.6	52.9	56.7	66.3	72.2
Business loans, total	\$ billion	136.9	164.0	169.5	137.7	154.0	176.4	186.4
Business loans, SMEs	% of total business loans	28.1	26.6	26.9	38.4	36.8	37.6	38.7
Short-term loans, SMEs	\$ billion	16.7	19.4	20.2	30.7	25.7	31.8	52.6
Long-term loans, SMEs	\$ billion	21.8	24.3	25.4	22.1	28.8	34.3	33.1
Total short- and long-term loans, SMEs	\$ billion	38.5	43.7	45.6	52.8	54.5	66.1	85.7
Short-term loans, SMEs	% of total SME loans	43.4	44.4	44.2	58.1	47.1	48.1	61.4
Loan guarantees outstanding, SBGC	% billion	–	–	–	2.0	2.8	4.6	8.6
Nonperforming loans, total	\$ billion	13.1	11.9	12.0	0.0	4.8	4.8	4.5
Nonperforming loans, SMEs	\$ billion	3.0	3.0	3.5	2.4	2.0	2.2	2.2
Nonperforming loans, SMEs	% of total business loans	7.9	6.8	7.6	4.5	3.6	3.3	3.1
Nonperforming loans, large	% of total business loans	9.6	7.3	7.1	–	3.1	2.7	–
Interest rate, SME average rate	%	5.9	6.3	6.6	7.1	8.1	7.0	6.4
Interest rate spread (between average interest rate for loans to SMEs and large firms)	%	1.2	1.3	1.4	–	2.7	1.5	1.3
Collateral, SMEs	\$ billion	22.9	66.0	103.5	90.0	307.3	342.9	–
Collateral, SMEs	Value of collateral provided by SMEs over SME business loans, %	1.7	4.5	6.6	5.4	17.8	16.6	–
Average exchange rate (Thai baht: 1 US dollar)		34.56	33.36	34.34	31.73	30.49	31.09	30.73

SBGC = Small Business Credit Guarantee Corporation, SME = small and medium-sized enterprise.

Note: Average exchange rate was used to convert Thai baht (B) to US dollars (\$).

Source: Organisation for Economic Co-operation and Development (OECD), 2015. *Financing SMEs and Entrepreneurs 2015: An OECD Scoreboard*. Paris.

finance is still important for extended credit, with commercial banks playing a leading role for Thai SME finance, since SMEs can have more chance in accessing loans provided by 30 commercial banks with 9,664 branches across the country. Commercial banks' total assets accounted for 47.9% of the total assets of financial institutions in 2015 (Bank of Thailand 2015a).

Commercial banks provided \$396.28 billion in loans to enterprises in Thailand in 2014, amounting to 3.51 times that of government-owned specialized financial institutions' (SFIs) outstanding loans at the end of 2014 (Table 6.3). In recent years, however, government-owned specialized financial institutions (SFIs) have become increasingly important for Thai SMEs, since they are another important source of finance for start-ups (SME Bank 2015). They were established to stabilize the country's economy via targeted groups such as low-income households and SMEs. At the end of 2014, government-owned SFIs provided loans to households and enterprises in Thailand amounting to \$119.29 billion. In recent years, the operations of government-owned SFIs have been carried out in response to the government's policy, which aims to alleviate effects from economic downturn and to facilitate access to capital for Thai SMEs. Slow growth in the domestic and global economy adversely impacted SMEs, which then affected the credit quality of government-owned SFIs because most of their customers are SMEs, which have lower levels of financial strength and adaptability compared with large enterprises (SME Bank 2015).

The Small and Medium Enterprise Development Bank of Thailand (SME Bank) was established to assist start-up SMEs or improve their businesses by providing loans, guarantees, venture capital, and counseling services. At the end of 2014, SME Bank had provided loans for 82,306 entrepreneurs, accounting for \$2.62 billion (Table 6.4). The Thai Credit Guarantee Corporation (TCG) was also established in 1991 to help small firms obtain credit from financial institutions through a guarantee service for Thai SMEs that had the potential to expand their businesses and generate profits into the future but lacked collateral security. A nonprofit organization owned by the government, TCG has become a key driver in strengthening SMEs' ability to obtain more credit from financial institutions. It has also assisted in improving the social and economic growth of the country. The TCG has outstanding guarantees greater than that of other government-owned SFIs' outstanding loans. At the end of 2014, the approval of guarantee outstanding of the TCG stood at \$12.05 billion and outstanding credit guarantees at \$8.3 billion (Table 6.3), assisting 92,393 SMEs to acquire \$19.68 billion in loans from financial institutions. These enterprises employed 2.76 million workers in 2014 (TCG 2014).

**Table 6.3: Government-Owned Specialized Financial Institutions and Commercial Banks' Loans and Credit Guarantees in Thailand (\$)**

Year	SFIs	Growth Rate (%)	TCG	Growth Rate (%)	SMC	Growth Rate (%)	Local Banks	Growth Rate (%)	Foreign Banks	Growth Rate (%)	All Commercial Banks	Growth Rate (%)
2007	48.87		0.65		0.06		163.50		16.71		180.22	
2008	55.70	14.0	0.66	1.3	0.05	(7.4)	205.30	25.6	20.98	25.5	226.28	25.6
2009	65.01	16.7	1.16	77.3	0.04	(33.7)	202.85	(1.2)	24.53	17.0	227.38	0.5
2010	84.22	29.5	2.30	97.8	0.04	7.1	245.32	20.9	30.87	25.8	276.20	21.5
2011	105.23	24.9	3.71	61.3	0.05	26.9	286.37	16.7	34.41	11.5	320.79	16.1
2012	115.57	9.8	5.81	56.6	0.12	160.3	326.61	14.1	36.19	5.2	362.81	13.1
2013	120.86	4.6	7.93	36.6	0.19	53.5	364.90	11.7	36.70	1.4	401.61	10.7
2014	119.29	(1.3)	8.30	4.7	0.29	54.2	362.27	(0.7)	34.01	(7.3)	396.28	(1.3)

(-) = negative number, SFIs = government-owned specialized financial institutions, which consist of (i) government savings banks, (ii) Bank for Agriculture and Agriculture Co-operatives, (iii) Government Housing Bank, (iv) Islamic Bank, (v) Export-Import Bank of Thailand (EXIM Bank), and (vi) Small and Medium Enterprise Development Bank; SMC = Secondary Mortgage Corporation, TCG = Thailand Credit Guarantee Corporation.  
 Sources: Bank of Thailand, 2015. Commercial Banks' Loans, Deposits, and L/D Ratio. Bangkok. <http://www.2.bot.or.th/statistics/BOTWEBSTAT.aspx?reportID=155&language=ENG> (accessed 20 October 2015); and Government of Thailand, Ministry of Finance, 2015. Table of Loans and Deposits of Specialized Financial Institutions. Fiscal Policy Office, Bangkok. [www.fpo.go.th/FPO/index2.php?mod=Category&file=categoryview&categoryID=CAT0001360](http://www.fpo.go.th/FPO/index2.php?mod=Category&file=categoryview&categoryID=CAT0001360) (accessed 21 October 2015).

**Table 6.4: Government-Owned Specialized Financial Institutions' Outstanding Loans and Credit Guarantees in Thailand (\$ billion)**

Year	GSB	Growth Rate (%)	BAAC	Growth Rate (%)	GHBank	Growth Rate (%)	Islamic Bank	Growth Rate (%)	EXIM Bank	Growth Rate (%)	SME Bank	Growth Rate (%)
2007	13.51	-	15.04	-	17.26	-	0.32	-	1.49	-	1.26	-
2008	16.35	21.00	17.52	16.51	18.50	7.21	0.50	55.65	1.52	2.33	1.31	4.09
2009	22.76	39.23	19.09	8.93	18.85	1.90	1.11	121.03	1.55	1.85	1.66	26.49
2010	35.04	53.95	21.35	11.84	20.78	10.21	2.71	145.47	1.78	14.91	2.56	54.56
2011	44.33	26.52	29.32	37.37	22.43	7.94	3.80	40.15	2.15	20.56	3.20	24.90
2012	47.97	8.21	35.73	21.87	22.71	1.26	3.89	2.20	2.14	(0.06)	3.11	(2.69)
2013	50.09	4.41	38.04	6.45	23.96	5.51	3.52	(9.37)	2.20	2.44	3.04	(2.32)
2014	49.42	(1.33)	37.12	(2.42)	24.45	2.04	3.43	(2.60)	2.25	2.51	2.62	(13.99)

( ) = negative number, BAAC = Bank for Agriculture and Agriculture Co-operatives, EXIM Bank = Export-Import Bank of Thailand, GHBank = Government Housing Bank, GSB = government savings banks, SME Bank = Small and Medium Enterprise Development Bank.

Source: Government of Thailand, Ministry of Finance. 2015. Table of Loans and Deposits of Specialized Financial Institutions (SFIs). Fiscal Policy Office. Bangkok. [www.fpo.go.th/FPO/index2.php?mod=Category&file=categoryview&categoryID=CAT0001360](http://www.fpo.go.th/FPO/index2.php?mod=Category&file=categoryview&categoryID=CAT0001360) (accessed 21 October 2015).

For SME exporters, the Export–Import Bank of Thailand (EXIM Thailand) is another government-owned SFI. EXIM Thailand has launched a number of financial services in line with government policies and measures to stimulate the Thai economy, such as (i) SME start-up credit, (ii) SME Export Delight, (iii) SME border trade, (iv) SME relocation and expansion, and (v) SME research and development and innovation credit. At the end of 2014, EXIM Thailand granted loans to all exporting enterprises in Thailand amounting to \$2.25 billion (Table 6.4).

Although government-owned SFIs have been increasingly crucial for the development of Thai SMEs, a large number of Thai SMEs have not applied for loans or incentives. According to the World Bank Manufacturing Sector Survey for Thailand (2006), only 3.1% and 3.6% of Thai manufacturing SMEs in the survey applied and received loans from the SME Bank and EXIM Thailand, respectively (Table 6.5). This might be because Thai manufacturing SMEs prefer to obtain loans from commercial banks due to attractive interest rates and greater convenience. In addition, only 1.2% of Thai manufacturing SMEs applied and received credit guarantees from the Thai Credit Guarantee Corporation (Small Business Credit Guarantee Corporation).

In conclusion, Thai manufacturing SMEs rarely apply for and receive loans from government-owned SFIs. They prefer to use their own retained earnings and obtain loans from local commercial banks. To address these problems, this chapter will address the following research questions:

- What are the key sources of finance that significantly contribute to Thai manufacturing SMEs' performance in terms of technical efficiency, export performance, and technological innovation?
- What are the key factors that can enhance Thai manufacturing SMEs' access to finance?
- How can Thai manufacturing SMEs gain better access to finance or improve their performance relating to greater financial access?

This chapter, therefore, aims to examine the key sources of finance that have significantly contributed to Thai manufacturing SME performance as measured by technical efficiency, export performance, and technological innovation performance. The chapter also investigates the key factors that have contributed to SMEs' access to finance. It is important to begin with a review of methodologies, including the concepts of technical efficiency, export performance, and technological innovation, which are presented in the next section.

**Table 6.5: Loans, Guarantees, and Incentives Received from Government-Owned Agencies**  
(\$ billion)

Reasons	SICGC	%	SME Bank	%	EXIM Bank	%	OSMEP	%	BOI	%
Never applied for other reasons	578	75.0	618	80.2	644	83.5	618	80.2	618	80.2
Never applied because process is too long and complicated	21	2.7	24	3.1	21	2.7	24	3.1	24	3.1
Applied and was turned down	3	0.4	9	1.2	6	0.8	9	1.2	9	1.2
Never heard about the scheme	160	20.8	96	12.5	72	9.3	96	12.5	96	12.5
Received the loans/incentives	9	1.2	24	3.1	28	3.6	24	3.1	24	3.1
Total	771	100.0	771	100.0	771	100.0	771	100.0	771	100.0

BOI = Board of Investment; EXIM Bank = Export-Import Bank of Thailand; OSMEP = Office of Small and Medium Enterprises Promotion; SICGC = Small Business Credit Guarantee Corporation (or Thai Credit Guarantee Corporation); SME Bank = Small and Medium Enterprise Development Bank of Thailand.  
Source: World Bank Enterprise Survey, Thailand (2007).

## 6.2 Methodology

### 6.2.1 Firm Performance

In this study, three measures of firm performance—technical efficiency, exports, and technological innovation—will be used, which can be defined as follows:

#### Technical Efficiency Concept

The finance and accounting literature extensively evaluate SME performance by applying financial ratios such as profitability ratios, liquidity ratios, market ratios, and debt ratios. Nevertheless, these financial ratios are just the last performance indicators as they are, in fact, influenced by how firms perform in terms of their efficiency and productivity, and how input and product prices change (Fried et al. 2008). A firm's efficiency and productivity performance, therefore, are fundamental to its financial achievement. Technical efficiency differs from the term “productivity” which refers to “total factor productivity,” since productivity is defined as the ratio of the change in total output over the change in total inputs (Coelli et al. 2005). Technical efficiency, however, is defined as the capacity and ability of a firm to produce the maximum possible output from a given bundle of inputs and a given technology (Coelli et al. 2005).<sup>4</sup> A firm's operation is technically efficient when it operates on the efficient production frontier, but its operation can be technically inefficient when it is under this frontier. Therefore, the technical efficiency concept can analyze a firm's technically optimal production, but the productivity concept cannot be applied in this case. A firm can be technically efficient but can enhance its productivity by changing its scale of operations. In addition, technical efficiency also differs from allocative efficiency which refers to the ability and willingness of a firm to equate its marginal revenue with its marginal cost (Kalirajan and Shand 1999).

#### Exports

Strong export performance plays an important role in driving a country's economic growth, since exports can enhance a firm's

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<sup>4</sup> Productivity is a dynamic concept concerned with identifying changes in output from changes in input. Productivity captures the importance of both technical change and efficiency. Technical efficiency, on the other hand, is a static concept concerned with measuring output from a given input at a point in time. It is interested in measuring this relationship relative to an efficiency frontier. The difference between the efficiency frontier and the actual input–output relationship captures the extent of technical inefficiency.

production efficiency to overcome higher trade barriers and address various market tastes in intense foreign markets. Thai SMEs, however, are still not fully competitive in foreign markets, since they do not have efficient production, good management practices, market capabilities, product and service improvement to meet high international standards, a supply of high-quality labor, advanced technologies, consumer and environmental reliability, and strong networks in running business operations. The Office of Small and Medium Enterprises Promotion (OSMEP 2011) also stated that Thailand's exports heavily rely on large enterprises. The public and private sectors, therefore, should focus more on promoting greater international trade participation by Thai SMEs. Punyasavatsut (2007) also pointed out that Thai manufacturing SMEs are not ready to face intense competition in export markets arising from the country's increased openness and economic integration, and concurrent intense competition from countries with lower labor costs.<sup>5</sup> Hence, it is crucial to evaluate SME performance in terms of exports in this study.

### **Technological Innovation**

According to the OECD (2005, p. 46), an innovation is defined as "the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations." Therefore, the minimum requirement for an innovation is that the product, process, marketing method, or organizational method must be new or significantly improved by a firm (OECD 2005, p. 48). In this study, SME performance is evaluated in terms of technological innovation, which consists of the introduction of new products and processes and significant technological changes to products and processes (OECD 2013). Therefore, innovation is crucial in enhancing productivity and competitive advantages in most developing nations, since the transformation of new ideas into new economic solutions through new products, processes, and services can lead to a more effective and productive use of resources (Crespi and Zuniga 2011).

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<sup>5</sup> Thailand is in a middle-income trap where the country is caught between the need to move away from competitiveness based on low labor costs to involvement in more value-adding activities. The country is finding major problems in moving out of this trap. It cannot compete on the basis of wage costs but is unable to move into activities requiring more knowledge, skill, innovation, and value addition. This is reflected in poor trade performance, particularly by SMEs.

## 6.2.2 Empirical Models Used to Link Key Factors Contributing to the Performance of SMEs

### The Stochastic Production Frontier and Inefficiency Effects Model

To answer part of the first question of the study, a stochastic production frontier and inefficiency effects model can be used to examine the significance of various sources of finance to SME technical efficiency performance. This can be done using a stochastic frontier analysis (SFA). An SFA requires functional forms (e.g., translog or Cobb-Douglas function) to obtain the efficient production frontier, the efficient relationship between firm input and output, and assumes that firms may deviate from this not only because of technical inefficiency but also due to measurement errors, statistical, noise or other nonsystematic influences (Admassie and Matambalya 2002). An SFA also needs strong distribution assumptions for both statistical random errors (i.e., normal distribution) and non-negative technical-inefficiency random variables. Battese and Coelli (1995) presented a model in an attempt to capture the factors that cause technical inefficiency for paddy farmers on an Indian village using panel data. In their model, inefficiency effects are stochastic and the model also allows for the estimation of both technical change in the stochastic frontier and time-varying technical inefficiencies. This chapter, therefore, will apply the Battese and Coelli (1995) model in a cross-sectional context to measure SME technical efficiency and investigate the impact of key sources of finance on Thai SME manufacturing technical efficiency.

### Maximum Likelihood Estimation of a Tobit Model

To answer part of the first and second research questions, this study also empirically investigates the effects of key sources of finance on SME export and technological innovation performance. In this study, the values of technological innovation are bounded between zero and one, since technical innovation represents SMEs' capability to undertake technological innovation initiatives as measured by the percentage of completion of all technological innovation initiatives. The value of exports is also bounded between zero and one, since exports are measured by the percentage of exports to total sales. In some cases, SMEs reported that they did not participate in technological innovation initiatives and exports. Focusing on the key factors contributing to SMEs' access to finance, the proxies used to quantify their access to finance are the amount of interest paid and loans received besides the use of binary variables for access to finance. The nature of the data in the

2006 World Bank Manufacturing Sector Survey, therefore, would cause the dependent variable (technological innovation, exports, interest, and loans) to be left-censored to zero. The maximum likelihood Tobit model, which is known as a censored regression model, can be applied in this study. According to Kumbhakar and Lovell (2000) and Coelli et al. (2005), applying the method of ordinary least squares (OLS) will lead to biased and inconsistent estimators, since the OLS method is likely to estimate values greater than one. Therefore, the maximum likelihood estimation for a left-censored Tobit model is applied in this study.

### **Maximum Likelihood Estimation of a Probit Model**

To answer the second research equation, the maximum likelihood estimation of a Probit model is also employed in this study, since the proxy for SMEs' access to finance is the probability of a Thai SME accessing external finance, including access to banks or financial institutions, government-owned financial institutions, and private commercial banks (local and foreign commercial banks). The Probit model is also more popularly compared with the Logit model, since economists are likely to favor the Probit model's normality assumption<sup>6</sup> (Wooldridge 2013). In addition, the Probit model's method of maximum likelihood estimation automatically accounts for the heteroskedasticity problem (Wooldridge 2013).

## **6.3 Literature Review**

The financing constraints of SMEs can be referred to as the problem of information asymmetry, since financial institutions perceive SMEs as being more risky compared with large enterprises due to lack of collateral, credit history, and credit rating as well as the opaque manner in which these businesses operate. SMEs, therefore, confront financial constraints from external lenders, since lenders are worried about their adverse selection costs and increased risk of moral hazard behavior with SMEs. Referring to the pecking order theory, entrepreneurs use internal

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<sup>6</sup> Probit and logit models are the two most common techniques for estimation of models with a binary dependent variable, which impose the assumption that individuals with a probability of 0.5 of selecting either of two alternatives are most sensitive to changes in independent variables. The scobit (or skewed-logit) model, however, might be appropriate where individuals with any initial probability of selecting either of two alternatives are most sensitive to changes in independent variables (Nagler 1994). However, this is beyond the scope of the present study.

sources of finance first, and then debt is used over equity if external finance is required (Mayers and Majluf 1984). Watson and Wilson (2002) also found that retained earnings are preferred over debt for SMEs, and debt will be preferred over issuance of new shares to investors as each of these financial sources gets steadily more expensive. According to Beck et al. (2006) external finance is more costly than internal sources due to asymmetric information and agency problems. A number of empirical works have studied SME sources of finance and obstacles in accessing external financing as follows.

Beck et al. (2006) used the World Bank Environment Survey conducted in 1999 and 2000 on a sample of over 10,000 firms across 80 developing and developed countries. They found that older, larger, and foreign-owned enterprises reported fewer financing obstacles. In addition, institutional development is the most important country attribute in explaining cross-country variation in a firm's financing obstacles.

Beck et al. (2008) used a firm-level survey database covering 48 countries to examine how financial and institutional development affects financing of large and small enterprises. They suggested that the pecking order theory holds across nations. They also found that small enterprises and enterprises in countries with poor institutions use less external finance, especially bank financing. Protection of property rights, which represents better institutions, also increases access to external financing for small enterprises and significantly more than that of large enterprises. In addition, small enterprises are not likely to use more leasing or trade finance compared with large enterprises, and therefore these sources of finance cannot be substituted when small firms cannot access bank financing. Finally, financially constrained large firms are able to acquire more external financing than small firms can.

Ayyagari et al. (2005) found that financing obstacles affect the growth rate of firms. They also revealed that only the cost of borrowing has a direct impact on firm growth, although firms face other specific financing obstacles such as lack of access to long-term capital and collateral requirements. The imperfections of financial markets due to lack of breadth of coverage and depth of financial availability, such as being corrupt, underfunded, and requiring excessive paperwork, directly affect the cost of borrowing. They also found that firms that have difficulties in posting collateral and limited access to long-term financing are likely to pay high interest rates.

Harvie et al. (2013) employed a structured questionnaire survey of SMEs conducted in eight Asian countries in 2010, consisting of 1,200 SMEs. They found that a number of SMEs still rely on internal financial sources for both start-up and business expansion. External

financing is still important for domestically owned, high growth, less mature, and low-profit SMEs that lack sufficient internal funds and operate in more developed economies. Moreover, they suggested that financial institutions are likely to impose risk premiums or potential credit rationing on SMEs, especially for smaller SMEs, due to their lack of transparency, poor corporate governance, and a higher chance of debt default compared with large enterprises. Finally, they pointed out that access to finance also increases SMEs' innovation capabilities and export market participation.

Wignaraja and Jinjarak (2015) employed the World Bank Enterprise Survey data to investigate the relationship between firm characteristics and SME finance for the People's Republic of China, Indonesia, Malaysia, the Philippines, Thailand, and Viet Nam. They found that SMEs in these countries rely heavily on internal funds due to a lower level of financial and capital market development. In addition, they found that firm characteristics are likely to be correlated with bank borrowing; line of credit availability; and collateral, credit, and lender type. Smaller SMEs are likely to have a significant and negative association with bank borrowing and line of credit availability. Finally, export market participation, firm age, and financial audit make a significant and positive contribution to SME finance.

Punyasavatsut (2011) used an enterprise survey collected by the Economic Research Institute for ASEAN and East Asia (ERIA) in 2010 to examine factors that determine better access to bank credit. He found that 30% of SME financing is from external funds, since most of them use their own funds and from friends and relatives to start up their businesses. They are likely to use overdrafts for their working capital requirements. However, 40% of Thai SMEs, especially small enterprises, gain access to credit, which still mostly depends on banks. In addition, he pointed out that SMEs' main obstacles to gaining financial access are lack of information and advice from financial institutions, cumbersome loan application processes, and inadequate collateral. Thai banks still rely on collateral-based lending practices and lack the knowledge to evaluate SME risk. He also mentioned that the main obstacles for Thai financial institutions in lending to SMEs are inadequate collateral, lack of business experience and sound business plans, nonperforming loan history, and high transaction costs per loan application.

Poonpatpibul and Limthammahisorn (2005) used the Bank of Thailand survey on demand for financial services in 2003 to investigate factors determining credit access to financial institutions for Thai SMEs. They found that a firm's age, assets, and sales growth facilitate better access to credit. In addition, they found that Thai SMEs rely more heavily on debt financing than on equity financing. They also

pointed out that there is evidence of information asymmetry arising between lenders and SMEs in Thailand due to inadequate business experience and financial literacy of SMEs, and insufficient risk-based credit assessment and management. As a result of problems relating to information asymmetry, the country's lending practice is still mostly based on collateral.

## 6.4 Data Source and Data Classification

This study employs the 2006 World Bank Manufacturing Sector Survey for Thailand. In the survey, business owners and top managers in 1,043 manufacturing firms were interviewed. According to the definition of SMEs proposed by the Ministry of Industry, SMEs in Thailand can be defined using two measures: the number of employees or the level of total fixed assets (excluding land). These two measures differ among four different sectors: manufacturing, services, wholesale, and retail. With respect to the Thai manufacturing sector, a firm that either employs not more than 50 workers or has total fixed assets (excluding land) with a value not exceeding B50 million is considered as a small firm. A firm that employs 51–200 workers or has total fixed assets valued between B51 million and B200 million is defined as a medium-sized enterprise. According to this criterion, firms that employ 200 workers or less are classified as SMEs for this study. After excluding the 272 large firms in the survey, the remaining 771 SMEs were used to conduct the empirical analysis in this chapter. The next section provides empirical evidence obtained by employing the methodology in section 6.2 with the data provided in this section.

## 6.5 Empirical Models and Results

According to section 6.2, the stochastic production frontier and inefficiency effects model can be used to investigate the key sources of finance contributing to SME performance as measured by technical efficiency, as is further explained in section 6.1. Other measures of SME performance, such as exports and technological innovation, as well as the key factors affecting SMEs' access to finance are examined in section 6.2.

## 6.5.1 Empirical Models

### The Stochastic Production Frontier and Inefficiency Effects Model

The Battese and Coelli (1995) model can be applied for this study, which employs cross-section data. There are two main parts in the Battese and Coelli (1995) model. The first part shows the estimation of the stochastic frontier production function, which consists of two random errors: (i) random errors ( $V_i, s$ ) and (ii) non-negative random variables ( $U_i, s$ ). The first random error terms, which capture the problems of omitted variables and model misspecification, are assumed to be independently and identically distributed normal random variables with zero means and variances ( $V_i \sim iid N(0, \sigma_v^2)$ ). The second, non-negative random variables, indicate the technical inefficiency effects and are assumed to be independently and identically distributed normal random variables as truncations (at zero) with  $Z_i\delta$  means and variances  $\sigma_u^2$  ( $U_i \sim iid N(0, \sigma_u^2)$ ). Moreover, these two random error terms are assumed to be independently distributed for all firms ( $i = 1, 2, \dots, N$ ). In addition, the second part of the model links a set of independent variables with the inefficiency effects (or the non-negative random variables). Applying the model of Battese and Coelli (1995), this study uses the Cobb-Douglas functional form, which can be written as:

$$\ln(Y_i) = \beta_0 + \beta_1 \ln(L_i) + \beta_2 \ln(K_i) + V_i - U_i \quad (1)$$

where

$Y_i$  = Value added of the  $i$ th firm

$L_i$  = Employee wages and salaries of the  $i$ th firm

$K_i$  = Total fixed assets of the  $i$ th firm

$V_i$  = Random error ( $V_i \sim N(0, \sigma_v^2)$ )

$U_i$  = Non-negative random variable (or technical inefficiency)

( $U_i \sim N(Z_i\delta, \sigma_u^2)$ )

In this study, the inefficiency effects model can be written as follows:

$$\begin{aligned} U_i = & \sigma_0 + \sigma_1 \text{ Firm age}_i + \sigma_2 \text{ Firm size}_i + \sigma_3 \text{ Domestic ownership}_i \\ & + \sigma_4 + \sigma_5 \text{ Innovation}_i + \sigma_6 \text{ CEO experience}_i + \sigma_7 \text{ CEO education}_i \\ & + \sigma_8 \text{ Government - owned SFIs}_i + \sigma_9 \text{ OSMEP}_i + \sigma_{10} \text{ BOI}_i + W_i \end{aligned} \quad (2)$$

$$\begin{aligned}
U_i = & \sigma_0 + \sigma_1 \text{ Firm age}_i + \sigma_2 \text{ Firm size}_i + \sigma_3 \text{ Domestic ownership}_i \\
& + \sigma_4 \text{ Export participation}_i + \sigma_5 \text{ Innovation}_i + \sigma_6 \text{ CEO experience}_i \\
& + \sigma_7 \text{ CEO education}_i + \sigma_8 \text{ Interest}_i + \sigma_9 \text{ Retained earnings}_i \\
& + \sigma_{10} \text{ Local banks}_i + \sigma_{11} \text{ Foreign banks}_i + \sigma_{12} \text{ Family \& friends}_i \\
& + \sigma_{13} \text{ Informal sources}_i + \sigma_{14} \text{ Bank numbers}_i + W_i
\end{aligned} \tag{3}$$

The variable definitions and summary statistics are explained in the Appendix.

### Maximum Likelihood Estimation of Tobit and Probit Models

Besides the analysis of SME technical efficiency, this study also empirically investigates the key sources of finance as well as other factors contributing to SME export and technological innovation performance. The maximum likelihood estimation of a Tobit model is used since the values of exports and technological innovation are measured by the percentage of exports to total sales, which are bounded between zero and one. In addition, a number of SMEs did not report these values, and therefore this would cause the dependent variable (technological innovation and exports) to be left-censored to zero. Therefore, the maximum likelihood estimation for a left-censored Tobit model is adopted and given as follows:

$$\begin{aligned}
y_i^* &= f(\text{firm age}_i, \text{firm size}_i, \text{foreign ownership}_i, \text{CEO experience}_i, \\
&\quad \text{CEO education}_i, \text{government-owned}_i, \text{SFI}_i, \text{OSMEP}_i, \text{BOI}_i, \\
&\quad \text{interest}_i) \\
y_i^* &= f(\text{firm age}_i, \text{firm size}_i, \text{foreign ownership}_i, \text{CEO experience}_i, \\
&\quad \text{CEO education}_i, \text{interest}_i, \text{retained earnings}_i, \text{local banks}_i, \\
&\quad \text{foreign banks}_i, \text{family \& friends}_i, \text{informal source}_i, \text{bank} \\
&\quad \text{numbers}_i) \\
y_i &= \begin{cases} y_i^* & \text{if } y_i^* > 0 \\ 0 & \text{if } y_i^* \leq 0 \end{cases}
\end{aligned} \tag{4}$$

where

$y_i^*$  = Unobserved variable of exports of firm  $i$

$y_i^*$  = Unobserved variable of technological innovation of firm  $i$

For the study of the key sources of finance and other factors on SME access to finance, this study uses the maximum likelihood estimation of Probit and Tobit models, since the dependent variable for access to finance in this study is a binary dependent variable that indicates

1 if a firm can gain access to finance, and 0 otherwise. In addition, the dependent variable for access to finance can be presented as the amount of loans and interest paid. According to the survey, a number of SMEs did not report the amount of loans and interest paid, and therefore this can cause the dependent variable (loans and interest paid) to be left censored at zero. Applying the maximum likelihood estimation of a Probit model, the equations for access to finance of all SMEs are identified and given as follows:

$$Z_i^* = (\text{firm age}_i, \text{firm size}_i, \text{foreign ownership}_i, \text{owner's multiple plants}_i, \text{CEO experience}_i, \text{CEO education}_i, \text{owner family's high wealth}_i, \text{owner family's medium wealth}_i, \text{investment plan}_i, \text{net profit margin}_{t-1}, \text{audited financial statement}_i, \text{collateral}_i, \text{return on assets}_{t-1})$$

$$Z_i^* = (\text{firm age}_i, \text{firm size}_i, \text{foreign ownership}_i, \text{owner's multiple plants}_i, \text{CEO experience}_i, \text{CEO education}_i, \text{owner family's high wealth}_i, \text{owner family's medium wealth}_i, \text{investment plan}_i, \text{net profit margin}_{t-1}, \text{audited financial statement}_i, \text{collateral}_i, \text{return on asset}_{t-1}, \text{auto components}_i, \text{electrical appliances}_i, \text{electronic components}_i, \text{food processing}_i, \text{furniture and wood products}_i, \text{garments}_i, \text{machinery and equipment}_i, \text{rubber and plastics}_i) \quad (5)$$

where,

$Z_i^*$  is unobserved access to external loans; For Probit model  $Z_i$  is 1 if  $Z_i^* > 0$  and  $Z_i$  is 0 if  $Z_i^* \leq 0$ ; For Tobit model  $Z_i$  is  $Z_i^*$  if  $Z_i^* > 0$  and  $Z_i$  is 0 if  $Z_i^* \leq 0$ ;

$Z_i^*$  is unobserved access to banks or financial institutions; For Probit model  $Z_i$  is 1 if  $Z_i^* > 0$  and  $Z_i$  is 0 if  $Z_i^* \leq 0$ ; For Tobit model  $Z_i$  is  $Z_i^*$  if  $Z_i^* > 0$  and  $Z_i$  is 0 if  $Z_i^* \leq 0$ ;

$Z_i^*$  is unobserved access to private commercial banks; For Probit model  $Z_i$  is 1 if  $Z_i^* > 0$  and  $Z_i$  is 0 if  $Z_i^* \leq 0$ ; For Tobit model  $Z_i$  is  $Z_i^*$  if  $Z_i^* > 0$  and  $Z_i$  is 0 if  $Z_i^* \leq 0$ ;

$Z_i^*$  is unobserved access to government-owned SFIs; For Probit model  $Z_i$  is 1 if  $Z_i^* > 0$  and  $Z_i$  is 0 if  $Z_i^* \leq 0$ ; For Tobit model  $Z_i$  is  $Z_i^*$  if  $Z_i^* > 0$  and  $Z_i$  is 0 if  $Z_i^* \leq 0$ ;

In addition, applying the maximum estimation of a Tobit model for access to finance as measured by the amount of loans and interest paid, the maximum likelihood estimation for a left-censored Tobit model is adopted and provided as follows:

$\theta_i^*$  = (firm age<sub>*i*</sub>, firm size<sub>*i*</sub>, foreign ownership<sub>*i*</sub>, owner's multiple plants<sub>*i*</sub>, CEO experience<sub>*i*</sub>, CEO education<sub>*i*</sub>, owner's high wealth<sub>*i*</sub>, owner's medium wealth<sub>*i*</sub>, investment plan<sub>*i*</sub>, net profit margin<sub>*t-1*</sub>, audited financial statement<sub>*i*</sub>, collateral<sub>*i*</sub>, return on assets<sub>*t-1*</sub>)

$\theta_i^*$  = (firm age<sub>*i*</sub>, firm size<sub>*i*</sub>, foreign ownership<sub>*i*</sub>, owner's multiple plants<sub>*i*</sub>, CEO experience<sub>*i*</sub>, CEO education<sub>*i*</sub>, owner's high wealth<sub>*i*</sub>, owner's medium wealth<sub>*i*</sub>, investment plan<sub>*i*</sub>, net profit margin<sub>*t-1*</sub>, audited financial statement<sub>*i*</sub>, collateral<sub>*i*</sub>, return on assets<sub>*t-1*</sub>, auto components<sub>*i*</sub>, electrical appliances<sub>*i*</sub>, electronic components<sub>*i*</sub>, food processing<sub>*i*</sub>, furniture and wood products<sub>*i*</sub>, garments<sub>*i*</sub>, machinery and equipment<sub>*i*</sub>, rubber and plastics<sub>*i*</sub>)

$$\theta_i = \begin{cases} \theta_i^* & \text{if } \theta_i^* > 0 \\ 0 & \text{if } \theta_i^* \leq 0 \end{cases} \quad (6)$$

where  $\theta_i^*$  = Unobserved variable of amount of loans of firm *i*  
 Unobserved variable of interest paid by firm *i*

## 6.5.2 Empirical Results

### Empirical Results from the Stochastic Frontier Analysis

According to the SFA results as indicated in Table 6.6, government-owned SFIs and the Board of Investment (BOI) play a leading role in promoting the technical efficiency of Thai manufacturing SMEs, due to the significant and negative estimated coefficients of these variables associated with SME technical inefficiency. SFIs' operations are likely to be carried out in response to government decisions aimed at helping Thai SMEs, which lack financial strength and adaptability compared with that of large enterprises (SME Bank 2015). In addition, the BOI has promoted improvement of production efficiency for Thai manufacturing SMEs by granting import duty and income tax exemptions. In this study, support from the Office of Small and Medium Enterprises Promotion (OSMEP) is found to be insignificantly related to SME technical efficiency. Unlike SFIs and the BOI, OSMEP mainly provides nonfinancial support for Thai SMEs, which does not help promote SME technical efficiency. With respect to the pecking order theory, this study investigates the contribution of key sources of finance to Thai manufacturing SME performance, such as funds from their retained earnings, family or friends, informal sources given by unlicensed lenders, local commercial banks, and foreign commercial banks.

Based on the magnitude of significance and the estimated coefficients for key internal sources of finance, retained earnings are found to be the most important internal source of finance in this study as indicated in Table 6.6. Thai manufacturing SMEs that employ more retained earnings and used them for working capital are likely to have their technical efficiency enhanced, since they can gain more flexibility by using their own funds, leading to higher levels of technical efficiency. For external sources of finance, Thai manufacturing SMEs that receive loans from foreign commercial banks are likely to have higher levels of technical efficiency. However, other sources of finance, such as funds from informal sources, family or friends, and local commercial banks, are not significantly related to SME technical efficiency. It might be the case that lenders from informal sources and family or friends do not seriously consider the business feasibility of the SME, and that SMEs who borrow money from local commercial banks have limited flexibility in operating their businesses due to too much monitoring by the lender. With respect to entrepreneurial characteristics, SMEs that have CEOs with more working experience are likely to have higher levels of technical efficiency, but SMEs that have CEOs with at least a bachelor's degree are likely to perform worse than those SMEs whose CEOs have below a bachelor's degree. This could be due to the fact that CEOs with vocational, high vocational, or technical training are likely to have more technical expertise than those with a university education due to the latter's focus on more theoretical aspects of learning. Exports also help increase SME technical efficiency due to the existence of a learning-by-exporting effect.

The two null hypothesis tests—(i) the absence of inefficiency effects and (ii) the insignificance of joint inefficiency variables—have been examined. They are strongly rejected at the 1% level of significance, which implies that the model of inefficiency effects exists for the case of Thai manufacturing SMEs and inefficiency effects are a linear function of all explanatory variables for the first model.

### **Empirical Results from the Maximum Likelihood Estimation of the Tobit Model for Export and Technological Innovation Performance**

Besides the SME technical efficiency performance, this study also examines SME performance in terms of exports and technological innovation. As shown in Table 6.7, SMEs that obtain loans and credit guarantees from government-owned SFIs such as the SME Bank, Export-Import Bank of Thailand, and Small Business Credit Guarantee Corporation are likely to perform better in terms of exports than SMEs that do not receive loans and credit guarantees from these institutions.

**Table 6.6: Maximum-Likelihood Estimates for Parameters of the Stochastic Frontier Production Function and the Inefficiency Effects Model**

	Model 1		Model 2	
	Coefficient	Standard Error	Coefficient	Standard Error
<b>Cobb-Douglas stochastic production:</b>				
Constant	0.577	(0.368)	0.8056*	(0.4056)
ln(Labour)	0.858*	(0.028)	0.8377*	(0.0307)
ln(Capital)	0.184*	(0.015)	0.1902*	(0.0143)
<b>Inefficiency effects model:</b>				
Constant	-0.200	(0.450)	0.3798	(0.2864)
Firm age <sub>i</sub>	0.004	(0.008)	-0.0002	(0.0066)
Firm size <sub>i</sub>	0.001	(0.001)	0.0005	(0.0013)
Domestic ownership <sub>i</sub>	-0.002	(0.002)	0.0000	(0.0020)
Export participation <sub>i</sub>	-0.323*	(0.153)	-0.2639	(0.1329)
Innovation <sub>i</sub>	0.008	0.006	0.0127*	(0.0043)
CEO experience <sub>i</sub>	-0.065*	(0.033)	-0.0474*	(0.0193)
CEO education <sub>i</sub>	0.381*	(0.233)	0.2083*	(0.1223)
Government-owned SFI <sub>i</sub>	-0.811*	(0.295)		
OSMEP <sub>i</sub>	-0.566	(1.107)		
BOI <sub>i</sub>	-1.850*	(0.497)		
Interest <sub>i</sub>			-1.0990	(1.2157)
Retained earnings <sub>i</sub>			-0.0074*	(0.0026)
Local banks <sub>i</sub>			0.0002	(0.0015)
Foreign banks <sub>i</sub>			-0.0184*	(0.0098)
Family and friends <sub>i</sub>			0.0034	(0.0030)
Informal sources <sub>i</sub>			-0.0016	(0.0037)
Bank numbers <sub>i</sub>	0.459*	(0.069)	-0.1805*	(0.0644)
sigma-squared	0.340*	(0.100)	0.4165*	(0.0308)
Gamma	0.577*	(0.368)	0.2492*	(0.0619)

BOI = Board of Investment, CEO = chief executive officer, OSMEP = Office of Small and Medium Enterprises Promotion.

Note: Robust standard errors are in parentheses; \* indicates a 5% level of significance; \*\* indicates a 10% level of significance.

Source: Authors.

**Table 6.7: Maximum Likelihood Estimation of a Tobit Model: Sources of Finance Affecting SME Export and Technological Innovation Performance**

Independent Variable	Dependent Variable (Model 1)				Dependent Variable (Model 2)			
	Exports		Innovations		Exports		Innovations	
	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.
Firm age <sub>i</sub>	-0.2542	(0.3580)	-0.0013	(0.0008)	-0.3244	(0.3643)	-0.0013	(0.0008)
Firm size <sub>i</sub>	0.3715*	(0.0459)	0.0004*	(0.0001)	0.3710*	(0.0447)	0.0004*	(0.0001)
Domestic ownership <sub>i</sub>	0.5400 *	(0.1003)	0.0000	(0.0002)	0.4728*	(0.1024)	-0.0001	(0.0003)
CEO experience <sub>i</sub>	-0.1600	(0.4569)	0.0006	(0.0009)	-0.0678	0.4632	0.0006	(0.0009)
CEO education <sub>i</sub>	14.6370*	(6.2856)	0.0484*	(0.0122)	15.6440*	(6.2811)	0.0441*	(0.0122)
Government-owned SFI <sub>i</sub>	22.1646*	(9.0577)	0.0184	(0.0222)				
OSMEP <sub>i</sub>	7.5144	(25.0038)	0.0011	(0.0367)				
BOI <sub>i</sub>	5.4967	(9.6980)	-0.0158	(0.0187)				
Interestv	1.1017*	(0.4804)	0.0023*	(0.0010)	1.3374*	(0.5047)	0.0024*	(0.0010)
Retained earnings <sub>i</sub>					0.0089	(0.1004)	0.0002	(0.0002)
Local banks <sub>i</sub>					-0.1060	(0.1058)	-0.0001	(0.0002)
Foreign banks <sub>i</sub>					0.2867	(0.4300)	-0.0001	(0.0011)
Family and friends <sub>i</sub>					-0.5841	(0.5612)	-0.0002	(0.0006)
Informal sources <sub>i</sub>					-0.5522**	(0.3306)	0.0004	(0.0006)
Bank numbers <sub>i</sub>					-0.7747	(2.1129)	0.0129*	(0.0045)
Constant	-71.7786	(8.8751)	0.2042	(0.0171)	-65.1274*	(11.1501)	0.1744*	(0.0247)
Number of obs.	771		771		771		771	
Prob > F	0.00		0.00		0.00		0.00	
Pseudo R2	0.04		-0.11		0.04		-0.13	

BOI = Board of Investment, CEO = chief executive officer, OSMEP = Office of Small and Medium Enterprises Promotion, SFI = specialized financial institution, SME = small and medium-sized enterprise.

Note: Robust standard errors are in parentheses. \* indicates the 5% level of significance, \*\* indicates the 10% level of significance.

Source: Authors.

However, a significant result is not found for the case of the technological innovation performance of Thai manufacturing SMEs.

SMEs that receive more loans from unlicensed lenders (informal lenders) perform worse in terms of exports than those with no loans from unlicensed lenders. This is because they are generally weaker firms and therefore cannot get access to formal finance. SMEs that pay more interest are likely to have better performance in exports and technological innovation performance than those paying lower total interest charges. More interest paid implies that SMEs with better performance in exports and technological innovation need more external finance for their working capital. For export performance this result is similar to the empirical findings of Harvie et al. (2013), suggesting that SMEs that have larger loans at a lower cost tend to export more.

Moreover, SMEs managed by CEOs with at least a bachelor's degree have better export and technological innovation performance than those managed by CEOs with less than a bachelor's degree. This evidence implies that better performance in export and technological innovation needs the type of theoretical knowledge and managerial skills obtained from a university education rather than specific technical expertise received from vocational, high vocational, or technical training. Similarly, larger SMEs tend to have better export and technological innovation performance, since smaller SMEs tend to face difficulties such as insufficient access to external loans for their investments and lack of efficient resources, economies of scale, and formal contracts with customers and suppliers (Alvarez and Crespi 2003). SMEs that have a higher share of foreign ownership achieve better export performance, since foreign investors bring advanced technology, managerial expertise, good practice in corporate governance, and a strong foreign-market network (Kimura and Kiyota 2007).

### **Empirical Results from the Maximum Likelihood Estimation of Tobit and Probit Models for Access to Finance**

This study examines the key factors affecting SME access to finance, which is classified into (i) access to all external loans, (ii) access to banks or financial institutions, (iii) access to private commercial banks, and (iv) access to government-owned SFIs (Table 6.8). This study also examines their access to finance in terms of the amount of interest paid and loans received besides the use of binary variables for access to finance (Table 6.9). From Table 6.8 it can be seen that SMEs that have collateral and externally certified financial statements are more likely to gain access to all external loans, including loans from banks or financial institutions. Collateral and certified financial statements are required to obtain external loans from all lenders, not just loans from banks or

**Table 6.8: Maximum Likelihood Estimation of Probit Model: SMEs' Access to External Loans and to Banks or Financial Institutions**

Independent Variable	Dependent Variable (Model 1)				Dependent Variable (Model 2)			
	Access to External Loans		Access to Banks or Financial Institutions		Access to External Loans		Access to Banks or Financial Institutions	
	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.
Firm age	0.0059	(0.0077)	-0.0020	(0.0073)	0.0650	(0.0829)	-0.0053	(0.0074)
Firm size	0.0050*	(0.0011)	0.0037*	(0.0010)	0.3833*	(0.0693)	0.0044*	(0.0010)
Foreign ownership	-0.0061*	(0.0022)	-0.0067*	(0.0021)	-0.0065*	(0.0022)	-0.0075*	(0.0022)
Owner's multiple plants	0.2448**	(0.1404)	0.2068**	(0.1137)	0.2340**	(0.1382)	0.2074**	(0.1182)
CEO experience	0.0048	(0.0091)	-0.0121	0.0083	0.0540	(0.0792)	-0.0119	(0.0084)
CEO education	-0.0176	(0.1126)	-0.1104	0.1072	-0.0161	(0.1135)	-0.1144	(0.1086)
Owner family's high wealth	0.2363	(0.2944)	0.4491	0.3070	0.2599	(0.2874)	0.4596	(0.2961)
Owner family's medium wealth	0.0706	(0.1416)	0.0896	0.1346	0.0631	(0.1444)	0.0952	(0.1376)
Investment plan	0.2085*	(0.1068)	0.0185	0.1016	0.2110**	(0.1120)	-0.0475	(0.1055)
Net profit margin <sub>t-1</sub>	-0.1275	(0.0933)	-0.2477	0.2388	-0.1595**	(0.0866)	-0.2725	(0.2544)
Audited financial statement	0.2981**	(0.1801)	0.4121*	(0.1749)	0.2325	(0.1845)	0.3467*	(0.1758)
Collateral	0.6198*	(0.1510)	0.5189*	(0.1479)	0.6422*	(0.1550)	0.5186*	(0.1484)
Return on assets <sub>t-1</sub>	-0.5527**	(0.3159)	-0.3862	0.3012	-0.6303**	(0.3495)	-0.4330	(0.3175)
Auto components					-0.1451	(0.2532)	0.1215	(0.2253)
Electrical appliances					-0.1052	(0.3288)	0.2000	(0.3434)
Electronic components					-0.3959	(0.2720)	-0.0544	(0.2564)
Food processing					-0.3185	(0.2370)	-0.0354	(0.2105)
Furniture and wood products					-0.1909	(0.2288)	0.0942	(0.2043)
Garments					-0.6113*	(0.2025)	-0.3317**	(0.1883)
Machinery and equipment					-0.0444	(0.2358)	0.2851	(0.2135)
Rubber and plastics					-0.2167	(0.1887)	0.3320*	(0.1710)
Constant	-0.9703*	(0.3064)	-0.6401*	(0.2784)	-1.9612*	(0.4109)	-0.6364*	(0.3102)
Number of obs.	771		771		771		771	
Prob > chi2	0.00		0.00		0.00		0.00	
Pseudo R2	0.09		0.07		0.12		0.09	

BOI = Board of Investment, CEO = chief executive officer, OSMPE = Office of Small and Medium Enterprises Promotion, SFI = specialized financial institution, SME = small and medium-sized enterprise.

Note: Robust standard errors are in parentheses, \* indicates the 5% level of significance, \*\* indicates the 10% level of significance.

Source: Authors.

**Table 6.9: Maximum Likelihood Estimation of Tobit Model: SMEs' Loan Size and Interest**

Independent Variable	Dependent Variable (Model 1)				Dependent Variable (Model 2)			
	Loan Size		Interest		Loan Size		Interest	
	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.
Firm age	0.0377	(0.0448)	0.0716**	(0.0421)	0.0206	(0.0452)	0.0460	(0.0421)
Firm size	0.0325*	(0.0054)	0.0350*	(0.0051)	0.0349*	(0.0054)	0.0386*	(0.0053)
Foreign ownership	-0.0300**	(0.0161)	0.0006	(0.0126)	-0.0326*	(0.0160)	-0.0053	(0.0123)
Owner's multiple plants	1.1948*	(0.3910)	1.3823*	(0.3866)	1.1611*	(0.3813)	1.2998*	(0.3520)
CEO experience	0.0276	(0.0556)	-0.0293	(0.0518)	0.0252	(0.0566)	-0.0365	(0.0508)
CEO education	-0.2800	(0.7109)	0.2539	(0.6636)	-0.3023	(0.7116)	0.2130	(0.6579)
Owner's high wealth	1.6223	(1.6963)	0.7678	(1.5992)	1.5661	(1.6113)	0.7174	(1.5205)
Owner's medium wealth	0.6093	(0.9049)	0.4836	(0.8318)	0.6401	(0.9026)	0.5381	(0.8340)
Investment plan	1.6411*	(0.6463)	1.4395*	(0.5903)	1.5420*	(0.6577)	0.9041	(0.6070)
Net profit margin <sub>t-1</sub>	-0.6023*	(0.1711)	-0.3503*	(0.1928)	-0.6457*	(0.1714)	-0.3640*	(0.1763)
Audited financial statement	2.1212	(1.4265)	1.7665	(1.1973)	1.6841	(1.3986)	1.2266	(1.1717)
Collateral	4.7566*	(1.2800)	0.8333	1.0038	4.9121*	(1.2788)	0.8798	(0.9712)
Return on assets <sub>t-1</sub>	-3.3967*	(1.3342)	-3.6552*	(1.3707)	-3.6539*	(1.3671)	-3.9602*	(1.4824)
Auto components					-0.6654	(1.3864)	1.2682	(1.2055)
Electrical appliances					-0.6481	(2.0998)	-1.1272	(2.3200)
Electronic components					-2.6550	(1.7766)	-1.1134	(1.6039)
Food processing					-2.4544**	(1.3644)	-0.4926	(1.2704)
Furniture and wood products					-1.6248	(1.2593)	-1.9072	(1.2754)
Garments					-4.3407*	(1.2388)	-3.3023*	(1.1566)
Machinery and equipment					-0.7058	(1.2924)	1.2704	(1.2135)
Rubber and plastics					-1.2858	(1.0031)	1.1717	(0.9792)
Constant	-1.1764	(2.0932)	-0.2680	(1.7957)	0.9050	(2.1627)	0.9508	(1.9247)
Number of obs.	771		771		771		771	
Prob > F	0.00		0.00		0.00		0.00	
Pseudo R2	0.02		0.02		0.03		0.03	

CEO = chief executive officer.

Note: Robust standard errors are in parentheses, \* indicates the 5% level of significance, \*\* indicates the 10% level of significance.

Source: Authors.

financial institutions, as these help reduce the problems of asymmetric information arising between SMEs and lenders. As shown in Table 6.9, a larger loan size of Thai manufacturing SMEs is likely to increase with their collateral. This finding is similar to the empirical results of Wignaraja and Jinjarak (2015), which suggested that financial audits are significantly and positively related to SMEs' access to bank borrowing and line of credit availability for Thailand and Malaysia. Harvie et al. (2015) also found that collateral is significantly and positively related to the term of the loan for selected Asian countries, and Poonpatpibul and Limthammahisorn (2005) revealed that Thai SMEs' credit access was found to increase with assets mortgaged as collateral.

SMEs which have multiple plants are also likely to gain access to all external loans including banks or financial institutions, since such SMEs are likely to have more assets which can be offered as collateral and are likely to be perceived as less risky by lenders. SMEs with multiple plants tend to have a larger loan size, and the total amount they pay in the form of interest will be higher as indicated in Table 6.9. This result suggests that SMEs with multiple plants need more working capital than those with no multiple plants, and therefore they actively seek external finance from all external lenders including banks or financial institutions. This finding is similar to the finding of Harvie et al. (2013), suggesting that SMEs in Asian countries with multiple businesses tend to gain access to at least two types of external finance. Similarly, larger SMEs are actively seeking external sources of finance including loans from banks or financial institutions. Larger SMEs are found to actively seek to expand their loan size, reflecting a higher cost of debt as measured by interest paid (Table 6.9). This result implies that larger SMEs are likely to produce more goods, leading to more demand for labor and other inputs, and therefore they actively require external sources of finance including loans and working capital from banks or financial institutions. This result is consistent with the findings of Harvie et al. (2013), which found a significant and positive association between SME size and loan size, and is similar to the empirical results of Poonpatpibul and Limthammahisorn (2005), which revealed that Thai SMEs' credit access was found to increase with assets and sales.

The empirical results of this study also suggest that SMEs with more foreign shareholders are financially self-reliant and do not seek external sources of finance including loans and working capital from banks or financial institutions. SMEs with more foreign shareholders tend to reduce their loan size. This is consistent with the findings of Harvie et al. (2013), who found foreign-owned SMEs are not actively seeking external finance, and Wignaraja and Jinjarak (2015), who suggest that SMEs with greater foreign ownership are less likely access bank borrowing

and other lines of credit in Thailand and Malaysia. In addition, SMEs with sound financial strength, as measured by higher levels of net profit margin or return on assets, are less likely to access external sources of finance since they tend to be more financially self-reliant, and therefore require less loans from all external lenders, resulting in a lower cost of debt as measured by interest paid. In other words, this result is consistent with the pecking order hypothesis. In addition, SMEs with an investment plan actively seek external finance, since investment plans require a large amount of funds, and, therefore, external finance is required in launching a new investment. This result is consistent with Harvie et al. (2013), which found that SMEs with a business plan need more loans for their investment and find it easier to access loans because of greater transparency. With respect to entrepreneurial characteristics, having a CEO with more experience or at least a bachelor's degree is not found to be significantly related to SMEs' access to external finance including access to banks or financial institutions.

In this study the age of the SME is also not significantly related to its access to external finance including banks or financial institutions. Similarly, an owner's family wealth is not found to be significantly related to SME access to external finance including banks or financial institutions. With respect to manufacturing subsectors it is found that SMEs in the garment sector are less likely to access external finance, including from banks or financial institutions, than those in textiles as the base group of submanufacturing sectors.<sup>7</sup> In addition, SMEs in garments and those in food processing do not actively seek to increase their loan size compared with those in textiles. Thai SMEs in other submanufacturing sectors are not observed for their statistical significance in this chapter.

Comparing access to private commercial bank finance with government-owned SFI finance (Table 6.10), collateral is required to access finance from private commercial banks, both local and foreign, but it is not found to be important for access to finance from government-owned SFIs. SMEs that provide audited financial statements tend to have more access to finance from private commercial banks as well as government-owned SFIs. SMEs with more plants are more likely to access finance from private commercial banks, but this is not significant for the case of access to finance from government-owned SFIs. SMEs with more foreign ownership are less likely to use finance from both private commercial banks and government-owned SFIs, since they are financially self-reliant and, therefore, are not actively

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<sup>7</sup> To avoid the dummy trap problem, we dropped the textiles industry, which is classified as the base industrial group among submanufacturing sectors in this study.

**Table 6.10: Maximum Likelihood Estimation of the Probit Model:  
SMEs' Access to Private Commercial Banks  
and SMEs' Access to Government-Owned SFIs**

Independent Variable	Dependent Variable			
	Access to Private Commercial Banks		Access to Government-Owned SFIs	
	Coefficient	Robust Std. Err.	Coefficient	Robust Std. Err.
Firm age	0.0097	(0.0074)	-0.0162	(0.0110)
Firm size	0.0042*	(0.0010)	0.0040*	(0.0012)
Foreign ownership	-0.0101*	(0.0022)	-0.0123*	(0.0041)
Owner's multiple plants	0.1600*	(0.0928)	0.0891	(0.1198)
CEO experience	-0.0018	(0.0085)	0.0082	(0.0114)
CEO education	-0.0806	(0.1088)	0.2340	(0.1614)
Owner's high wealth	0.0089	(0.2903)	0.2974	(0.4250)
Owner's medium wealth	-0.0167	(0.1383)	0.2934	(0.2232)
Investment plan	0.0026	(0.1030)	0.0172	(0.1425)
Net profit margin <sub>t-1</sub>	-0.1133	(0.0811)	0.1726	(0.3772)
Audited Financial statement	0.3633*	(0.1833)	0.7443*	(0.4465)
Collateral	0.7662*	(0.1520)	-0.1656	(0.2234)
Return on assets <sub>t-1</sub>	0.0239	(0.1835)	0.0095	(0.2050)
Constant	-0.9064*	(0.2792)	-2.6890*	(0.5056)
Number of obs.	771		771	
Prob > chi2	0.00		0.00	
Pseudo R2	0.10		0.07	

CEO = chief executive officer, SFI = specialized financial institution, SME = small and medium-sized enterprise.

Note: Robust standard errors are in parentheses, \* indicates the 5% level of significance, \*\* indicates the 10% level of significance.

Source: Authors.

seeking external finance. Larger SMEs tend to access finance from both private commercial banks and government-owned SFIs. Larger SMEs are likely to produce more goods and they are also likely to have more ambitious investment plans for further growth, leading to more demand for labor and other inputs used for production, and therefore they are actively seeking external finance from private commercial banks and government-owned financial institutions.

## 6.6 Conclusions and Policy Implications

In summary, our empirical results confirm that retained earnings are still important to enhance SME technical efficiency, but loans from unlicensed lenders (or informal sources) decrease their export performance. External finance from government-owned SFIs can help Thai manufacturing SMEs increase their technical efficiency and export performance. In recent years, government-owned SFIs have initiated working capital and loan programs for Thai SMEs in response to the government's policy of facilitating access to capital sources for Thai SMEs. The results presented suggest that these programs are successful. The groups of borrowers from SFIs are mainly SMEs that are financially constrained and have less adaptability in sourcing finance compared with large enterprises. Unlike in the case of private commercial banks, most SMEs are not seeking external finance from government-owned SFIs. This evidence can be found from the survey, which indicates that only 3.1%, 1.2%, and 3.6% of Thai manufacturing SMEs received loans from the SME Bank, Small Business Credit Guarantee Corporation, and EXIM Thailand in 2006, respectively. Therefore, the financial services provided by these government-owned SFIs should be promoted, since SMEs currently perceive that it is more convenient to use working capital and loans from private commercial banks due to a large number of branches across the country. In addition, the lending process should be closely monitored, since the SFIs' assessment for SME loans may be too lenient. Moreover, government agencies should provide necessary financial information and literacy for Thai SMEs, especially start-up SMEs.

Besides government-owned SFIs, foreign commercial banks can also help increase SME technical efficiency. In addition, the results reveal that larger SMEs have superior performance in export and technological innovation. Therefore, policies to support the success of larger SMEs should be encouraged; this can be accomplished, for instance, by credit financing or equity financing from venture capital funds or the Market for Alternative Investment (MAI). SME age is not significantly related to SME performance as measured by technical efficiency, exports, and technological innovation. Higher costs of debt as measured by interest costs significantly correlated to SME export and technological innovation, since exporting SMEs or innovative SMEs require more loans as reflected by interest paid than non-exporting and non-innovative SMEs. Focusing on CEO characteristics, experience can help increase SME technical efficiency. In reality, start-up SMEs do not have entrepreneurs with high working experience. Workshops and

training for start-up SMEs should be emphasized to provide necessary knowledge in conducting their businesses. CEO education also promotes SME export and technological innovation performance.

Due to asymmetric information and adverse selection costs relating to Thai SMEs, the results show that financial institutions in Thailand still heavily rely on collateral-based lending and SME financial transparency. The reliability of externally audited financial statements can reduce information asymmetry, adverse selection costs paid by lenders, and moral hazard behavior of borrowers. Many SMEs, especially start-up SMEs, do not have the collateral required by financial institutions. For instance, 12.18% of Thai manufacturing SMEs in the survey were found not to have collateral. Relationship-based lending should be promoted to financial institutions in Thailand as this can encourage close linkages between credit officers and potential SMEs, which can help credit officers obtain better information about SME prospects and their business plans. In addition, information sharing through credit bureaus should substitute for collateral as a screening device, but the screening cost should be reduced to promote information sharing among financial institutions. More importantly, credit guarantees provided by the Thai Credit Guarantee Corporation (TCG), previously known as the Small Business Credit Guarantee Corporation, should be promoted for SMEs, especially start-up SMEs, which have insufficient collateral. The network among the TCG, commercial banks, and other government-owned SFIs should be strengthened as this can help Thai SMEs to obtain sufficient credit in a timely manner and allow the institutions to share financial information on SMEs.

For legal issues, the amendment of some sections in the TCG Act should be encouraged, since the TCG has currently limited its guarantee services to banks due to the act. The TCG's guarantee services through the capital market, therefore, should be promoted, since SMEs can access new funds by issuing debt instruments such as debentures backed up by debenture issuance guarantees by the TCG. However, credit guarantees provided for SMEs might lead to nonperforming credit guarantees in the future, and so there should be continuous development of credit risk management tools, such as credit scoring to ensure that each credit type and credit limit are accurately provided for each SME client. This can help protect against overborrowing and the higher risk of moral hazard behavior among SMEs. A certified financial statement is required for SMEs to access external finance, including from private commercial banks and government-owned financial institutions. Hence, transparency and good accounting standards should be promoted for Thai SMEs. This is because it can help reduce the problem of asymmetric information arising between SMEs and lenders

and adverse selection costs borne by financial institutions. In practice, most start-up SMEs lack financial literacy in preparing a good business plan and documentation necessary for loan approval. Seminars, training, or financial services related to improving the financial literacy of SMEs should be promoted, especially to start-up SMEs.

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# 7

## Optimal Credit Guarantee Ratio for Asia

*Naoyuki Yoshino and Farhad Taghizadeh-Hesary*

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### 7.1 Introduction

Small and medium-sized enterprises (SMEs) in Asia are frequently hailed as the backbone of the economies. There is widespread consensus on their significant role in economic growth, employment creation, boosting foreign trade, and poverty alleviation. Over the period 2007–2012, they accounted for 98% of all enterprises and 38% of the gross domestic product (GDP) on average and employed 66% of the national labor force (statistics in this paragraph from ADB 2015). They also play a significant role in trade. Thirty percent of total export value was accounted for by SMEs in Asia on average during the same period. In the People’s Republic of China, SMEs accounted for 41.5% of total export value in 2012, up 6.8% year-on-year, while in Thailand they accounted for 28.8% of total export value, growing 3.7% year-on-year. SMEs that are part of global supply chains have the potential to promote international trade and mobilize domestic demand.

Because of the economic significance of SMEs, it is important to find ways to provide them with stable finance. However, SMEs usually have severe difficulties with raising money. The undersupply of credit to SMEs is caused by asymmetric information, high default risk, and lack of collateral. These factors make it far more difficult for SMEs to access finance compared with large enterprises. Lenders prefer to increase the flow of funds to larger firms, which are not as limited by these factors and are considered lower risk. In order to address this problem, various government and donor initiatives have emerged, in developed as well as developing and emerging economies, to establish credit guarantee schemes (CGSs) to reduce the supply–demand gap in SME finance.

CGSs have been used over the decades in many countries and in various forms to increase the flow of funds to targeted sectors and segments of the economy, including SMEs. A CGS makes lending more attractive by absorbing or sharing the risks associated with lending. A CGS can also increase the amount of funds lent to enterprises beyond its own collateral limits, because the guarantee is a form of collateral. A CGS can assume the additional role of loan assessor and monitor and thereby improve the quality of lending (Zander, Miller, and Mhlanga 2013). However, guarantee funds have a cost, which is paid by fees charged and/or subsidized by the government or a third-party institution.

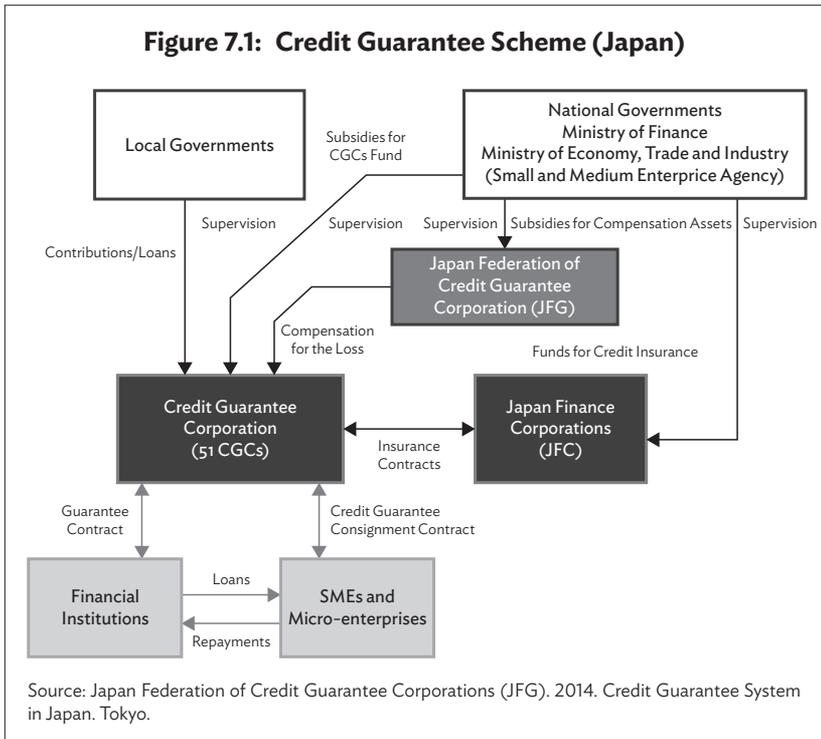
Many countries, such as Japan, previously had full guarantee schemes that covered 100% of the default cost incurred by borrowers (Uesugi, Sakai, and Yamashiro 2006). However, the Government of Japan recently revised its policy and now implements a partial credit guarantee, as the full guarantee created moral hazard: when government covers the full default costs and absorbs the full risk, the lending institution has little incentive to assess and monitor the health of the borrower. This can raise the number of nonperforming loans (NPLs) in the banking system and reduce the productivity of public reserves. Hence, partial credit guarantee schemes can be an optimal model. The guarantee can provide a substitute for collateral-based lending (see Figure 7.1 for Japanese scheme).

However, the literature on loan guarantees leaves three important questions unanswered. First, what is the optimal credit guarantee ratio (i.e., share of the loan covered by the guarantee) to fulfill the government's goal of minimizing banks' NPLs to SMEs and at the same time fulfill the government's objective of supporting SMEs? Second, will the ratio be constant regardless of macroeconomic conditions? Third, should the rate be constant for all banks or should it vary based on a bank's financial soundness? This chapter addresses these three questions.

## 7.2 An Overview of Credit Guarantee Schemes with Examples from Asia

CGSs were used in several countries at least since the early 20th century (Beck, Klapper, and Mendoza 2008). Japan was an early innovator. CGSs spread first throughout Europe and the Americas in the 1950s and then to Africa, Asia, and Oceania in the 1960s and 1970s (Zander, Miller, and Mhlanga 2013).

A CGS normally consists of three parties: a borrower, a lender, and a guarantor. The borrower is often an SME seeking finance. The



borrower typically approaches a bank or other financial institution for a loan. Because of information asymmetry, the loan request is frequently turned down. This is where the guarantor comes in. The guarantor is a credit guarantee corporation (CGC) or agency, which is usually run by a government or trade association and seeks to facilitate access to debt capital by providing lenders with the comfort of a guarantee for a substantial portion of the debt (Riding and Haines 2001).

In Japan, the CGCs are funded by the Ministry of Finance through the Ministry of Economy, Trade and Industry and also by local governments (Figure 7.1). The national government thereby provides direct subsidies to CGCs and subsidies for compensation assets to the Japan Federation of Credit Guarantee Corporations, which provides compensation in case of losses to CGCs. The national government also provides funds for credit insurance to Japan Finance Corporation, which insures the contracts.<sup>1</sup>

<sup>1</sup> Japan Finance Corporation, under the SME Credit Insurance Act (Act No. 264 of 1950), insures guaranteed liabilities (i.e., credit guarantees) provided by CGCs to SMEs and micro businesses that fall short in terms of collateral or creditworthiness

Local governments also support CGCs by providing contributions and loans to them. In 2013, 1.46 million SMEs, out of a total of 3.8 million SMEs, were guaranteed by the CGSs, a coverage share of 37.9%. There are 51 CGCs in Japan, one for each prefecture and one in each of the cities of Kawasaki, Gifu, Nagoya, and Yokohama. At the end of 2013, their total liabilities stood at approximately ¥30 trillion.

A CGS makes it easier for banks to lend to SMEs because if an SME defaults, the CGC will cover a large share of the lender's losses. For example, if the guarantee ratio is 80%, it means when a SME defaults the bank can recover 80%. If there was no guarantee, the bank might not be able to recover any portion of the loan. In Japan, after the tsunami and earthquake disaster of Fukushima in March 2011, the government raised the guarantee ratio to 100% (full guarantee) because many SMEs found it much more difficult to borrow from banks. However, a full guarantee creates a moral hazard regarding banks. In case of a full guarantee, when an SME defaults, the entire loan will be recovered for the bank. As a result, banks do not carefully monitor the business of the SMEs and determine whether they are sound before continuing to lend money. More recently, since the majority of the losses of SMEs after the Fukushima disaster were recovered, the ratio was reset to 80%.

Credit guarantee schemes have been established in several countries throughout Asia, including India, Indonesia, Malaysia, the Republic of Korea, Solomon Islands, and Viet Nam. The guarantee coverage rates vary among countries: in Kazakhstan it is up to 70%, in India 75%, and in Indonesia 70%–80%. The question is, what is the optimal credit guarantee ratio for each country? In the following sections, we provide an overview of CGSs in three countries—Indonesia, the Philippines, and Thailand—and an answer to this question.

## 7.2.1 Indonesia

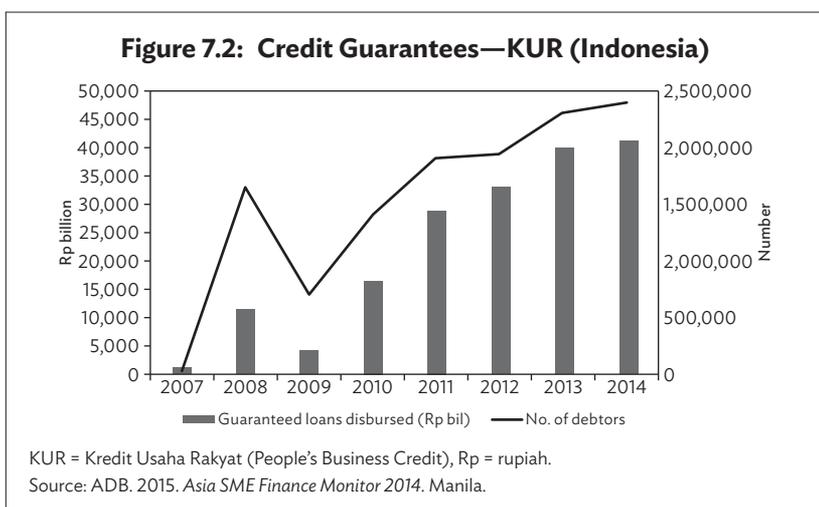
The number of micro, small, and medium-sized enterprises (MSMEs) has been growing annually by more than 2%, and the sector was not seriously damaged by the change in the external environment caused by the global financial crisis of 2008–2009. As of the end of 2013, 57.9 million MSMEs operated in Indonesia, accounting for 99.9% of total

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when raising funds from financial institutions or issuing corporate bonds. The reason behind the establishment of the Credit Insurance System is to promote the development of the MSME sector by insuring guarantees for SME loans and similar liabilities. It is designed so that the Credit Insurance System and the Credit Guarantee System together facilitate the smooth supply of business funds for MSMEs. This mechanism is known as the Credit Supplementation System and plays an important role in the Japanese government's SME finance policy.

enterprises. According to 2011 data, primary industry (agriculture, forestry, and fisheries) accounted for 48.8% of MSMEs, followed by trade (28.8%) as a combined figure of the wholesale and retail trade and the hotel and restaurant sector.

The credit guarantee industry in Indonesia has two layers: central guarantee institutions and regional guarantee institutions. Credit guarantee institutions provide various types of products for MSMEs and cooperatives through banks and nonbanking financial institutions, including Islamic guarantees. People's Business Credit (KUR) is a public credit guarantee scheme designed for MSMEs which guarantees 70%–80% of the credit applied, while the remaining 20%–30% credit risk is taken by participating banks. KUR is delivered by 7 commercial banks and 26 regional development banks, with concessional lending rates. Figure 7.2 shows guaranteed loans disbursed by KUR and number of debtors.



## 7.2.2 Philippines

In the Philippines in 2012, the number of registered MSMEs reached 940,886, a 15.2% increase from the previous year, representing 99.6% of total enterprises. By business sector, MSMEs in trade and repair (wholesale and retail trade and repair of motor vehicles and motorcycles) accounted for 46.4% of total MSMEs in 2012, followed by services with 39.4% and manufacturing with 12.5%. MSMEs employed 64.9% of total workforce employment in the Philippines in 2012.

There are two major credit guarantee programs for MSMEs in the Philippines. One is provided by the Small Business Corporation (SBC), which is a government financial institution, and another is the Credit Surety Fund Program of the Bangko Sentral ng Pilipinas<sup>2</sup> (BSP). The SBC, with a guarantee ratio of 70%, provided P80 million in guarantees during 2013, and P112 million from January to June 2014. The total lending guaranteed by the SBC between 2002 and mid-2014 was P1.6 billion (Table 7.1).

The BSP Credit Surety Fund Program, from the time of its inception in 2008 to 31 October 2014, guaranteed cumulative loans for 10,515 beneficiaries. As of 18 December 2014, 37 CSFs were operating in 27 provinces and 10 cities nationwide.

**Table 7.1: Small Business Corporation's Credit Guarantee Program (Philippines)**

Item	2004	2005	2006	2007	2008	2009
Loan origination (pesos)	287,970,000	228,740,870	316,061,318	212,555,000	166,500,000	82,500,000
Guaranteed amount <sup>a</sup> (pesos)	221,964,500	168,696,109	214,955,744	131,346,500	107,810,172	58,300,000
Guarantee payments (pesos)	2,420,793	664,869	6,216,703	11,607,602	10,448,183	...
Item	2010	2011	2012	2013	2014 <sup>b</sup>	Total <sup>c</sup>
Loan origination (pesos)	136,600,000	40,200,000	182,550,000	134,018,000	194,980,207	2,374,523,395
Guaranteed amount <sup>a</sup> (pesos)	66,890,000	26,390,000	125,635,000	80,312,600	112,286,145	1,604,081,970
Guarantee payments (pesos)	1,122,163	2,106,533	...	...	973,924	35,560,771

SME = small and medium-sized enterprise.

<sup>a</sup> Guaranteed amount is computed as approved credit line or loan amount x guarantee cover (%). Based on historical data, average guarantee cover is 70%, but there were special cases where the guarantee cover is below 70%, such as in 2010.

<sup>b</sup> January to June 2014.

<sup>c</sup> Total amount from 2002 to June 2014.

Source: ADB. 2015. *Asia SME Finance Monitor 2014*. Manila.

<sup>2</sup> The central bank of the Philippines.

In cooperation with the BSP, the Development Bank of the Philippines also offers a CSF credit facility, through which qualified cooperatives and nongovernment organizations (NGOs) may apply for loans, either for relending to their members who need funding for their business (wholesale) or directly to a cooperative or NGO for its own entrepreneurial business activities (retail). Based on the its 2013 annual report, the Development Bank of the Philippines has supported a total of 29 CSFs, with 428 participating cooperatives and NGOs.

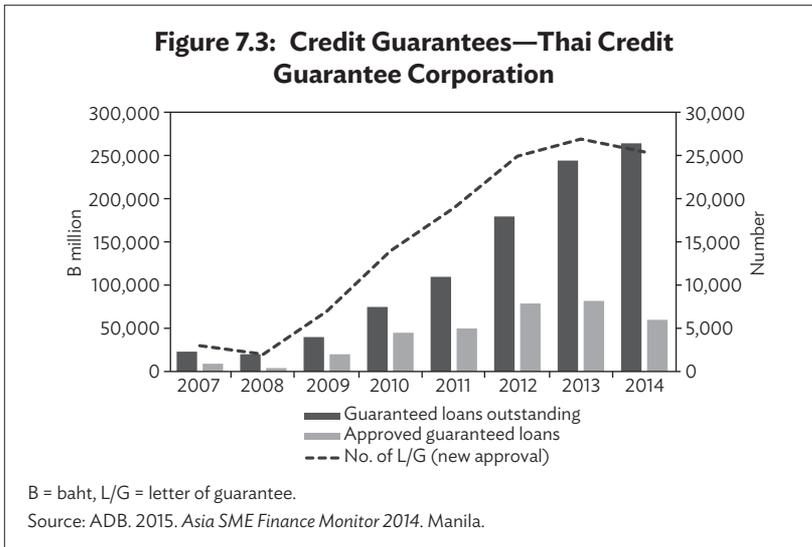
### 7.2.3 Thailand

SMEs play a critical role in driving the Thai economy, accounting for 97.2% of total enterprises and numbering 2.76 million. The SME sector was seriously damaged by the 2008–2009 global financial crisis and the devastating flooding of 2011, with a 9.2% decrease in the number of SMEs in 2011, but the sector has recovered since this. In 2013, 43.5% of SMEs operated in wholesale and retail trade as well as automotive repair, followed by the service sector (including hotels and restaurants) with 39.1%. SMEs employed 11.4 million workers, or 81% of the country's total workforce, in 2013. The service sector was a dominant group in SME employment, accounting for 44.7% of total SME employees, followed by the trade sector at 31.7%.

The Thai Credit Guarantee Corporation is a state-funded guarantee institution started in 2009 as part of economic stimulus measures following the global financial crisis. Its aim is to support SME access to bank loans. The Thai Credit Guarantee Corporation guarantees 100% of the payment stated in each letter of guarantee issued to participating banks, when prosecuted. However, it is done under the condition that the nonperforming guarantee does not exceed 16% of the average guarantee outstanding in each portfolio that pools all guaranteed SME loans from the participating bank every year.

Besides this program, there are specialized portfolio guarantee schemes for (i) start-up SMEs operating for not more than 3 years, which was launched in 2013 with a limit of B10 billion; and (ii) the One Tambon (village) One Product and Community Businesses Scheme, launched in the second half of 2014 with a limit of B10 billion.

The share of guaranteed loans to total SME loans by commercial banks reached 6.1% in 2014, which was almost eight times higher than 2008 (0.8%). Newly approved guarantees amounted to B61,051 million with 25,250 letters of guarantee in 2014 (Figure 7.3).



## 7.3 The Model

We develop a model to calculate the optimal credit guarantee ratio for SME loans. The model differentiates the guarantee ratio based on three factors: (i) the financial soundness of the lending institution, (ii) macroeconomic conditions, and (iii) government policy objectives. With this model, sound institutions can access a higher guarantee ratio than those that are less sound. Furthermore, the ratio would be lower in a better macroeconomic situation because the risk of SME default will decrease. The part of the model used to categorize banks based on soundness draws on the work of Yoshino and Hirano (2011, 2013) and Yoshino, Taghizadeh-Hesary, and Nili (2015).

### 7.3.1 Policy Objective Function

The equation below shows the policy objective function of the government:

$$U = w_1(L - L^*)^2 + w_2(\rho - \rho^*)^2 \quad (1)$$

where  $U$  is the government objective function. Equation 1 shows that there are two objectives for the government in determining the optimal credit guarantee ratio for bank loans to SME. The first objective is to stabilize the quantity of loans to SMEs ( $L - L^*$ ), where  $L$  is actual

SME loans and  $L^*$  is desired SME loans. The second objective of the government is to set the NPL ratio to a desired ratio  $(\rho - \rho^*)$ , where  $\rho$  is the current default risk ratio of loans, and  $\rho^*$  is the desired default risk ratio of loans.  $w_1$  and  $w_2$  in equation 1 are the policy weights for the two objectives.  $w_1$  is the weight for stabilizing SME loans, and  $w_2$  is the weight for reducing the NPL. If the two objectives have equal weight, then  $w_1 = w_2 = 0.5$ .

In equation 1,  $L^* = (1 + a)L_{t-1}$ , where  $a$  is the desired growth rate of SME loans and is set by the government. For example, if the government wants to increase bank lending to SMEs by 2% from the previous year,  $a$  is equal to 0.02. Also in equation 1,  $\rho^* = (1 - b)\rho_{t-1}$ , where  $b$  is the change in the desired NPL ratio compared with the previous year. If the government wants to reduce the NPL ratio by 10% compared with a year earlier, then  $b$  is set equal to 0.1.

The loan demand function for equation 1 is:

$$L = l_o - l_1 r_L + l_2 Y^e \quad (2)$$

where  $l_o$  is the fixed demand for loans,  $r_L$  is the loan interest rate, and  $Y^e$  is expected GDP.  $l_1$  is the coefficient of the interest rate on loans and is theoretically negative. When the interest rate increases, the demand for loans will decrease, which means the slope of the function is negative. In good economic conditions the demand for loans will increase, hence  $l_2$  is expected to be positive.

### 7.3.2 Optimal Credit Guarantee Ratio

Equations 3 and 4 present the profit maximization behavior of banks:

$$\text{Max. } \Pi = r_L(L) L - \rho(g, Y, P_L, P_S, M, Z) L - r_D D - C(L, D) \quad (3)$$

$$\text{Subject to: Bank's balance sheet } (1 - \rho)L + \rho L = D + A \quad (4)$$

where,  $r_L$  is the interest rate on loans, which is the function of loans  $L$ ,  $Y$  is GDP,  $g$  is credit guarantee ratio (for example, 0.80 means 80% of the bank's losses are covered by the credit guarantee corporation and 0.20% are not covered),  $P_L$  is price of land,  $P_S$  is stock price,  $M$  is money supply,  $Z$  represents financial profile of the bank,  $r_D$  is interest rate on deposits,  $D$  is deposits, and  $C$  is the bank's operational costs such as employee wages and computer and equipment costs, which depend on lending and deposits.

When the credit guarantee ratio ( $g$ ) is raised by the supporting organization, which is most often a government entity, it means in case

of SME default, the government share of the loan default burden is increased, hence it will have less pressure on the lending institutions which is a bank, which means share of banks from the loans default risk will decrease  $\rho$ . There is significant empirical evidence regarding the countercyclical behavior of NPLs. The general explanation is that higher real GDP growth usually translates into more income, which improves the debt servicing capacity of borrowers. Conversely, when there is a slowdown in the economy,  $\rho$  is likely to increase as unemployment rises and borrowers have difficulty repaying their debts (Salas and Saurina 2002; Rajan and Dhal 2003; Fofack 2005; Yoshino and Hirano 2011, 2013; Klein 2013; Yoshino, Taghizadeh-Hesary, and Nili 2015). In Yoshino, Taghizadeh-Hesary, and Nili's paper (2015), the loan default risk ratio depends on the various macroeconomic factors mentioned earlier ( $Y, P_L, P_S, M$ ). When land prices increase, collateral value increases as well, so default risk ratio  $\rho$  will decline. When business conditions improve, increases in GDP growth and stock prices cause a reduction in default risk  $\rho$ . Several studies found that NPLs are affected by stock prices, arguing that a drop in share prices might lead to more default via wealth effects and decline in the value of collaterals (Klein 2013). Fofack (2005) found that broad money supply (M2) has positive covariance structure with NPLs in a group of sub-Saharan African countries. An increase in the aggregate stock of money has contributed to a deterioration of bank portfolios in these countries and resulted in the accumulation of NPLs. In a more recent study on the Iranian banking sector, Yoshino, Taghizadeh-Hesary, and Nili (2015) also found significant association between M1 and Iranian Banks' NPLs.

Equation 4 shows the bank's balance sheet. The first component  $(1 - \rho)L$  shows good loans, and the second component  $\rho L$  shows NPLs or bad loans. On the right-hand side of this equation,  $A$  is the bank's capital.

From equation 2, we can write the interest rate on the loan as below:

$$r_L = \frac{1}{l_1} (l_o + l_2 Y^e - L) \quad (5)$$

In the next step, in order to get the amount of loan in equilibrium, we get first-order condition of the bank's profit function with respect to loan  $L$  as:

$$\frac{\partial \Pi}{\partial L} = -\frac{1}{l_1} \times L + \left[ \frac{1}{l_1} (l_o + l_2 Y^e - L) \right] - \rho_{(g, Y, P_L, P_S, M, Z)} - r_D - \rho'_L = 0 \quad (6)$$

Then we write equation 6 for  $L$ . The result is equation 7, which shows the amount of loan in equilibrium:

$$L = \frac{l_1}{2} \left[ \frac{l_0}{l_1} + \frac{l_2}{l_1} Y^e - \rho(g, Y, P_L, P_S, M, Z) - r_D - \rho'_L \right] \quad (7)$$

In the last part, we get the first-order condition of the government policy objective function with respect to the optimal credit guarantee ratio  $g$ :

$$\frac{\partial U}{\partial g} = 2w_1(L - L^*) \cdot \frac{\partial L}{\partial g} + 2w_2(\rho - \rho^*) \cdot \frac{\partial \rho}{\partial g} \quad (8)$$

which is equal to:

$$= 2w_1(L - L^*) \cdot \left( \frac{-l_1}{2} \cdot \frac{\partial \rho}{\partial g} \right) + 2w_2(\rho - \rho^*) \cdot \frac{\partial \rho}{\partial g} \quad (9)$$

In equation 3 we showed that the profit of the bank is a function of various factors including default risk ratio  $\rho$ . The higher the default risk, the lower the profit for the bank (Yoshino and Hirano 2011, 2013). Hence, we need to develop a model to capture those factors that affect this ratio:

$$\rho = f(g, Y, P_L, P_S, M, Z) \quad (10)$$

In the development of model 10, we were inspired by Yoshino and Hirano (2011) and Yoshino, Taghizadeh-Hesary, and Nili (2015). However, model 10 is the modified and updated version of the model presented in these two papers. There are many other scholars who have assessed the impact of macroeconomic variables on bank loan defaults. For instance, Louizis, Vouldis, and Metaxas (2012) found that NPLs in the Greek banking system can be explained mainly by macroeconomic variables (GDP, unemployment, interest rates, public debt, etc.). In a more recent study, Baselga-Pascual, Trujillo-Ponce, and Cardone-Riportella (2015) found that bank loan defaults are directly affected by higher inflation and economic crisis and reversely by liquidity. Although the four macro variables stated in equation 10 (GDP, stock price, land price, and money supply) can capture macro shocks, some banks can fail even if the macrofinancial system is sound. So additional variables are needed that can capture idiosyncratic uncertainty in the economy. This why we inserted  $Z$  in the model—to capture micro shocks to each bank

or to each group of banks.  $Z$  denotes the bank's financial profile, which we will further explain. If the banking behavior improves, it will have an impact on the bank's soundness and on the level of NPLs. Hence, our model has the ability to capture macro and micro shocks. Considering the aforementioned papers' findings, we can write equation 10 as follows:

$$\rho = f(g, Y, P_L, P_S, M, Z) = -\alpha_1 g - \alpha_2 Y - \alpha_3 P_L - \alpha_4 P_S + \alpha_5 M - \alpha_6 Z \quad (11)$$

In the next step, we insert the loan demand function from equation 2 in equation 9, and write the expanded version of  $\rho$  as in equation 11, in equation 9 and then write it for  $g$ , yielding the result below:

$$g = -\frac{1}{\alpha_1 \left( \frac{w_1 l_1^2}{4} + w_2 \right)} \cdot w_1 \frac{l_1^2}{4} \left( \frac{l_0}{l_1} + \frac{l_2}{l_1} y^e - r_D - \rho'_L \right) + \frac{l_1}{2\alpha_1} L^* - \frac{w_2}{\alpha_1} \rho^* - \frac{\alpha_2}{\alpha_1} Y - \frac{\alpha_3}{\alpha_1} P_L - \frac{\alpha_4}{\alpha_1} P_S + \frac{\alpha_5}{\alpha_1} M + \frac{\alpha_6}{\alpha_1} Z \quad (12)$$

As is clear from equation 12, the optimal credit guarantee ratio is a function of various factors including the actual current amount of loans to SMEs, the desired level of SMEs' loans, the desired default risk ratio of loans, fixed demand for loans, deposit interest rate, expected GDP, the weight for stabilizing the SME loans (policy rate), the weight for reducing the NPL ratio (policy rate), marginal increase of NPLs by increase of additional loans, price of land, price of stock, GDP, money supply, and the financial profile of banks. It means based on the macroeconomic situation and government policies for supporting SMEs and for reducing NPLs,  $g$  should vary. On the other hand, each bank has a different  $g$ , because they have different banking behavior.

## 7.4 Empirical Survey

As mentioned in the introduction, the third question of this research is whether a credit guarantee corporation should provide the same guarantee ratio for all lending institutions. Or, should the ratios differ based on the health of the lending institution? As model 12 shows, the optimal credit guarantee ratio depends on banking behavior and should vary based on their soundness. Lenders that are more sound and are managing their NPLs should receive a higher guarantee ratio.

Therefore, we need to categorize banks according to their soundness and adjust the guarantee ratio for each group based on the result. In the

following section we provide an empirical survey for a group of banks from an Asian country, and categorize them based on their soundness. Then, in the last part of section 7.4.1, we will calculate the optimal credit guarantee ratio for each group of banks based on this model.

Section 7.4.2. is for the robustness check of our model, in order to show how the NPL/L (default risk ratio) of NPLs, which is the main factor for calculation of the optimal credit guarantee ratio, changes in different macroeconomic conditions and in different bank-level conditions.

### 7.4.1 Grouping Banks Based on Their Soundness

In our model, healthier banks should receive a higher credit guarantee rate from the government. To enable us to identify the healthier group of banks, classification or credit rating is needed.

Extensive empirical research devoted to analyzing the stability and soundness of financial institutions dates back to the 1960s. Ravi Kumar and Ravi (2007) provided a comprehensive survey of the application of statistical and intelligent techniques for predicting the default of banks and firms. Despite its obvious relevance, however, the development of reliable quantitative methods for the prediction of banks' credit rating has only recently begun to attract strong interest. These studies are mainly conducted within two broad research strands focusing on statistical and machine learning techniques, and may address both feature selection and classification. Poon, Firth, and Fung (1999) developed logistic regression models for predicting financial strength ratings assigned by Moody's, using bank-specific accounting variables and financial data. Factor analysis was applied to reduce the number of independent variables and retain the most relevant explanatory factors. The authors showed that loan provision information, and risk and profitability indicators, added the greatest predictive value in explaining Moody's ratings. Huang et al. (2004) compared support vector machines and backpropagation neural networks to forecast the rating of financial institutions operating in markets in the United States and Taipei, China, respectively. In both cases, five rating categories were considered, based on information released by Standard & Poor's and the ratings corporation in Taipei, China. The analysis of variance was used to discard noninformative features. In this study, support vector machines and neural networks achieved comparable classification results. However, the authors found that the relative importance of the financial variables used as inputs by the optimal models were quite different between the two markets. A study by Orsenigo and Vercellis (2013) presented an empirical evaluation of two linear and nonlinear techniques—principal component analysis (PCA) and double-bounded tree-connected Isomap

(dbt-Isomap)—to assess their effectiveness for dimensionality reduction in bank credit rating prediction, and to identify the key financial variables endowed with the greatest explanatory power. Extensive computational tests concerning the classification of six banks' ratings datasets showed that the use of dimensionality reduction accomplished by nonlinear projections often induced an improvement in the classification accuracy, and that dbt-Isomap outperformed principal component analysis (PCA) by consistently providing more accurate predictions.

In our present research on credit rating of banks we employ the statistical techniques used by Yoshino and Taghizadeh-Hesary (2014a, 2015) for credit rating and classification of SMEs. They used PCA and cluster analysis and applied various financial variables of 1,363 SMEs in Asia. In our present chapter, we assign credit ratings to and classify a group of Asian banks into two groups, so that the healthier group receives a higher credit guarantee than the less-sound group.

To be able to do so and to ensure our results are credible, we need to select variables that capture all relevant characteristics of the banks that are the subject of our examination.

### Selection of Variables

It is widely known that ratings are directly affected by the financial performance of banks. Based on this assumption, we focus on banks' financial profiles and employ eight financial variables that describe all general characteristics of banks (Table 7.2).

**Table 7.2: Variables Examined**

No.	Symbol	Definition
1	L-D	Total loans/total deposits
2	PR-L	Properties/total loans
3	(SD+LD)-D	(Saving deposits + long-term deposits)/total deposits
4	A-L	Total assets/total loans
5	SC-L	Securities/total loans
6	CA-D	Cash/total deposits
7	CBR-D	Accounts receivable from central bank/total deposits
8	OBR-D	Accounts receivable from other banks/total deposits

Note: Properties are land, buildings, and other hard assets owned by banks. Securities include shares of corporate stock or mutual funds, bonds issued by corporations or governmental agencies, limited partnership units, and various other formal investment instruments that are negotiable and fungible. Accounts receivable from the central banks includes reserve requirement (or cash reserve ratio) and other sums that are normally in the form of cash stored physically in a bank vault (vault cash) or deposits made with a central bank. Accounts receivable from other banks are sums loaned to other banks.

Source: N. Yoshino, F. Taghizadeh-Hesary, and F. Nili. 2015. *Estimating Dual Deposit Insurance Premium Rates and Forecasting Non-performing Loans: Two New Models*. ADBI Working Paper 510. Tokyo: Asian Development Bank Institute.

Loans, properties, securities, cash, accounts receivable from the central bank, and accounts receivable from other banks are components of a financial institution's assets. The higher these variables, the more stable and sound a particular financial institution tends to be. At the next stage, two statistical techniques are used: PCA and cluster analysis. The underlying logic of both techniques is dimension reduction (i.e., summarizing information on numerous variables in just a few variables), but they achieve this in different ways. PCA reduces the number of variables into components (or factors), whereas cluster analysis reduces the number of banks by placing them in small clusters. In this survey, we use components (factors), which are the result of PCA, and subsequently carry out a cluster analysis to classify the banks.

### Principal Component Analysis

PCA is a standard data reduction technique that extracts data, removes redundant information, highlights hidden features, and visualizes the main relationships that exist between observations.<sup>3</sup> PCA is a technique for simplifying a dataset by reducing multidimensional datasets to lower dimensions for analysis. Unlike other linear transformation methods, PCA does not have a fixed set of basis vectors. Its basis vectors depend on the dataset, and PCA has the additional advantage of indicating what is similar and different about the various models created (Ho and Wu 2009). Through this method we reduce the eight variables listed in Table 7.2 to determine the minimum number of components that can account for the correlated variance among the banks.

To examine the suitability of these data for factor analysis, we perform the Kaiser–Meyer–Olkin (KMO) test and Bartlett's test of sphericity. KMO is a measure of sampling adequacy to indicate the proportion of common variance that might be caused by underlying factors. High KMO values (higher than 0.6) generally indicate that factor analysis may be useful, which is the case in this study: KMO = 0.61. If the KMO value is lower than 0.5, factor analysis will not be useful. Bartlett's test of sphericity reveals whether the correlation matrix is an identity matrix, indicating that variables are unrelated. A level lower than 0.05 indicates that there are significant relationships among the variables, which is the case in this study: significance of Bartlett's test < 0.05.

Next, we determine how many factors to use in our analysis. Results show that the three factors are significant. (Z1, Z2, and Z3). Taken together, Z1 to Z3 explain 82.421% of the total variance of the financial ratios.

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<sup>3</sup> PCA can also be called the Karhunen–Loève Transform, named after Kari Karhunen and Michel Loève.

In running the PCA, we use direct oblimin rotation. Direct oblimin is the standard method to obtain a non-orthogonal (oblique) solution, i.e., one in which the factors are allowed to be correlated. To interpret the revealed PCA information, the pattern matrix must subsequently be studied. Table 7.3 presents the pattern matrix of factor loadings using the direct oblimin rotation method, where variables with large loadings—absolute value ( $>0.5$ ) for a given factor—are highlighted in bold.

As can be seen in Table 7.3, the first component, Z1, has three variables with an absolute value ( $>0.5$ ), which are all positive—(i) total assets/total loans, (ii) accounts receivable from central bank/total deposits, and (iii) accounts receivable from other banks/total deposits. For Z1, the variables with large loadings are mainly assets, hence Z1 generally reflects the assets of the examined banks. As this factor explains the greatest variance in the data, it is the most informative indicator of a bank's overall financial health. Z2 represents deposits and this component has three major loading variables:

- (i) total loans/total deposits, which is negative;
- (ii) (saving deposits + long-term deposits)/total deposits, which is positive; and
- (iii) cash/total deposits.

If the amount of deposits increases, Z2 increases. Z3 has two major loadings, which are (i) properties/total loans and (ii) securities/total loans, so it reflects 1/total loans. The larger the amount of loans, the smaller is Z3.

**Table 7.3: Factor Loadings of Financial Variables after Direct Oblimin Rotation**

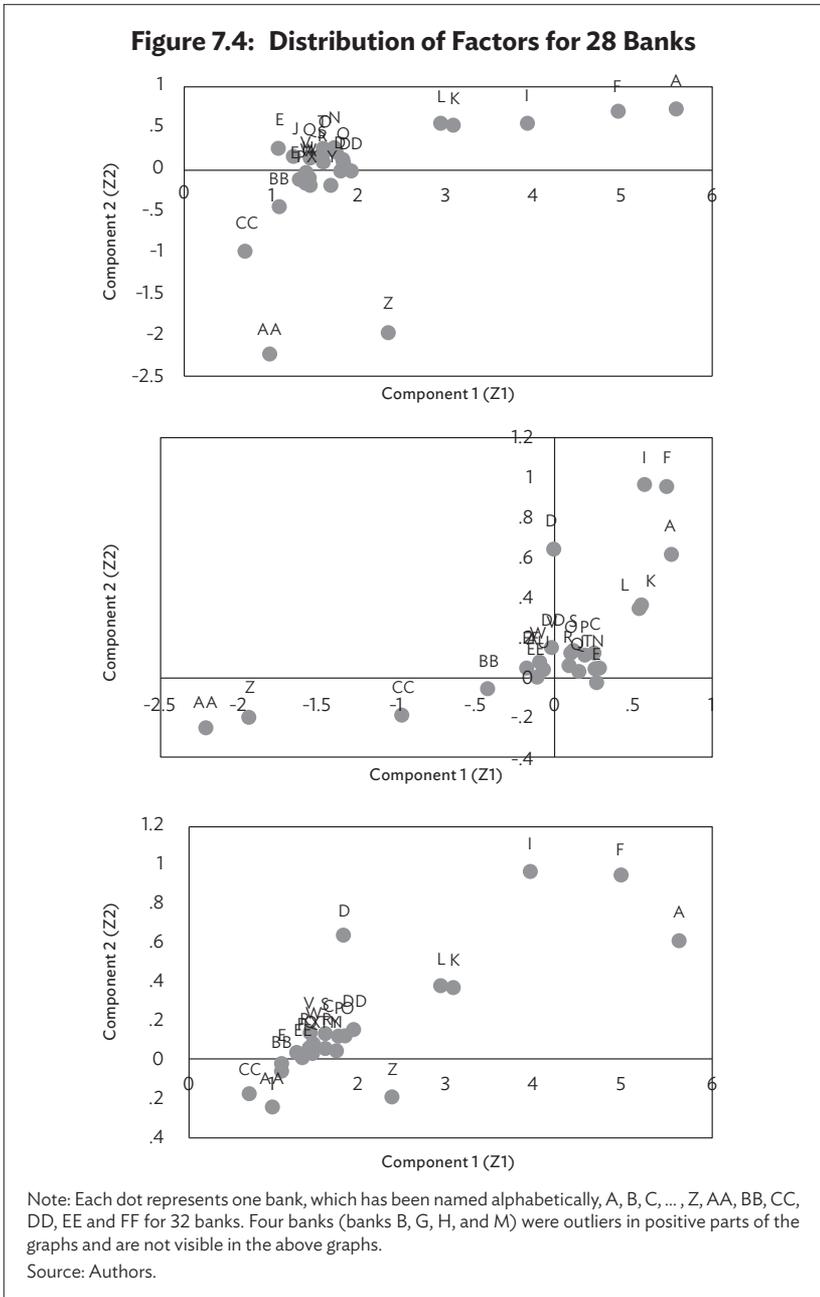
Variables (Financial Ratios of Banks)	Component		
	Z1	Z2	Z3
L-D	(0.238)	<b>(0.912)</b>	(0.143)
PR-L	0.042	0.190	<b>0.780</b>
(SD+LD)-D	(0.287)	<b>0.819</b>	(0.123)
A-L	<b>0.987</b>	0.083	0.130
SC-L	(0.096)	(0.140)	<b>0.875</b>
CA-D	0.379	<b>(0.536)</b>	0.039
CBR-D	<b>0.954</b>	(0.104)	(0.102)
OBR-D	<b>0.981</b>	(0.011)	(0.117)

() = negative.

Note: The extraction method is principal component analysis. The rotation method is direct oblimin with Kaiser normalization. For definitions of the variables, please refer to Table 7.1.

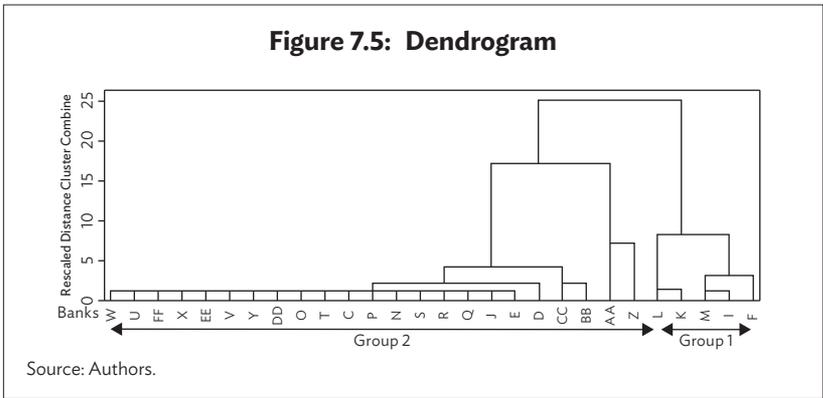
Source: Authors.

Figure 7.4 shows the distribution of the three components (Z1, Z2, and Z3) for 28 out of a total of 32 Iranian banks.



### Cluster Analysis

In this section, we take the three components that were obtained in the previous section and identify those banks that have similar traits. We then generate clusters and place the banks in distinct groups. To do this, we employ cluster analysis, which organizes a set of data into groups so that observations from a group with similar characteristics can be compared with those from a different group (Martinez and Martinez 2005). In this case, banks are organized into distinct groups according to the three components derived from the PCA obtained in the previous section. The series can be described by a tree display called the dendrogram (Figure 7.5). Figure 7.5 shows the dendrogram that results from this hierarchical clustering.



The resulting dendrogram (hierarchical average linkage cluster tree) provides a basis for determining the number of clusters by sight. In the dendrogram shown in Figure 7.5 the horizontal axis shows 28 banks, which have been named alphabetically. As mentioned above, 32 banks have been the subject of our examination. However, four banks have outlying positive data that are far removed from the data for the other 28 banks. We do not include these four banks in our cluster analysis as our result would not be a rational clustering. This is the reason Figure 7.5 shows only 28 banks on the horizontal axis.

The dendrogram classifies the banks into two main clusters (Group 1 and Group 2), but it does not show which of these two clusters contain the financially healthier banks, so we have to take one further step. By comparing the classification resulting from cluster analysis (Figure 7.5) and the distributions of factors in Figure 7.4 we can conclude that the sequence of banks on the horizontal axis of our dendrogram is based on their soundness. Among these 28 banks, bank F has the highest stability and soundness, whereas bank W has the lowest.

## Robustness Check of Banks' Credit Rating

For robustness, we check the rankings of 3 of the 28 banks for all eight examined financial variables. We randomly pick one bank from Group 1 and one from Group 2, and the bank that is in the middle of the credit ranking selected. The results are summarized in Table 7.4.

**Table 7.4: Robustness Check for Three Sample Banks**

Bank	Credit Rank	Rank of L-D	Rank of PR-L	Rank of (SD+LD)-D	Rank of A-L	Rank of SC-L	Rank of CA-D	Rank of CBR-D	Rank of OBR-D
I	2	24	1	16	3	5	8	21	2
R	14	14	17	12	15	9	11	9	7
W	28	11	20	22	20	6	10	3	18

Note: Credit rank is the ranking shown by our dendrogram—the lower this number, the healthier the bank. For definitions of the variables, please refer to Table 7.2.

Source: Authors.

The first randomly picked bank from Group 1 is bank I. Bank I is the second most sound and is a stable bank according to our credit rating result, and the robustness check supports this result (Table 7.4). This bank shows fairly stable and healthy status in most of our eight financial variables. It is the top bank for PR-L (properties/loans), meaning this bank has a relatively large amount of properties compared with the amount of loans, which means it is stable. It ranks second for OBR-D (accounts receivable from other banks/total deposits), fifth for SC-L (securities/loans), and third for A-L (assets/loans)—these results indicate that this bank has sufficient assets, which favors its stability and soundness. Although it has one of the lowest ranks for

L-D (loans/deposits), this suggests this bank is trusted by depositors, and therefore the amount of deposits is large compared with loans. The second bank in our robustness check is bank R, which can be found in the middle of the horizontal axis of our dendrogram with a credit rank of 14, which is close to the middle of these 28 banks. When considering bank R's ranking in terms of the eight variables, for most of these variables it appears in the middle of the ranking. If we take a simple average of the rank of this bank in our eight variables, the result is almost 12, which is close to the credit rank of 14 suggested by our method. The third bank in our robustness check is bank W, a bank we picked randomly from Group 2. Bank W has the lowest soundness and stability in this group and among all 28 banks. When considering the ranking of this bank in our eight variables in Table 7.2, it is apparent that this bank is not sound. It has very low rankings for PR-L (properties/loans), (SD+LD)/D ([saving

deposits + long-term deposits]/total deposits), A–L (assets/loans), and OBR–D (accounts receivable from other banks/total deposits), which suggests this bank is unsound and unstable—it has the lowest credit rank of the banks examined.

### Calculation of the Optimal Credit Guarantee Ratio

As mentioned earlier, the optimal credit guarantee ratio in our model depends on three groups of factors: macroeconomic variables, government policies, and banking profile. These three groups consist of various variables including price of land, price of stock, gross domestic product (GDP), money supply, actual SME loans, fixed demand for loans, deposit interest rate, expected GDP, marginal increase of NPLs by increase of additional loans, desired SME loans, desired default risk ratio of loan, weight for stabilizing the SME loans, weight for reducing the NPL ratio, and financial profile of banks. For calculation of the optimal credit guarantee ratio for the two categories of banks in our survey based on their soundness, for those variables that were existing (such as macroeconomic variables) we used their actual variables. For those variables that were not accessible for us such as the government policies, we set assumptions. Results shows that for Group 1 the optimal credit guarantee ratio is 0.775% and for Group 2 (banks that are less healthy), the calculated optimal credit guarantee ratio is 0.683%. There is clearly a significant difference between the two rates. It means governments, in order to avoid moral hazard and incentivize Group 2 banks to raise their level of health and manage their NPLs, should give different rates to each groups.

### 7.4.2 Robustness Check of the Optimal Credit Guarantee Model

One of the key elements of model 15 is loan default risk ratio  $\rho$ . Based on model 10, it depends on credit guarantee ratio, macroeconomic factors, and the bank's profile. To show how each group of banks'  $\rho$  response to macroeconomic shocks as well as idiosyncratic shocks we develop an econometrics model.

As mentioned earlier, for the empirical analysis in this chapter we use macroeconomic data and financial profiles of 32 banks in an Asian economy to forecast the default risk ratio for each group of banks (Group 1 and Group 2). As per equation 10, we need to use macroeconomic variables (real GDP, price of land, price of stock, money, etc.) and  $Z_i$ , which represents the financial profile of banks and captures idiosyncratic shocks, to see the response of different groups of banks'  $\rho$ .

In our empirical analysis, for the macroeconomic variables we employed real GDP, and instead of the price of stock and the price of land, due to lack of data, we used the consumer price index (CPI), which is the best representative for the price level in an economy and can be used as a substitute for these two price levels. For the monetary variable we used M1.

Equation 10 has three categories of variables that determine  $\rho$ —the first category consists of  $g$  or optimal credit guarantee ratio, the second category consists of the macroeconomic variables described above; the third category is  $Z_i$ , reflecting the financial profile of banks. The latter category is made up of three significant components— $Z_1$ ,  $Z_2$ , and  $Z_3$ —obtained using principal component analysis in section 4.1.2. with their factor loadings presented in Table 7.3. Using the loadings of each of the eight financial ratios, we obtained  $Z_1$ ,  $Z_2$ , and  $Z_3$  for each group (Groups 1 and 2), and since those eight financial ratios of banks are time-series variables,  $Z_1$ ,  $Z_2$ , and  $Z_3$  will be also time-series variables. For our empirical analysis, we use monthly data from 2011M1 to 2013M12.

Since we have two groups of banks, we should run two regressions—one for each group. The left-hand side of equation 10 for each group's regression will be the sum of NPLs of that group/total loans of that group of banks; the right-hand side of equation 10 will be the macroeconomic variables and three components ( $Z_1$ ,  $Z_2$ , and  $Z_3$ ) for that group of banks. Here we are assuming that that  $\rho$  is only determined by macro variables and banking behavior.

### Data Analysis

To evaluate the stationarity of all series, we used an Augmented Dickey-Fuller (ADF) test. The results we obtained imply that all variables are nonstationary. These variables include GDP growth rate; CPI inflation rate (inflation rate of each month compared with the same month of the previous year); M1 growth rate (growth rate of M1 in each month compared with the same month of the previous year—the original quarterly data were converted to monthly data); sum of NPLs/sum of total loans for Groups 1 and 2 of the banks; and  $Z_1$ ,  $Z_2$ , and  $Z_3$  for each group of banks. However, when we applied the unit root test to their first differences, we were able to reject the null hypothesis of unit roots for each of the variables. These results suggest that all variables each contain a unit root. When we performed the unit root test and discovered that the variables are nonstationary in level and stationary at first difference, they were integrated of order 1. The next step was to conduct a cointegration analysis to examine whether a long-run relationship exists among these variables.

## Cointegration Analysis

We conduct a cointegration analysis using Johansen's technique by assuming a linear deterministic trend and for two cases—with intercept, and with intercept and trend. Given the short period of our data, the Akaike information criterion (AIC) suggests using variables with one lag. The results of the cointegration rank test using trace are presented in Table 7.5.

As is clear from Table 7.5, the above test rejects the null hypothesis of non-cointegrating variables for Group 1 and Group 2. This means that all variables are cointegrated and there is a long-run association among variables, or, in other words, in the long run, these seven variables

**Table 7.5: Cointegration Rank Test (Trace)**

Group 1 of Banks						
Hypothesized no. of CEs	Intercept			Intercept and trend		
	Eigenvalue	Trace Statistic	Prob.	Eigenvalue	Trace Statistic	Prob.
None	0.80	192.62*	0.00	0.80	217.14*	0.00
At most 1	0.75	136.33*	0.00	0.75	160.38*	0.00
At most 2	0.61	87.91*	0.00	0.62	111.82*	0.00
At most 3	0.53	55.01*	0.01	0.55	77.80*	0.00
At most 4	0.39	28.35	0.07	0.51	49.89*	0.01
At most 5	0.25	11.06	0.21	0.35	24.98	0.06
At most 6	0.02	0.86	0.35	0.25	10.10	0.12
Group 2 of Banks						
Hypothesized no. of CEs	Intercept			Intercept and trend		
	Eigenvalue	Trace Statistic	Prob.	Eigenvalue	Trace Statistic	Prob.
None	0.80	167.96*	0.00	0.81	200.61*	0.00
At most 1	0.75	112.06*	0.00	0.80	141.91*	0.00
At most 2	0.48	64.19	0.13	0.58	86.33	0.07
At most 3	0.46	41.23	0.18	0.47	55.63	0.20
At most 4	0.24	19.41	0.46	0.38	33.63	0.31
At most 5	0.21	9.58	0.31	0.24	16.82	0.43
At most 6	0.03	1.17	0.28	0.19	7.34	0.31

CE = cointegrating equation, prob. = probability.

Note: \* denotes rejection of the non-cointegrating hypothesis at the 5% level.

Prob. shows MacKinnon–Haug–Michelis p-values..

Source: Authors.

(NPL/L, GDP growth rate, CPI inflation rate, M1 growth rate, Z1, Z2, and Z3) for each group of banks move together. Hence, we should run a vector error correction model (VECM). The AIC results of our linear deterministic VECM indicate that it is slightly better to estimate the model by including trend and intercept than to include just intercept for both bank groups, so we have also retained this finding.

### Vector Error Correction Model

We estimate model 10 in a VECM setting including the seven variables –  $\rho$  (or NPL/L), GDP growth rate, CPI inflation rate, M1 growth rate, Z1, Z2, and Z3—for each group. The VECM can be defined as follows (see Yoshino, Taghizadeh-Hesary, and Nili 2013; Yoshino et al. 2014):

$$dV_t = A(O)dV_t + \Pi V_{t-1} + \varepsilon_t \quad (13)$$

for

$$V = (\rho, gdp, cpi, m1, Z_1, Z_2, Z_3) \quad (14)$$

where  $d$  denotes the first differences,  $O$  is the lag operator, and  $\varepsilon$  is an error term.  $\Pi$  can be written as  $\Pi = \alpha\beta'$  where  $\alpha$  and  $\beta$  are  $p \times r$  matrixes, and  $p$  is the number of variables in  $V$ .  $gdp$  is GDP growth rate,  $cpi$  is CPI inflation rate, and  $m1$  is M1 growth rate.  $\beta$  is a vector of the cointegrating relationship and  $\alpha$  is a loading matrix defining the adjustment speed of the variables in  $V$  to the long-run equilibrium defined by the cointegrating relationship. The rank of  $\Pi$  is denoted by  $r$ . As mentioned above, the AIC standard suggests one lag.

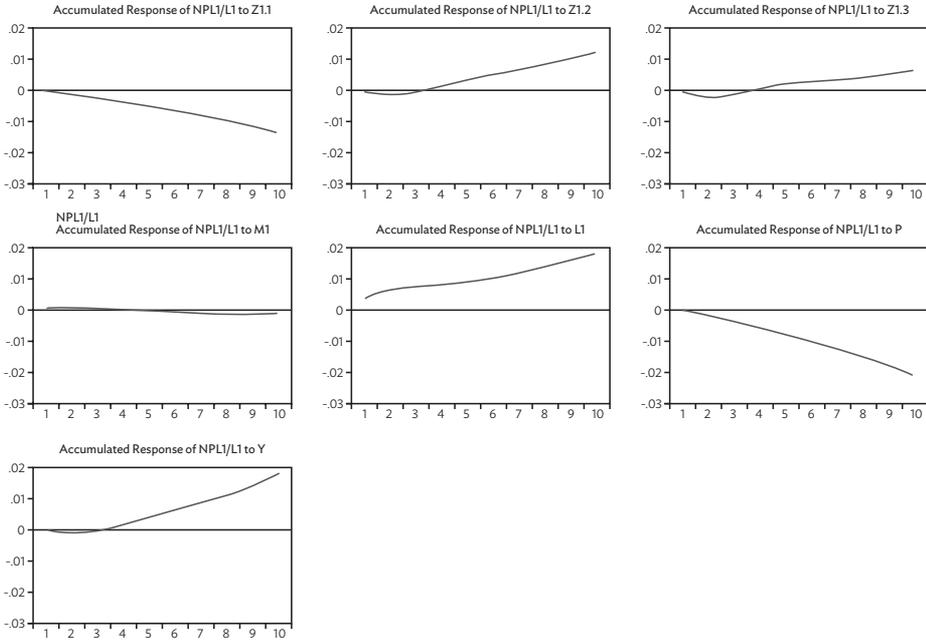
### Impulse Response Analysis

In this section, we conduct impulse response analysis on the resultant VECM from the previous subsection, in order to provide further evidence of the dynamic response of  $\rho$  (or NPL/L) to macro and idiosyncratic innovations. (For more information on impulse response analysis, see Yoshino and Taghizadeh-Hesary 2014b; Taghizadeh-Hesary, Rasolinezhad, and Kobayashi 2015).

The accumulated response of NPL/L to macro and idiosyncratic innovations for Group 1 of the banks is shown in Figure 7.6.

The three graphs in the first row of Figure 7.6 show accumulated responses of  $\rho$  (or NPL/L) to an unanticipated positive shock to Z1, Z2, Z3 for Group 1 of the banks. The response of NPL/L to Z1 is statistically negative and very persistent. This means a positive shock to Z1, which mainly represents assets, will decrease NPL/L of Group 1. An unanticipated positive shock to Z2, which represents deposits, has a statistically negative effect on NPL/L of Group 1 and builds up over

**Figure 7.6: Response of NPL/L to Innovations  
(Group 1 of Banks)**



NPL/L = non-performing loans as a share of total loans.

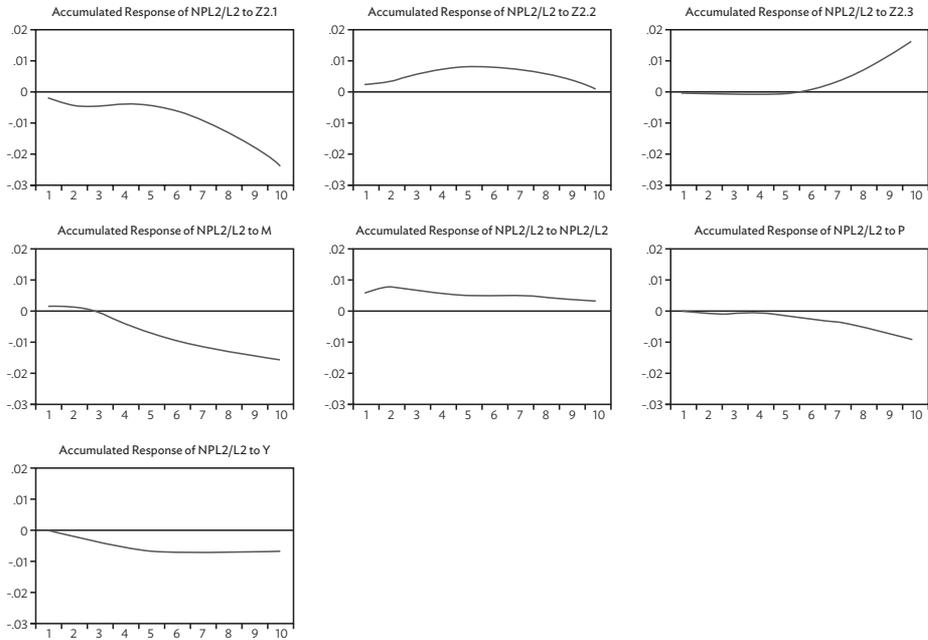
Note: Accumulated response to Cholesky one-standard deviation innovations. NPL/L1 is the ratio of nonperforming loans over total loans for Group 1 of the banks; Z1,1 denotes the first component, Z1,2 the second component, and Z1,3 the third component, all three for Group 1; M1 denotes M1 growth rate, P denotes consumer price index inflation rate, and Y denotes gross domestic product growth rate.

Source: Authors.

the first 3 months, after which it becomes insignificant, meaning an unanticipated increase in deposits will reduce the NPL/L for Group 1. An unanticipated positive shock to Z3, has a statistically negative effect on NPL/L of Group 1 and builds up over the first 3 months, after which it becomes insignificant.

The four other graphs in Figure 7.6 show accumulated responses of NPL/L of Group 1 of the banks to positive shocks to macro variables and to lagged NPL/L. The response of NPL/L to M1 growth rate shocks is statistically positive and builds up over the first 5 months, after which it becomes insignificant. An unanticipated positive shock to P (CPI inflation) has a statistically negative and persistent effect on NPL/L of Group 1, which is consistent with Yoshino and Hirano (2011, 2013). When

**Figure 7.7: Response of NPL/L to Innovations  
(Group 2 of Banks)**



NPL/L = non-performing loans as a share of total loans.

Note: Accumulated response to Cholesky one-standard deviation innovations. NPL2/L2 is the ratio of nonperforming loans over total loans for Group 2 of the banks; Z2,1 denotes the first component, Z2,2 the second component, and Z2,3 the third component, all three for Group 2; M1 denotes the M1 growth rate, P the consumer price index inflation rate, and Y the gross domestic product growth rate.

Source: Authors.

prices increase, collateral value increases, which means default risk or NPL/L will decrease. An unanticipated positive shock to Y (GDP growth rate) has a statistically negative effect on NPL/L of Group 1 and builds up over the first 2 months, after which time it becomes insignificant. This result is also consistent with Yoshino and Hirano's (2011) findings. When business conditions improve, increases in GDP growth cause a reduction in default risk (NPL/L). Moreover, Figure 7.6 shows that for Group 1, current NPL/L effects by lagged NPL/L.

Figure 7.7 depicts the accumulated responses of NPL/L to macro and idiosyncratic innovations for Group 2 of the banks.

Group 2 shows similar responses to innovations to macro variables. This indicates that focusing only on a model based on macro variables

for calculating the optimal credit guarantee ratio is misleading as it is possible that under good economic conditions some banks show negative financial performance and have high default risk. It also means that not only macro variables but also bank-level variables are important in determining the optimal credit guarantee ratio.

The responses of Group 2's NPL/L to an unanticipated positive shock to Z1 and Z3 is similar to Group 1's responses, but for shocks to Z2 the responses differ. The response of Group 2's NPL/L to positive shocks to Z2 is statistically positive and persistent, which goes against our finding for Group 1. This means that increasing deposits, which is good news for banks, tends to result in an increase in NPL/L for Group 2. This shows that Group 2 does not manage their NPL/L well—by expanding their business and accepting more deposits the NPL/L ratio increases, which indicates that Group 2 is not as sound as Group 1.

These results confirm our findings in the previous sections of this chapter. Moreover, it backs up our suggestion that macro variables and policy variables are not sufficient to calculate the credit guarantee ratio. The ratio should be determined for each bank or for each group of banks based on their soundness, because banking behavior is one of the most important factors in determination of credit guarantee ratio.

## 7.5 Conclusion

SMEs in Asia are frequently hailed as the backbone of the economies. However, SMEs usually have severe difficulties raising money. The undersupply of credit to SMEs is mainly due to asymmetric information, high default risk, and lack of collateral. These factors make it more difficult for SMEs to access finance compared with large enterprises. Lending institutions prefer to increase the flow of funds to larger firms, which are not as limited by these factors and are considered lower risk. In order to address this problem, various government and donor initiatives have emerged, in developed as well as developing and emerging economies, to establish credit guarantee schemes. The public credit guarantee scheme is a tool to reduce the supply–demand gap in SME finance.

A credit guarantee scheme involves at least three parties: a borrower, a lender, and a guarantor. The borrower is often an SME or micro enterprise seeking debt capital. This borrower typically approaches a private financial institution (bank) for a business loan. Because of asymmetry of information, the private lender frequently turns down the loan request. This is where the guarantor comes into the picture. The guarantor (credit guarantee corporation), usually a government or trade

association, seeks to facilitate access to debt capital by providing lenders with the comfort of a guarantee for a substantial portion of the debt.

However, the literature on loan guarantees has left three important questions unanswered: (i) What is the optimal credit guarantee ratio to fulfill government's goal for minimizing banks' NPLs to SMEs while at the same time fulfilling the government policies for supporting SMEs? (ii) Should this rate be constant regardless of the macroeconomic status? and (iii) Should this rate be same for all banks, or should it vary based on a bank's soundness?

In order to answer these questions, we have developed a theoretical model as well as an empirical survey. The model developed in this survey shows that the optimal credit guarantee ratio is determined by three groups of variables: (i) government policies for NPL reduction and SME support, (ii) macroeconomic variables, and (iii) bank-level variables or banking behavior. Our model shows that the optimal credit guarantee ratio is a function of various factors including the current amount of SME loans, the desired level of SME loans, the desired default risk ratio of loans, fixed demand for loans, deposit interest rate, expected GDP, weight for stabilizing the SME loans (policy rate), weight for reducing the NPL ratio (policy rate), marginal increase of NPLs by increase of additional loans, price of land, price of stock, GDP, money supply, and the financial profile of banks.

One of the key elements in the theoretical model that we developed for calculations of optimal credit guarantee ratio is loan default risk ratio. In order to provide sufficient proof for our theoretical model, we developed a VECM model for capturing the impact of macro variables and bank-level variables on two different groups of banks that

were categorized based on their soundness. The results of the empirical analysis demonstrate that loan default ratio is affected by macro variables; however, macro variables were not enough to explain this ratio, and banking behavior must also be considered, because it is possible that some banks will behave well in a bad economic situation or in an economic downturn.

In other words, the optimal credit guarantee ratio should vary for each bank, or for each group of banks, based on their financial soundness. Sound banks should receive a higher guarantee ratio from the government, and less healthy banks should receive a lower guarantee to avoid a moral hazard problem. Moreover, this rate should vary based on economic conditions. Governments should lower the guarantee ratio in good economic conditions where the default risk of SME loans is reduced, and raise it in bad economic conditions to protect the SME financing and economic growth.

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# 8

## Commercial Bank Innovations in SME Finance: Global Models and Implications for Thailand

*Tientip Subhanij*

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### 8.1 Introduction

Small and medium-sized enterprises (SMEs) play a central role in enhancing economic dynamism and employment opportunities in Thailand. Development of this sector has, therefore, been widely acknowledged as a crucial strategy for growth. Compared with large enterprises, which have many financial channels including capital markets, SMEs depend primarily on bank loans to finance their business operations. However, one of the main obstacles for SMEs remains the lack of adequate access to financial services (Ayyagari et al. 2006).<sup>1</sup> SMEs, especially small enterprises, usually have difficulties in obtaining finance, and hence are prevented from contributing fully to economic development.

In countries around the world, including Thailand, the lack of bank financing to small enterprises is often regarded as one of the reasons for income distribution problems and poor economic performance. Past studies have also shown that financial access helps generate more new firms, which are generally vibrant and creative (Demirgüç-Kunt et al. 2008). For these reasons, policies to promote inclusive finance should be prioritized as one of the most important economic development policies.

This chapter focuses primarily on bank financing of SMEs and discusses possible strategies for banks to enter this market. It analyzes

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<sup>1</sup> “Adequate financial access” is defined as the ability to gain access to external funding as needed at a reasonable price.

cross-country experience in bank downscaling<sup>2</sup> strategies and discusses the recent status of the SME financing environment in Thailand. It then provides policy suggestions to enhance SME financial access in Thailand.

## 8.2 Literature Review

Small business formation and growth are impacted significantly by imperfections in bank credit markets. Small firms are different from larger firms because they have information constraints. Their businesses tend to be more informal and have inadequate business planning. As a result, they do not have enough information available for lenders to evaluate their performance and business potential (Berger et al. 2001). Past research has shown the importance of developing relationships with banks for small business. Petersen and Rajan (1994) found that a relationship with an institutional lender increases the availability of financing to a small business. Berger and Udell (1995) found that lenders offered lower rates to firms with longer relationships and were less likely to require collateral.

There are generally two primary methods of bank lending. The first is transaction lending, which is used mostly by private commercial banks and relies mainly on quantitative data to screen loan applications. These data include information on financial status, collateral, credit history, etc. The other approach is relationship lending, which relies mostly on qualitative data collected on clients over the period of their relationship with loan officers. This lending approach is used for clients who may not have adequate quantitative information, such as credit history or financial statements, to be approved for loans (Berger and Udell 2004). The main drawback of this lending approach is that knowledge and information about customers are more difficult to transfer than those in transaction lending.

Lenders who lend to small borrowers tend to use the relationship lending approach. This is typical in microfinance institutions (MFIs), which play a primary role in the microfinance industry. Microfinance provides access to finance for poorer households and small businesses lacking opportunities to obtain financial services from traditional banks, and the transaction size is small. MFIs generally use relationship lending to alleviate problems of asymmetric information between bank lenders

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<sup>2</sup> The term “downscaling” in this paper refers to banks that have traditionally served larger clients but now make loans to microenterprises.

and borrowers, which gives rise to credit rationing and higher interest rates for small businesses. In this case, interest rates often cannot be used as a screening mechanism for selecting creditworthy borrowers because information asymmetries leave lenders vulnerable to adverse selection and moral hazard problems (Stiglitz and Weiss 1981). Good borrowers may not be able to obtain credit from banks because the costs of evaluating the creditworthiness of a small business are typically high compared with the risk-adjusted return to the lender.

Microfinance used to be the exclusive preserve of nongovernment organizations, cooperatives, and MFIs while commercial banks were new players in microfinance (Baydas et al. 1998). Given the success of microfinance around the world, a large number of commercial banks have made a profitable business out of this sector. With rising competition in the traditional bank business and growing pressure from some governments, commercial banks have become interested in microfinance. Some could make profits lending to small businesses and micro clients, but some could not. The main factors for failure are often the lack of adequate understanding of the microfinance market as well as high operating costs. Some banks, however, have managed to find profitable business opportunities by downscaling to this new market, achieving both social and financial objectives.

### **8.3 Characterizing Commercial Bank Entry Strategies and Experiences**

Efforts to develop financial services for SMEs have been growing and have evolved considerably for the past few decades. In response to a growing understanding of the financial needs of SMEs, there has been a shift toward commercializing these efforts through formal financial services. This section builds on previous empirical evidence of bank microfinance strategies in various countries. It discusses cases of successful bank financing models and attempts to draw some lessons from such experiences. While there are many ways in which banks become engaged in small business lending, previous empirical works have classified the strategies that banks normally use to enter the microfinance market into two main categories: direct and indirect. The direct approach is when banks set up internal units within the banks to serve SMEs or establish separate companies to deal with this market. The indirect approach is when commercial banks enter into an SME segment by working with existing MFIs (Isern and Porteous 2005; Sinswat and Subhanij 2010; and Bounouala and Rihane 2014).

### 8.3.1 Direct Approach: Bank Downscaling

As discussed earlier, downscaling refers to the engagement of commercial banks in microfinance by expanding their product offering to low-income households and small enterprises (World Bank 2013). Some banks reach out to their small clients using their existing operations. Some banks choose to set up a separate internal unit or create a separate company. We can further classify four main types of strategies that banks use to serve small clients directly:

#### Internal Microfinance Unit

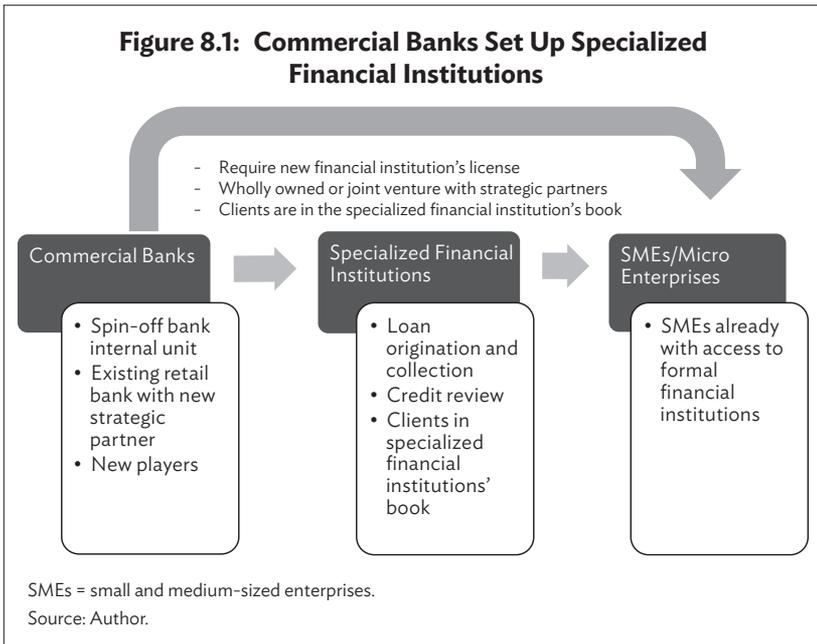
In this case, a commercial bank serves small clients internally by setting up a separate unit that specializes in microfinance. Although banks may give authority to the specialized unit for loan process decisions, systems, staff, or governance, the unit is under the same legal entity and is subject to the same regulations.

The strength of this model lies in its simplicity and ease of implementation. The bank only needs to tailor its method of operations to the requirement of micro clients. The main challenge lies in whether the bank can build an independent corporate culture and governance for the microfinance unit, ensuring that microfinance staff are not viewed as secondary to staff in other units and that important decisions are made by executives with enough interest and experience in microfinance (Lopez and Rhyne 2003). Not addressing this need could result in bad policy decisions and insufficient resource allocation to microfinance.

#### Specialized Financial Institutions

A bank may choose to set up a specialized financial institution (SFI) as a separate legal company to do microfinance business. The new company can be entirely or partly owned by the bank and is normally licensed as a nonbank financial institution. The new institution may be independent or stand-alone or utilize the bank's existing infrastructure (Figure 8.1).

This setup overcomes some of the main obstacles of the internal unit model as it is able to have separate staff, management, and governance structure, enabling autonomy of microfinance operations. The bank will also assume less risk, as the risk is shared with other shareholders who may be able to bring in more microfinance experience. Reputation risk is also mitigated as the operations of the bank and its microfinance subsidiary are separated. However, the drawback is that the new institution will have less access to bank infrastructure and may end up with duplicate accounting, human resources, and information technology systems.

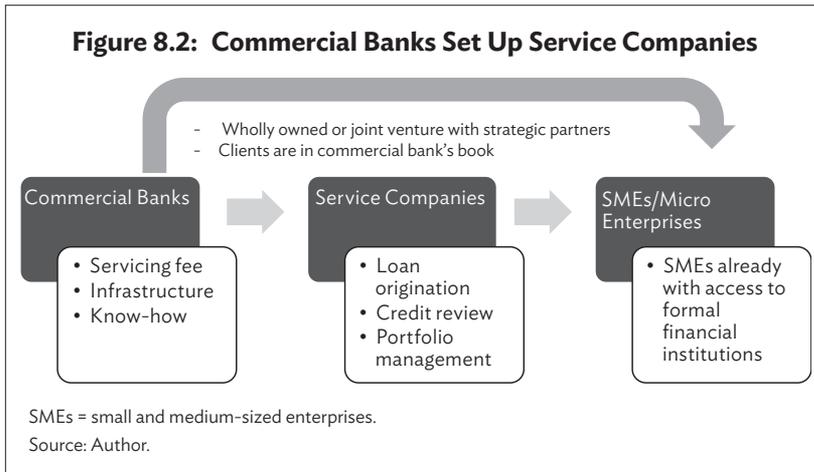


### Microfinance Service Company

This model requires the bank to set up a service company, which is a nonfinancial company that is not overseen by banking regulators. The company is set up to originate and manage a portfolio of microloans for the banks in return for a fee and has independence in terms of management, staff, and governance. Despite more autonomy compared with the internal model, a service company has more limited operations than an SFI. Loans and services to micro customers are also recorded in the commercial bank's accounts. The bank in return provides infrastructure such as teller support, IT facilities, etc. to the service company and receives a fee for the services. The service company typically operates within the bank branches or in separate offices nearby and can be either wholly or partly owned by the parent bank (Figure 8.2). This model enables the bank to include more experienced partners in microfinance as well as interested investors as financial partners.

The advantage of this model is that a service company, unlike an SFI, does not require a separate banking license. Moreover, setting up a service company does not require much initial capital and is less expensive to establish than an SFI.

It also addresses some of the drawbacks of the internal model because it has its own structure, management, governance, and staff



who give priority to microfinance operations. At the same time, the service company can utilize the parent bank's infrastructure and services to operate more effectively rather than setting up an entirely new institution.

### Correspondent Banking

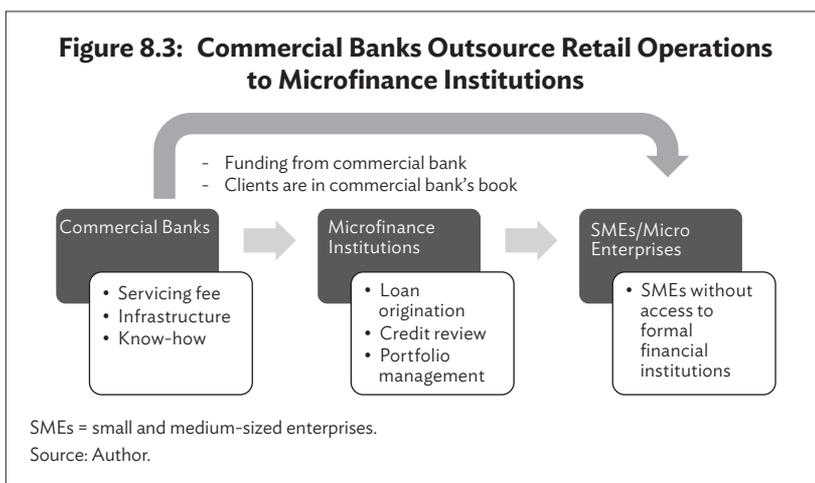
Apart from the models previously discussed, commercial banks can enter into a contract with other nonfinancial institutions (e.g., convenience stores, supermarkets, post offices, lottery outlets, gas stations) to use them as an agent to process micro clients' transactions. Rather than using a branch teller, commercial banks use retail outlet employees or owners to handle transactions such as payments, deposits, withdrawals, funds transfers, balance enquiries, etc. Credit services, however, are often restricted to loan and credit card applications. These retailers can act as important distribution channels for the bank's products.

### 8.3.2 Indirect Approach: Bank Partnership with Existing MFIs

Rather than directly entering the microfinance sector, a bank can do this indirectly by working with existing MFIs. This approach takes full advantage of these institutions' skills in relationship lending and enables bank to gain more experience in microfinance operations. There are three main possible business models: outsourcing retail operations, providing commercial loans to MFIs, and providing infrastructure and services to MFIs.

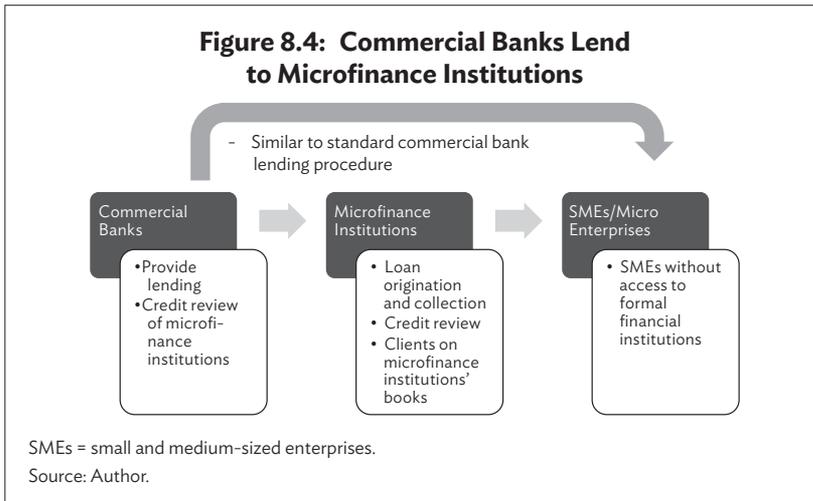
## Outsourcing Retail Operations

A bank can engage in microfinance business by contracting a well-performing MFI to make credit decisions and extend microloans on its behalf, in return for a share of interest income or fees (Figure 8.3). This model requires risk and reward sharing between bank and MFI, making sure that both parties maintain high portfolio quality. To ensure that the MFI effectively reviews and monitors the loan portfolio, the bank may require the MFI to finance some parts of its microcredit or provide a first loss guarantee which pays for the first dollar of loss up to the maximum guarantee amount. The credit decisions may be made entirely by the MFI or jointly with the bank, depending on MFI performance in maintaining a high-quality loan portfolio. These loans are then registered in the commercial bank's book. To enter into this type of agreement, the bank may require exclusivity from the MFI, preventing it from servicing other banks. This arrangement takes advantage of MFIs' market knowledge and credit methodology and utilizes the bank's funding and transaction processing capabilities. In this way, the bank will not need to make significant investment or operational changes in order to lend to small clients.



## Providing Commercial Loans to MFIs

In this case, the bank simply provides credit to an MFI as working capital or to onlend to micro clients (Figure 8.4). It is, therefore, similar to normal commercial bank lending. Loans given to MFIs may be unsecured, backed by collateral, or guaranteed by a third party. The loan agreement may come with conditions for the MFI to provide periodic



financial statements, allow for bank inspection, etc. In this model, the bank should select an MFI that is ready to receive commercial funding. Criteria may include availability of financial statements, a good management team and governance, a quality loan portfolio with adequate loan loss policies, transparent and timely relevant reports, and MFI business prospects. Several banks choose this model of partnering with MFIs due to its simplicity, compared with the outsourcing model.

### Providing Infrastructure and Services to MFIs

In this model, the bank is least engaged in microfinance business. The bank has the least exposure to micro clients because it only provides facilities and infrastructure to the MFI. These may include providing front office functions, such as having the bank staff in its branches serve MFI clients); granting access to bank infrastructure, such as ATMs and counter service for transaction processing, money transfers, foreign exchange transactions, etc.; providing IT services; and renting offices to the MFI. The bank will not only receive fees and income in return from the MFI and its clients, but will also be able to learn the patterns and behavior of micro clients. The knowledge and learning may come from MFI clients opening accounts with the bank directly, or from processing transactions such as loan disbursements and repayments via the MFI's account with the bank.

### 8.3.3 Cross-Country Experiences

This study focuses on commercial banks and their role in financing SMEs. We will discuss some innovative business models that banks have

used to provide financial access to small enterprises. As there may be no one best way to engage in microfinance business, we discuss the entry strategies of commercial banks in five very diverse countries: Mongolia, Haiti, Lebanon, India, and Turkey.

### **Agricultural Bank of Mongolia and Rural Lending, Mongolia**

The Agricultural Bank of Mongolia is a leading financial service provider for Mongolia's rural sector and is currently known as Khan Bank. It was set up in the early 1990s as the Agricultural Cooperative Bank, inheriting the assets from the former state bank. Its objective was initially to serve the agricultural sector in Mongolia. Khan Bank was fortunate to have an extensive network, a legacy from the former state bank, of more than 300 rural branches and 2,600 staff. Later, it was instructed to widen its operational scope and make more loans, which resulted in significant deterioration in its financial position. However, because of its importance to rural Mongolians, it was granted a period of operation, rather than being closed down. The bank later recognized and used its wide branch network to reach out to the massive rural market. As a result, it went from a nearly failed bank to a very successful privatized state bank, highlighting the hidden potential of the microfinance segment to turn around even the most troubled bank.

Apart from its extensive branch network, key to the bank's achievement is its strategy to launch new products and rapidly deliver them across the country, leveraging the bank's branch outreach to achieve economies of scale. These products were tailored to suit clients' needs. An example of a successful product is the herder loan, which was designed to match Mongolian herders' irregular stream of income (Gutin and Young 2005). As herders only have income during certain periods, the product is short-term in nature (usually lasting no more than 1 year) and helps cover expenses during times when herders have no cash or need to buy herd-related products.

Today, Khan Bank is the main rural financial services provider in the country, offering deposit and loan products to individuals, SMEs, and corporate customers throughout its network of 535 branches, and was Mongolia's largest retail bank at the end of 2014. In an extraordinarily challenging year of 2014, which saw a significant drop in foreign direct investment, an increase in the foreign trade deficit, high inflation, and currency depreciation, Khan Bank continued to perform well and maintained its market leadership position. In 2014, net profit after tax increased 12.0% and return on equity registered at 28.3%. The bank is one of the best-performing banks in the country and has received many awards, including Best Bank in Mongolia by *Euromoney*.

### **Sogebank and SOGESOL, Haiti**

Sogebank became interested in microfinance in the late 1990s as the management believed that this market offered opportunity to achieve both social and financial objectives. As one of the biggest commercial banks in Haiti, Sogebank has the advantage of an extensive branch network.

To reduce risk, in 2000 Sogebank enlisted Accion support to help create SOGESOL, an independent microlending institution using a service company model. Sogebank was in a good position to do microfinance business because it already had a large number of small clients' savings and the capacity to handle these transactions. Under this model, SOGESOL originates and monitors loan portfolios for Sogebank and in turn receives a net fee for these services. The loans are booked at Sogebank, but SOGESOL has primary responsibility for promoting, evaluating, approving, tracking, and collecting them. SOGESOL's first loans were issued in August 2000. It now has more than 35,000 active borrowers and outstanding loans of more than \$7.8 million.

As a service company for Sogebank, SOGESOL was able to minimize costs by setting up its branches close to or in Sogebank branches. Given very high operational costs in Haiti due to poor infrastructure, power shortages, and safety issues, the ability to leverage Sogebank branches substantially reduces SOGESOL's operational costs. As a result, SOGESOL needed little financial support to effectively launch microfinance operations and was able to reach profitability in 2002, after just 2 years of operations and amidst a severe economic and social crisis in Haiti. Without having to worry about start-up and operating costs or opening full-fledged branches, SOGESOL has been able to concentrate on improving credit methodology and providing credit administration services.

### **Jammal Trust Bank Partnership with AMEEN, Lebanon**

The microfinance market in Lebanon is relatively small and competition is limited. In general, banking institutions lack interest in the sector given its size, its perceived risk, the up-front investment required to enter the market, and the availability of other investment options with less risk. A small number of unregulated microfinance institutions operate with limited donor funding and lack the equity and commercial financing required to grow their portfolio and outreach. In Lebanon, the microfinance market is mostly served by three large microfinance programs: Al Majmoua, Access to Microfinance and Enhanced Enterprise Niches (AMEEN), and Al-Qard Al-Hassan. AMEEN started its pilot program in 1999 under the international nongovernment organization CHF. AMEEN first partnered with Jammal Trust Bank because the bank believed in the mission and had the right network of

branches. Since then, three other banks have joined to become AMEEN's partners: Credit Libanais in 2001, Lebanese Canadian Bank in 2004, and Fransabank in 2008.

The partnership between AMEEN and the banks presents an interesting model of how local commercial banks are able to outsource client mobilization, analysis, and follow-up to an MFI, while funding the credit themselves. Through this linkage, AMEEN is able to expand outreach without building new branches and has secured a stable source of funding for onlending to microenterprises, while the commercial banks are able to enter a new market without significant investment requirements in staffing and technologies. AMEEN has credit officers going door-to-door, introducing loans to potential borrowers. This type of personal outreach is critical to the success of the project because potential borrowers are mostly from low-income groups that have no experience in using banking services. The credit officers are from the target community because they know the local needs best.

AMEEN essentially works as a service company for the banks. Credit decisions are made jointly by AMEEN and the partner bank. All payments and disbursement take place at the bank. The bank generates the loan agreement and makes the disbursement using funds from the bank or, in some cases, from both the bank and AMEEN, based on the terms of the partnership agreement. In the event that the loan goes into default, AMEEN is responsible for managing delinquency until the loan is deemed not collectable, at which point the bank takes over (Green and Estevez 2005).

### **ICICI Bank Link with Spandana, India**

ICICI Bank is one of the largest banks in India. It is second in terms of assets and market capitalization and has 4,050 branches and 12,919 ATMs in India. The bank entered the microfinance market in 2002 and by early 2005 had a portfolio of about \$66 million through 27 partner MFIs (Harper 2005). There are about 1,600 MFIs in India, but few are of sufficient size and strength to be suitable partners for ICICI Bank. Therefore, the bank helped develop their capacity through training, mentoring, and regular visits by the bank's senior staff. The partnership approach remains the dominant strategy, accounting for more than 90% of the bank's microfinance portfolio. The loans are negotiated and disbursed to clients by MFI staff, acting as agents of ICICI Bank. These MFIs are paid either a flat fee or a percentage of the loan interest for originating and maintaining the accounts, and for recovering the loans. Borrowers sign loan agreements with ICICI Bank, not with the MFI.

To provide an incentive for portfolio quality management, the MFI is required to provide a "first-loss default guarantee" in which it shares risk with the bank on the loan portfolio up to a certain agreed limit.

ICICI Bank also provides an overdraft facility to the MFI equivalent to the amount that the MFI is obliged to pay as the first-loss default guarantee. The overdraft is drawn only in the case of default, and the MFI is obliged to pay a penal rate of interest on the amount that it draws from the overdraft facility (Ananth 2005).

A particular success story is the link between ICICI and Spandana, an MFI in India. Since the partnership began in 2003, the two organizations have worked very closely together. Spandana's operations are primarily concentrated in the state of Andhra Pradesh and it delivers financial services in 21 of the state's 23 districts through 216 branches. In each of these 21 districts, there is at least one branch operating under the ICICI Bank partnership model. The result of this partnership was a phenomenal increase in Spandana's borrowers—250% from 2004 to 2005, the largest jump in history. Spandana's partnership with ICICI Bank benefits both organizations. ICICI Bank, through its association with Spandana, is able to reach an underserved market segment. The partnership benefits Spandana by providing it with steady access to funds. Spandana's operating costs are much lower than comparable costs of banks and nonbank finance companies. The delinquency levels are also much lower, at less than 1% compared with over 5% for banks and nonbank finance companies.

### **Garanti Bank, Turkey**

Turkey's economy has faced a series of financial crises since 1992, leading to high inflation and devaluation of the Turkish lira. Although the economy stabilized in 2000, it again went into financial chaos in 2001. The reemergence of financial uncertainty weakened domestic demand, hurting small and micro enterprises. The rise in unemployment in 2003 severely affected some areas where income was already very low. One of the main factors slowing the country's economic recovery in the medium to long term is high unemployment. Closer examination reveals that there is a large financially unserved and unrealized workforce consisting mainly of unemployed women. This means there is huge potential for women to engage in entrepreneurial activities, leading to a reduction in the unemployment rate (Dincer 2014). Therefore, increasing women's participation in the labor force is the most practical long-term solution to overcome the structural unemployment problem in Turkey. As a result, the country has turned to microfinance to empower small companies, and especially women, to support economic development. Turkey's government is the driving force behind the shift in banking business decisions.

Garanti is Turkey's second-largest private bank, with consolidated assets of around \$100 billion. Garanti provides a wide range of financial

services to 13.7 million customers across an extensive distribution network of 998 domestic branches. The bank has invested heavily in a large network of alternative channels, including 4,260 ATMs; an award-winning call center; and internet, mobile, and social banking platforms. Garanti's strategy has long focused on SMEs in Turkey, a segment that drives growth and employment. In 2006, Garanti became the first bank in the region to offer products and services specifically targeted toward women entrepreneurs, in line with a new Turkish government policy supporting women entrepreneurship (IFC 2014). Garanti Bank has 1,600 staff across 998 branches looking after SME business segments. The ability to quickly develop and roll out convenient and effective products is at the core of Garanti's success with the SME segment. Successful product development is a result of regular market research, close interaction with SMEs, and feedback from business line staff. Garanti's turnaround times are some of the fastest in the industry, with time-to-yes decisions for small and mass clients made in as few as 3 hours, and disbursements in a single day. For medium-segment clients, time to disbursement can be as quick as 1 day for existing clients, while new client applications are processed within a week. Today, Garanti is a market leader in the SME segment, with approximately 1.5 million customers. SME loans constitute approximately 32% of its business banking loans.

In terms of partnership with MFIs, Garanti entered into a relationship with Maya Enterprise in 2001. While Maya helped local businesses fill out forms and negotiate deals, Garanti provided branch network banking, access to ATMs, and electronic banking facilities to Maya's customers. Garanti benefited from the increased revenue from the fees while Maya's costs were reduced and efficiency was increased by taking advantage of existing bank infrastructure and systems (Isern and Porteous 2005). This is an example of a successful relationship between a bank and an MFI in Turkey.

The summary of each bank business model and key success factors are summarized in Table 8.1.

### 8.3.4 Lessons Learned

Cross-country case studies have demonstrated that banks, MFIs, and customers can all benefit from microfinance. The case studies contain a number of messages for policy makers and bankers to extend outreach to smaller customers who lack access to formal financial services. Here we highlight and draw important lessons from these experiences.

- (i) To succeed in microfinance, a bank must understand the requirements of small customers to be able to design products

**Table 8.1: Bank Business Models and Key Success Factors**

Bank/MFI	Country	Model	Key Success Factors
Agricultural Bank	Mongolia	Internal microfinance unit	<ul style="list-style-type: none"> <li>• Extensive rural branch network</li> <li>• Tailored products</li> </ul>
Sogebank/SOGESOL	Haiti	Microfinance service company	<ul style="list-style-type: none"> <li>• Extensive branch network</li> <li>• Reduced operating costs</li> <li>• Focus on credit methodology</li> </ul>
Jammal Trust Bank/AMEEN	Lebanon	Outsourcing retail operation	<ul style="list-style-type: none"> <li>• Nationwide branch network</li> <li>• Hands-on loan officer</li> <li>• MFI access to low funding cost</li> </ul>
ICICI Bank/Spandana	India	Outsourcing retail operation	<ul style="list-style-type: none"> <li>• MFI training and mentoring</li> <li>• Reduced operating cost</li> <li>• MFI steady access to funding</li> </ul>
Garanti Bank/Maya Enterprise	Turkey	Internal microfinance unit/Providing infrastructure	<ul style="list-style-type: none"> <li>• Tailored products</li> <li>• Quick loan decision time</li> <li>• Reduced operating cost</li> <li>• Increased fee</li> </ul>

MFI = microfinance institution.

Source: Author.

that match their financial preferences. In general, micro clients prefer simple products and financial procedures and do not have the resources to travel frequently to the bank. Ag Bank, for example, has addressed these issues by designing financial products tailored to its customers' needs and delivering them profitably even in the remote rural areas.

- (ii) Despite its perceived high risk, the business of microfinance can help diversify risks. This is because a microfinance portfolio typically consists of a large pool of small clients with small loan sizes, so default by one of them would hardly affect the total portfolio. As a result, returns from this market can be high despite higher transaction costs, as demonstrated by the case of Ag Bank, which was able to achieve high return on equity even during a difficult economic period and was regarded as one of the best-performing banks in Mongolia.
- (iii) In an increasingly globalized world where banks will face more competition from international banks, the best way to compete is not to compete in the market for high-income customers, but rather to focus on rural and low-income market segments. Although risk may be high, with the right partnership and the fact that small customers typically value

ongoing financial access and often try to maintain or improve their credit record, the delinquency rate for microfinance can be low, even when compared with the traditional line of banking business. This is illustrated in the case of the ICICI Bank partnership with Spandana where the bank was able to maintain very low delinquency levels for the microfinance portfolio.

- (iv) Small borrowers require different credit methodology than large borrowers. Banks need to maintain regular contact with these customers and ensure that an appropriate mechanism is in place to promptly detect loan payment problems for further recovery actions. There is also the need for a system to ensure that borrowers realize that intended default will have consequences. Because of the unique credit methodology and collection efforts required, banks such as ICICI Bank, Jammal Trust Bank, and Sogebank have realized that by utilizing MFIs' strength in this area, banks can enter the microfinance sector without having to significantly invest in or change their operational procedures.
- (v) Small clients do not like complicated banking processes and are put off by complicated financial products and long loan disbursement time. Developing easy-to-understand products and offering timely approval are therefore the keys to success, as demonstrated in the case of Garanti Bank. The bank is able to quickly develop convenient loan products and its decision time is one of the shortest in the industry. Loan decisions for small and mass clients are usually made in as few as 3, and disbursements within a day.
- (vi) The costs of assessing new customers are usually high. But in many places, MFIs have already invented methods and provided assistance to make sure that poor customers have enough credibility to receive credit. In other words, MFIs have done the prescreening of banks' customers for them, and with the right partnership, banks can readily bring these customers into the banking system at little or no cost. Successful examples can be found in many places, such as the partnerships in Lebanon between AMEEN and banks such as Jammal Trust Bank. Despite high interest rates, few borrowers actually defaulted. The microfinance portfolio default rate was less than 1% and a large number of borrowers returned and became repeat clients, reflecting the success of the programs.
- (vii) Setting up a new institution specializing in microfinance to reach out to small clients is more costly and time-consuming

than doing the same thing through established banks and their branch network. This is because creating new institutions requires large start-up equity and is a complicated process. Although most countries have strict regulations on banks that mobilize savings from small clients, only small changes to regulations are needed, especially with regard to unsecured loans, before a bank can engage in microfinance business. It is easier to overcome these regulatory barriers than to create an entirely new microfinance institution.

- (viii) A bank may choose to enter the microfinance market directly, rather than through partnership with MFIs. In this case, there are many successful examples of setting up a service company, rather than creating new specialized financial institution. Sogebank, for example, decided to engage in the microfinance business by using a service company model. This model allowed the bank the flexibility to involve other partners for technical and financial support. Because the service company can also take full advantage of the parent bank's branding and infrastructure, it can therefore dedicate more resources to microfinance operations.

## 8.4 SME Financing and Microfinance in Thailand

### 8.4.1 Overview of SMEs and Challenges

SMEs represent the largest share of Thailand's businesses. In 2014, 99.7% of enterprises (around 2.74 million) in Thailand were SMEs. SMEs' contribution is equivalent to B5,212,004 million, or 39.6% of GDP. Most SMEs are family-run or owned by an individual. The largest portion of SMEs are engaged in services (41.3%), followed by trade and maintenance businesses (27.9%) and production (23.5%). SMEs play an important role in employment, accounting for around 10.5 million employees, or as much as 80.3% of total employment. SMEs also make significant contributions to Thailand's exports, accounting for 26.3% of the total export value (OSMEP 2015).

Thai SMEs face many challenges, including lack of technology and innovation, proper management, marketing channels, and financial access. For financial access, the main constraints are found to include lack of financial institution advice, complex loan procedures, inadequate collateral, high interest rates, inadequate SME business plan and experience, unqualified accounting system, high operational costs per

loan, restricted government regulations, and an unlevel playing field (Wesaratchakit et al. 2010). Meanwhile, the capital market is relatively underutilized for SME finance and only a few SMEs are able to list on the Market for Alternative Investment.

#### 8.4.2 Structure of Financial System and the Role of Commercial Banks

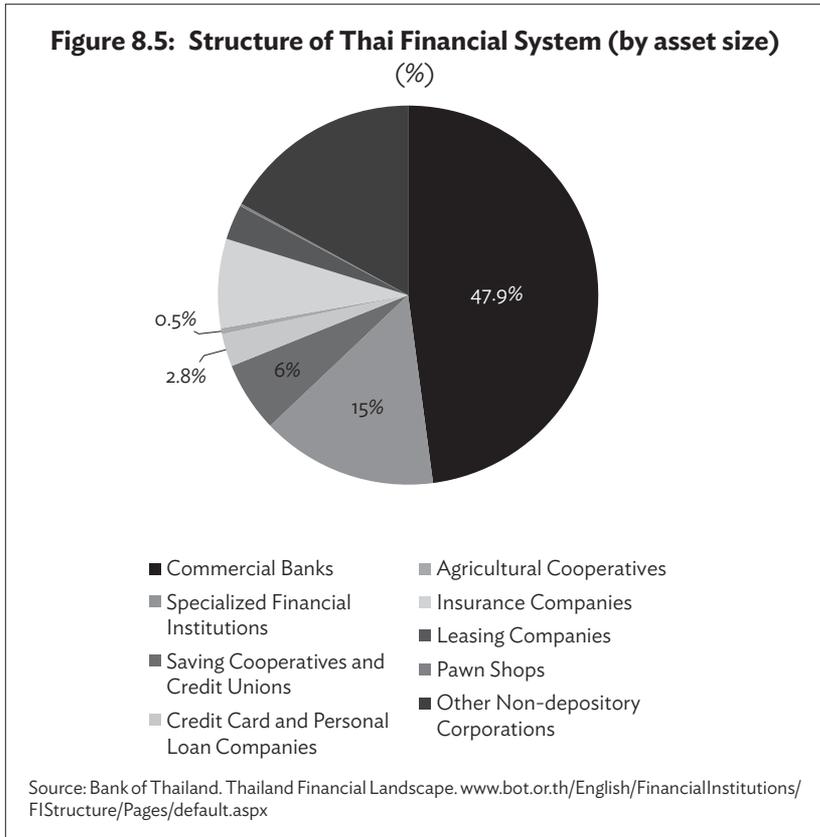
Thailand's financial sector is dominated by banks. Therefore, loans and financial services are mainly intermediated through commercial banks. The country has a strong and developed commercial banking sector that has little to do with small-scale lending. Compared with other countries, the Thai private sector plays a small role in the microfinance business and it is the Thai government who has been taking leadership as a provider of small-scale credit. In fact, the business and legal environment in Thailand is not conducive to private sector investment. As a result, private sector initiatives are generally small and target specific groups of people. They are also scattered across a range of institutions, including banks, specialized financial institutions (SFIs), nonbank financial institutions, cooperatives, and informal financial service providers.

To understand the state of SME financing in Thailand, it is useful to classify financial institutions according to three main categories: (i) formal financial institutions, which are those operating under prudential regulations, including commercial banks, finance companies, credit fonciers, government SFIs, retail banks, credit card companies, and personal loan companies; (ii) semiformal financial institutions, which consist of legal financial institutions operating under non-prudential regulations—these include cooperatives, credit unions, and the Village and Urban Revolving Fund (VRF); and (iii) informal financial institutions, which consist of financial institutions without legal status and that are not regulated by any authorities. These are community-based organizations that provide financial services to community members; they include savings groups, moneylenders, village banks, nongovernment organizations' MFIs,<sup>3</sup> and other unspecified financial providers.

For the Thai financial system as a whole, commercial banks and SFIs play the most prominent role, especially in the formal sector. At the end of 2014, there were 30 banks and 6 specialized financial institutions (SFIs), with asset shares of 47.9% and 15.0%, respectively

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<sup>3</sup> In Thailand, MFIs include cooperatives, credit unions, village banks, and VRFs. These institutions deliver financial services including microloans to poorer household and small businesses. MFIs are normally in the semiformal and informal sectors.



(Figure 8.5). Other financial institutions such as saving cooperatives and credit unions, credit card and personal loan companies, and agricultural cooperatives accounted for only 6.0%, 2.8%, and 0.5% in terms of asset size, respectively.

It should be understood that the political culture in Thailand strongly supports the financial needs of the poor, SMEs, the rural population, and farmers. Consequently, there have been extensive formal government schemes aiming to provide financial services to these groups. This has been done through large and influential government SFIs and the VRFs. These SFIs, which are subsidized and closely controlled by the government, are generally considered a policy vehicle to bring economic and social benefit to villagers through programs such as loan, savings, and insurance programs. While some SFIs offer the same deposit-taking and loan products as the commercial banks, they have a greater presence than commercial banks in rural and remote areas. The village

and urban revolving funds penetrate even further into rural areas than commercial banks and SFIs, bringing microfinance services in the form of loans to lower-income clients in the remote areas. The latest Bank of Thailand and National Statistical Office survey revealed that indebted Thai households indeed borrow most frequently from SFIs (37.8%), followed by village and urban revolving funds (23.6%). The percentage of households that borrow from VRFs have also increased over the years, from 19.2% in 2009 to 22.4% in 2011 and 23.6% in 2013 (Table 8.2). Commercial banks, meanwhile, provide only 9.3% of credit to indebted Thai households.

**Table 8.2: Source of Funds for Indebted Thai Households (2013)**

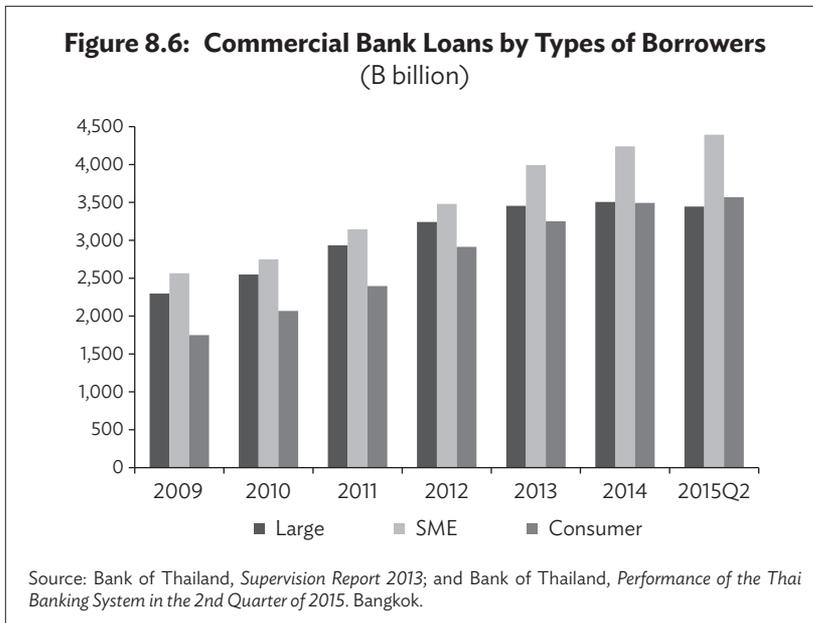
Source of Funds	% of Indebted Households
Bank of Agriculture and Agricultural Cooperatives	30.8
Government Housing Bank and Government Savings Bank	7.0
Commercial banks	9.3
Other formal financial institutions	19.6
Village and Urban Revolving Fund	23.6
Cooperatives and loans from employer	4.5
Informal borrowings	5.2

Source: *Village and Urban Revolving Fund*, Thai Parliament (2015).

For SME financing, the landscape is also characterized by credit and interest rates subsidized by the government, either directly or indirectly, via the VRF and the SFIs, particularly the two most prominent SFIs, the Bank of Agriculture and Agricultural Cooperatives (BAAC) and Government Savings Bank (GSB). SFIs are the biggest formal players in the Thai microfinance market, and carry out various government programs in this area. While both BAAC and GSB target low-income groups, BAAC's main customer base is farmers while GSB has a larger share of urban customers. BAAC was established to provide affordable loans to Thai farmers and small entrepreneurs in rural areas. Its most important feature is its extensive network capable of reaching low-income people in the rural areas, as well as its large savings mobilization. In addition to offering microloans directly to low-income customers, several SFIs, especially BAAC and GSB, also provide loans to semiformal financial institutions such as village funds and cooperatives at below-market interest rates (Meagher 2013). These institutions form partnerships with MFIs along the lines discussed above.

As discussed earlier, commercial banks are not prominent players when it comes to the market for microfinance. To be fair, however, following the Financial Sector Master Plan Phase 1 (2004–2008) and Phase 2 (2010–2014), the banking sector has entered into the SME segments. In fact, most commercial banks currently have retail banking operations and have launched many new products tailored for SMEs, resulting in increased lending to SMEs over the years (Figure 8.6). Still, the majority of SMEs, particularly small enterprises, do not have access to bank credit. According to the survey on debt burden and financial access of Thai SMEs by the Office of Small and Medium Enterprises Promotion, the major source of funding for large enterprises (53.3%) and medium enterprises (72.0%) is loans from financial institutions, while only 35.7% of small enterprises' funding is from bank credit (OSMEP 2012). As a result, many small businesses end up using their own funds or borrowing from loan sharks (or moneylenders), which charge very high interest rates (Fiscal Policy Office 2015).

The government and the Bank of Thailand have initiated a number of rules and regulations to provide an enabling environment for commercial banks to enter the microfinance industry. These include, for example, allowing commercial banks to extend microfinance loans for SMEs not exceeding B200,000 per borrower, allowing retail banking licenses, and



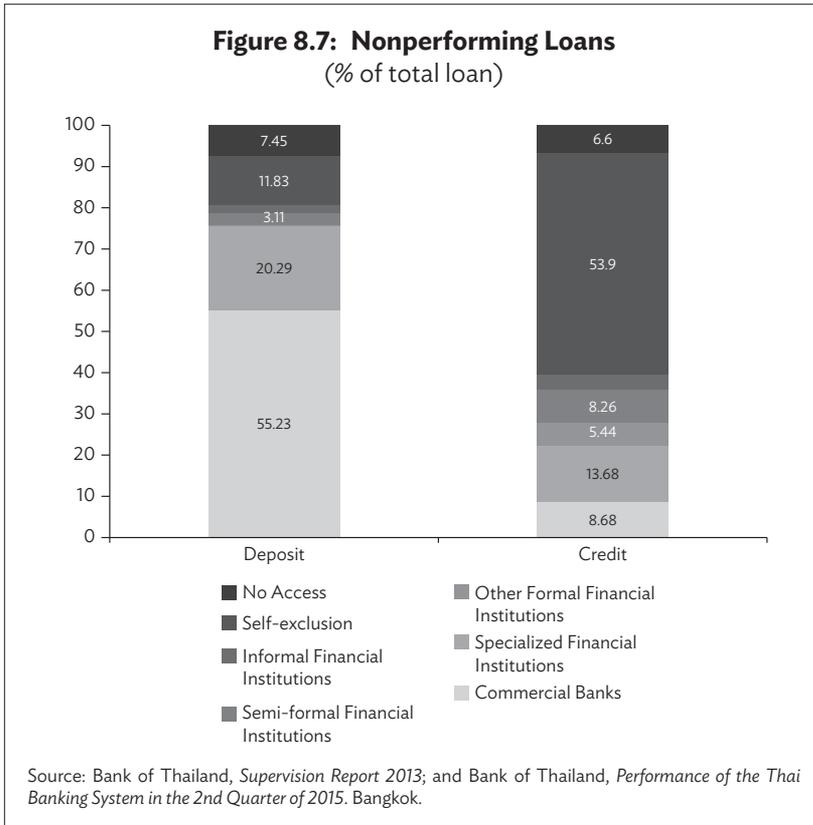
allowing new players for nanofinance for loans not exceeding 100,000 baht per borrower.

These microfinance guidelines have not provided enough incentive for banks to downscale due to high operating costs, with the exception of Krug Thai Bank, a state-owned commercial bank, and Thai Credit Retail Bank. In terms of outreach, however, the contribution of retail banks in microfinance has not been significant since their establishment; only 0.3% of SMEs are reported to frequently use services from retail banks (OSMEP 2012). Meanwhile, other nonbank institutions such as personal loan companies, which play an important role in retail lending, are allowed to provide loans only for consumption purposes at an interest rate not exceeding 28%, including all fees, and cannot provide business loans (Fiscal Policy Office 2015).

In the past, one of the efforts to involve private banks in microfinance was the establishment of retail banks with features similar to SFIs to act as a niche player in microenterprise and SME financing. A retail bank is basically a limited-charter commercial bank focusing on retail and SME finance, and may not operate in high-risk areas such as forex and derivatives. In 2005, the Ministry of Finance approved four retail bank licenses under policies adopted in the Financial Sector Master Plan, but only one (Thai Credit Retail Bank) remains open for business today. Although Thai Credit Retail Bank aims to serve small businesses and customers whose loan sizes are too small to qualify for loans with other commercial banks, its average loan size is still around B400,000 (approx. \$11,428), above the B200,000 threshold used by the Bank of Thailand as the definition of microcredit.

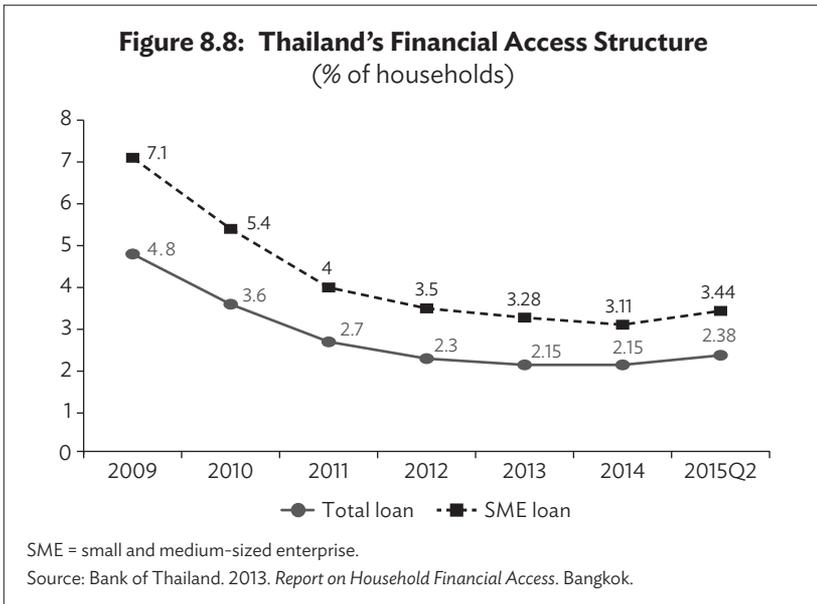
Another active player is Krug Thai Bank, which is a state-owned commercial bank. Apart from its own microfinance initiative via the Community Bank project, Krug Thai Bank's main involvement in microfinance is the government-affiliated activity. Through its link with the government, the bank provides financial services to village and urban revolving funds and serves as a financing channel for well-performing funds to finance their expansion, using a financing approach similar to the one discussed above. The loans are wholesaled to these funds, which in turn provide loans to their members for income-generating purposes.

As of the second quarter of 2015, SME loans account for 38.5% of commercial banks' outstanding loans, most of them geared toward medium-sized enterprises (Bank of Thailand 2015). The ratio of nonperforming loans for SMEs is also reported to be relatively high at 3.44%, compared with overall banking nonperforming loans of 2.38% (Figure 8.7), and is much higher than that of large customers (1.19%). Although commercial banks are the main provider of credit in Thailand, they have no real interest in servicing small customers, given the much



greater volume and profits to be found in the business sector, foreign exchange services, and high-income and middle-class customers.

In fact, despite official efforts to bring more people and businesses into the financial system, it appears that the overall situation of financial access in Thailand has not improved. According to a 2013 survey by the National Statistical Office and the Bank of Thailand, while 80.7% of households surveyed use deposit services from financial institutions, only 39.5% reported taking out loans from the financial system (BOT 2013a and Figure 8.8). This means that as much as 60.5% of households in 2013 do not use credit services from financial institutions, higher than the 33.9% recorded in 2006. The majority of those who do not use credit services are self-excluded. The main reasons are no credit need and preferences for credit from SFIs and VRFs. Households without access to formal and semiformal sectors account for around 10% of the total. The main reasons for having no access include inadequate



financial status and lack of collateral, fear of rejection, and complicated loan procedures (Bank of Thailand 2013a). The breakdown also finds that only around 27.8% of households reported actually taking out loans from formal financial institutions in 2013, compared with 43.3% in 2006.

### 8.4.3 Recent Developments in SME Support Schemes in Thailand

Amidst very slow economic growth, and slower than the ASEAN average, the Thai government and the Bank of Thailand have implemented several policies and measures to revive the Thai economy. One of these policies involves financial support for SMEs. It is believed that with a more vibrant SME sector, the Thai economy will be able to grow faster and become more resilient. This section discusses recent official measures and progress.

#### Nanofinance

The nanofinance scheme is a recent effort by the government to address the problem of loan sharks (or moneylenders) faced by SMEs that do not have access to formal lenders. About 600,000 households in Thailand are reported to borrow from the informal sector, while

1.3 million households cannot gain access to formal credit (Bank of Thailand 2013a). In early 2015, the government together with the Bank of Thailand launched a nanofinance scheme to help start-up firms gain access to credit. Operators with registered capital of at least B50 million are eligible to become nanofinancial institutions under the Bank of Thailand's criteria, and their debt-to-equity ratio may not exceed seven times their registered capital. Interest rates for nanofinancing are capped at 3% per month, or 36% a year, with the principal not exceeding B100,000 for each borrower. One important feature of nanofinance is that there is no collateral or statement of income required for borrowing (Fiscal Policy Office 2015). Commercial banks and registered institutions can operate the nanofinance scheme immediately without seeking permission from the finance minister, but nonbank lenders must apply and obtain the minister's approval. Currently, nine companies have won licenses to become nanofinance lenders and five companies have started operations.

Although it may be too early to evaluate the success of the nanofinance scheme, progress in terms of lending to SMEs has been slow. The first nanofinance companies started operations in May 2015, and by November 2015 the portfolio of outstanding loans was reported to be only B59 million (approx. \$1.69 million) for 3,141 borrowers, much less than the government expected. New operators have been cautious in lending to these high-risk borrowers with no collateral. It is reported that nanofinance companies are choosing to lend primarily to existing customers, rather than to new customers or start-up entrepreneurs, due to concern over the quality of new borrowers. Operating costs in processing a new loan application are high relative to the size of the loan. If default occurs, the costs to recover the loan are also considered too high for companies to bear. Meanwhile, one company that chooses to extend loans mostly to new customers has a nonperforming loan ratio of 16%, much higher than expected. Therefore, with the current average loan size of less than B20,000 (approx. \$571) and possible risk of default, nanofinance companies view the 36% interest rate cap by the government as too low to cover operating expenses. Nanofinance companies consider this interest rate low, especially when compared with underground lenders or loan sharks, which normally charge interest rates of 15%–20% per month, or almost 200% or more per year.

### **Village and Urban Revolving Fund**

In 2001 the Village and Urban Revolving Fund (VRF) program was initiated by the government. It aimed to provide B1 million (approx. \$28,571) to every village and urban community in Thailand to create

locally run microfinance banks. It is estimated that of all 120,000 microfinance initiatives worldwide, Thailand's microfinance scheme in the form of the VRF lends more money to more people than any other scheme (*The Economist* 2013). The total initial capital injection amounted to B78 billion (approximately \$2.2 billion), equivalent to 1.5% of GDP. A recent study found that since 2001 the government has injected over B151.6 billion (around \$4.3 billion) to set up and increase capital for the VRF (Vichienplert 2015). While the scheme is funded by government grants and funds are handled by intermediaries such as the Bank of Agriculture and Agricultural Cooperatives, each village has a pot run by an elected local committee that has some discretion in setting loan amounts and interest rates.

Recently, in the face of economic slowdown, the Thai government decided to revive the VRF scheme by investing an extra B60 billion (approx. \$1.7 billion) into existing village funds. The loans are given for the purpose of livelihoods, start-ups, or business expansions. Only well-performing village funds have the right to participate in this initiative, which offers interest-free periods for 2 years and a 1% interest rate after that. Only about 60,000 village funds are currently qualified to get loans under this government initiative.

The original intention of the VRF scheme was to create self-sustaining microfinance banks in each of Thailand's villages. Villagers are eligible by residency to take out a loan, typically limited to B20,000 without collateral. As of September 2013, there were 79,255 funds, including 74,989 village, 3,528 urban, and 738 military community funds. These funds currently have as many as 11.7 million members and have lent a total of about B546.5 billion (approx. \$15.6 billion) to 10.3 million active borrowers across the country (Vichientplert 2015). Village funds have the potential to transform themselves into village banks if they get good and capable executives, adhere to their founding principles, and have mechanisms to ensure villagers truly understand the purpose of such funds. With the VRF scheme, villagers have convenient access to funding that comes with a very low interest rate and therefore have a better chance of seeing their start-ups take off. The scheme, however, has its drawbacks. Private providers are unable to compete with the VRFs on cost. Regulations and licensing requirements in Thailand are so strict that nongovernment organizations have stopped setting up microfinance business. In the environment of widespread government-subsidized microfinance programs, there are very few private-driven MFIs with legal status in Thailand. This is in stark contrast to many middle-income countries where private sector organizations have taken the initiative to be the main providers of microfinance.

### **Other Recent Measures and Development for SME Support**

Other recently approved measures to support SMEs are (i) extension of B100 billion in soft loans via SFIs. Government Savings Bank (GSB) extends a 0.1% interest rate loan to commercial banks, which will then relend to SMEs at no more than 4.0%. The government will subsidize the interest for GSB to meet its costs; (ii) improvement in criteria and conditions of guarantee on loans in the portfolio guarantee scheme by Thai Credit Guarantee Corporation; (iii) a B6 billion venture capital fund to be set up by Krug Thai Bank, SME Bank, and GSB; (iv) reduction of corporate income tax for SMEs registered as juristic persons with profit above B300,000 from 15%–20% to 10% for two accounting periods (2015 and 2016); and (v) exemption of corporate income tax for new start-ups in sectors in demand (e.g., innovative technology) that are registered between 1 October 2015 and 31 December 2016 for five consecutive accounting periods (Government of Thailand 2015).

In addition to the above measures, the recently approved Business Security Act makes the taking of collateral in Thailand more practical and covers a broader range of assets. This should open up new access to finance for many SMEs. Under the previous law, only mortgages and pledges could be used as security to ensure performance under contracts. Pledging is not business-friendly because the law requires borrowers to hand over collateral to lenders, which means a business that depends on that collateral can no longer continue. Mortgaging is more business-friendly as SMEs can continue to utilize their collateral after the loan contract is signed. The previous law, however, only allowed certain types of assets to be mortgaged, including immovable assets (land and buildings) and some types of registered movable property (e.g., ships of five tons and over and floating houses). Therefore, assets that SMEs own, such as machinery, receivables, inventory, intellectual property, and ownership of business, were considered unacceptable for mortgaging. This issue has long been recognized as one of the obstacles for taking collateral in Thailand and has obstructed SMEs' ability to get loans from banks.

The recently enacted law, which attempts to solve this problem and unlock financing for businesses, should open a new window of opportunity for SMEs. Movable assets are now accepted as collateral to secure lending. Assets that are considered collateral include a business, a claim, movable property used in the security provider's business (e.g., machinery, inventories, and raw materials), real property if the security provider is in the real estate business, intellectual property, and other assets as provided in the ministerial regulation (Ministry of Commerce 2015). The law has been announced in the Royal Gazette and will be effective in July 2016.

## 8.5 Conclusions and Policy Recommendations

Thailand's SME financing landscape is full of diverse financial service providers ranging from formal to completely informal institutions—from commercial banks, state-owned banks, retail banks, and nanofinance companies to cooperatives, village funds, and various savings groups. These providers are also subject to differing interest rate regimes, capital requirements, and consumer protection norms.

In this environment, there is also a widespread use of loan sharks (or moneylenders), which charge interest rates of around 15%–20% per month, or 180%–240% per year. Despite a large amount of effort to support SMEs in various forms and commercial banks' increased focus on SME lending, SMEs still have difficulty in accessing the needed credit. The main reasons are from both the demand and supply sides. On the supply side, banks have no incentive to downscale into the small-client segment largely because of the lack of knowledge in these markets, especially in the rural areas. The situation was further aggravated by interest rate caps on microfinance lending and tough competition from government-subsidized credit, making profitability almost impossible. As the private sector plays a small role in providing financial services to SMEs, Thailand's microfinance industry is underdeveloped compared with other countries in the region, particularly in terms of providing good quality and creative financial products to poorer households (Bird et al. 2011). Given that Thailand is a bank-based economy with relatively strong and healthy commercial banks, the potential role of banks in promoting financial access should not be taken lightly.

The main obstacles to bank downscaling lie in three areas. First, banks are unaccustomed to serving the special needs of small borrowers, and therefore the high unit costs and inadequate information about small-scale finance pose unfamiliar risks. The traditional commercial banking model is not designed for small-scale credit or for the kind of relationship lending commonly used in microfinance that helps build the necessary record of information and trust over time. Banks generally cannot afford to visit borrowers or properly assess risk in rural areas. Second, interest rate caps on personal loans and microcredit (currently 28% for personal loans and microcredit and 36% for nanofinance) add more constraints as operating costs for small loans are high. Third, banks are unable to compete on cost with government-subsidized SFIs and village funds. These factors reinforce the perception that microlending is too expensive and too risky for banks to incorporate as a profitable line of business.

Against this background, this study proposes that rather than providing subsidized credit to SMEs or creating entirely new types of

financial licenses, the government should not overlook the possibility of engaging mainstream commercial banks in microfinance, possibly via partnerships with existing MFIs. There is a need to explore ways to utilize the competitive advantage of existing banks to promote more financial access in Thailand. This study provides three main recommendations:

### **Recommendation 1: Facilitate partnerships between commercial banks and MFIs and phase out government support schemes**

To a large extent, the very existence of state support of SMEs and microlenders is owed to the inability or unwillingness of banks to serve small customers. But banks have enormous potential for making financial systems truly inclusive. Commercial banks in Thailand have wide branch networks, the ability to offer a range of services, and the funds to invest in systems and technical skills. Commercial banks can use these strengths to reach massive numbers of small clients, both on their own and in partnership with other MFIs such as VRFs, cooperatives, and various savings groups in the country. Currently, there are as many as 148,000 semiformal and informal MFIs in Thailand (Lewis et al. 2013), representing a vast market opportunity for business partnerships.<sup>4</sup>

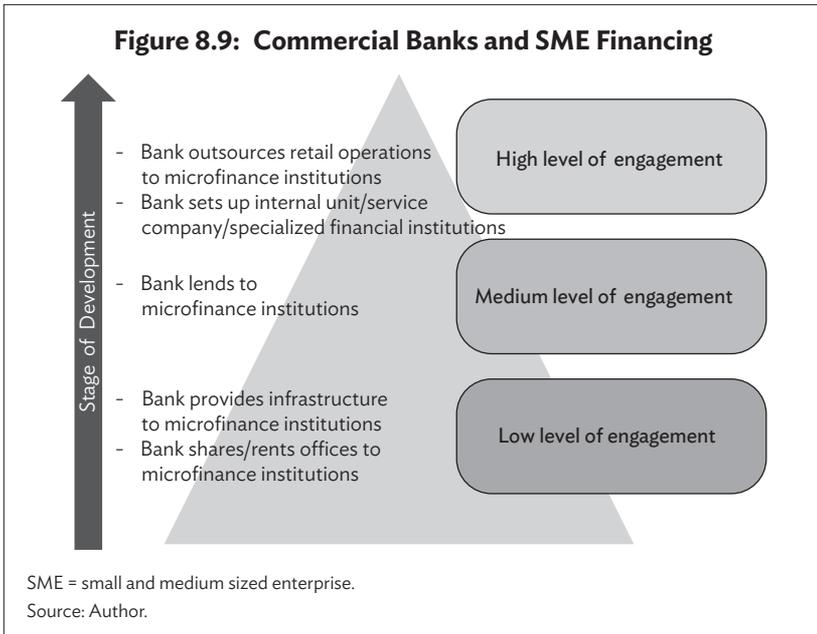
To enable commercial banks to compete with SFIs on cost, the Thai government should gradually phase out SME financial assistance via existing SFIs and allow a competitive level playing field for commercial banks. SFIs in Thailand such as the Bank of Agriculture and Agricultural Cooperatives and Government Savings Bank already have a large number of savers and extensive branch infrastructure as well as links with semiformal financial institutions such as village and urban revolving funds and cooperatives (Meagher 2013). In addition, SFIs enjoy preferential treatment in terms of tax and regulatory requirements. The government should allow these SFIs to compete or partner with commercial banks based on market mechanisms without subsidized credit. It is also necessary to phase out microfinance support schemes through other institutions such as cooperatives and village funds.

A bank entering the microfinance market may start with the lowest level of engagement, providing infrastructure to MFIs for a fee. By providing services to MFIs such as cashier services, an ATM network,

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<sup>4</sup> These estimates include cooperatives and occupational groups (13,000), savings groups for production (24,000), village funds (80,000), and self-help and community financial organizations (28,000).

or office rental in return for fees or rents, banks have an opportunity to learn more about small clients and their transaction patterns. This learning process should enable banks to progress as appropriate toward the highest levels of engagement in the microfinance business, where they outsource retail operations or set up their own subsidiaries (Figure 8.9).



## Recommendation 2: Liberalize interest rate requirements for microfinance

The Bank of Thailand has set a 28% cap, inclusive of all fees, for lending from nonbank financial institutions as well as microcredit loans from commercial banks. Recently, even though the Bank of Thailand has allowed the new nanofinance license, regulations require the new operators to charge interest of no more than 36%. However, this interest rate may be too low for nanofinance companies to break even, as reflected by a very low loan disbursement rate since its inception. As the average size of nanoloans has so far been smaller than the maximum allowable limit (around less than B20,000), nanofinance companies view high unit cost as an important obstacle. Therefore, the interest rate cap should be

either lifted for microfinance loans or allowed more flexibility in terms of the interest rate charged. Rather than imposing a flat-rate ceiling, the interest rate should be allowed to vary according to loan size, giving nanofinance companies some room to cover costs. It is reported that microfinance interest rates in other countries vary from 27% to 75% per year (Fiscal Policy Office 2015).

### **Recommendation 3: Develop SME and MFI credit information systems**

Information is key to reducing transaction costs in SME lending and monitoring. Whether banks choose to lend directly to SMEs or partner with existing MFIs, there is the need to build an SME lending database and centralized information on MFIs. A credit rating scheme for SMEs could be developed and implemented using data on lending by banks to SMEs. From the lender's point of view, it is costly to examine the financial health of each SME. This cost is passed on to SMEs, thereby increasing their borrowing costs. Centralized information on MFIs, including credit ratings, should also reduce information costs for banks looking for viable MFIs as business partners.<sup>5</sup> Formal documentation and operating procedures of MFIs should be established to facilitate matchmaking between banks and MFIs. For this, it may be necessary for the government to establish formal and legal procedures for MFIs, while ensuring that these do not impede MFIs' existing flexibility in lending to local clients.

To conclude, the Thai government has recognized the importance of SMEs to the economy and has provided a substantial amount of support to this sector. It has been more than 10 years since the start of the Financial Sector Master Plan, which aimed to provide an enabling environment for more financial access in Thailand. Still, SMEs have not been able to catch up with larger enterprises. SME contribution to GDP has been declining, with its share in 2015 (39.6% of GDP) still lower than what it was 20 years ago (44.2%), and the constraints to SME financing remain the main topic of policy discussion today. The real issue, therefore, may not be about the lack of financing and support per se but about how to design appropriate business models and market-friendly supporting schemes to help SMEs gain access to credit on a sustainable basis. For this, it should no longer be assumed that the private sector is

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<sup>5</sup> Currently, the National Credit Bureau of Thailand, established in 2005 as a result of a merger between two existing credit reporting agencies at the time, collects personal information on the loan and credit card products from formal financial institutions but does not have credit information from MFIs.

not willing to provide financial services to SMEs at a reasonable price, and that government support is needed as a result. The private sector should, for their part, become more involved in SME financing as an alternative to public financial assistance. To facilitate this process, the government should explore the possibility of providing the necessary infrastructure and incentives to encourage commercial banks to become more active players in the microfinance market, either by expanding their retail operations or by partnering with existing MFIs, or both. As a bank-based economy, Thailand will benefit a great deal from making use of commercial banks' competitive advantage to create a more market-friendly environment for SME financing. This will also ensure that lending to small-business clients is market-driven, not a burden to the government, and self-sustaining in the long run.

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# 9

## Bridging the “Missing Middle” between Microfinance and SME Finance in South Asia

*Savita Shankar*

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### 9.1 Introduction

In recent times, financial inclusion has been on the policy agenda of many developing countries. An inclusive financial system implies availability of a continuum of financial services for all income groups, namely a seamless range of financial services with no gaps in provision. The idea is that an inclusive financial system provides credit to all bankable individuals and firms, insurance to all insurable individuals and firms, and savings and payment services for everyone (United Nations 2006). Financial inclusion does not imply that everyone will use all available financial services, rather that everyone has the option to use them.

In the case of enterprise credit, loans of various sizes need to be provided by a range of financial institutions in the system. This implies that if microfinance institutions (MFIs) provide loans up to a certain amount, loans just above that threshold need to be provided by another kind of institution, without a gap in between. Often, the same entrepreneur’s credit needs may vary with changes in the size and needs of the enterprise.

As a result of the emphasis placed on financial inclusion, many developing countries in Asia have facilitated the development of microfinance sectors. South Asia, Bangladesh, India, and Pakistan have large and vibrant microfinance sectors. However, not enough attention has been paid in the past to carving out a route for MFI borrowers who outgrow microfinance. With maturity of the microfinance sector, there are likely to be some “MFI graduates” who need to be serviced

by another institution in the system. These borrowers are still too small to avail themselves of small and medium-sized enterprise (SME) credit from commercial banks, but their loan sizes are often far higher than the upper threshold of microcredit.

The term “missing middle” is generally used to describe the disproportionately small number of small and medium-sized enterprises as compared with the number of micro and large enterprises in many developing countries (Ayyagari et al. 2005). Here, however, it is used more specifically to refer to the lack of financing options for enterprises whose needs fall in between the typical loan sizes offered by MFIs and commercial banks.

A study in India found that once an individual gains access to microfinance, three kinds of outcomes are possible (Shankar 2015). The first kind of outcome is in the case of MFI borrowers who utilize their loans primarily for their business activity and whose businesses generate sufficient margins after payment of principal and interest. These individuals experience rapid increases in income on account of microcredit and often become eligible for individual loans from their MFI if the organization provides such loans. Such borrowers may be categorized as “effective utilizers.” A second category of MFI borrowers utilizes the loan for their own business activity but do not receive sufficient margins and hence do not see rapid increases in income due to microcredit. They primarily use microcredit to smoothen their cash flow. These individuals usually remain in groups and may be referred to as “cash flow smoothers.” A third category of individuals use the majority of their loans for nonbusiness purposes (such as repayment of existing loans or consumption expenditures). They also stay within the group framework, but if loan sizes keep increasing, they may find it hard to service the loan and may eventually default or drop out. Such individuals may be categorized as “ineffective utilizers.”

This chapter focuses on the first category (effective utilizers) who have the potential to act as decentralized sources of employment and economic growth. Two leading urban-based microfinance institutions in India estimate that 15% to 20% of their group borrowers fall in this category. These microfinance borrowers grow at an above-average rate and often eventually reach the upper limit of the loan size provided by the MFI. These upper limits are in turn set by regulatory authorities. This is mainly because microfinance in many countries is directly or indirectly subsidized as it is meant for low-income individuals who are new entrants to the financial system. For example, in India, until April 2015, microcredit loans were required to be lower than Rs50,000. If the microfinance borrower’s needs exceed the regulatory limit, they need to look for funding from outside sources.

Drawing on analysis of policy initiatives and discussions with leading microfinance providers, this chapter aims to assess if in the mature microfinance markets of India, Bangladesh, and Pakistan there exist specific initiatives to address the needs of microfinance graduates. In all three countries, the percentage of adults (above the age of 25 years) who have a bank account and the percentage who have a borrowing account with a financial institution are both low. Table 9.1 gives these numbers for the three countries and that of a few other countries in Asia.

**Table 9.1: Financial Inclusion Indicators in Selected Asian Countries, 2014**  
(%)

Country	Percentage of adults above 25 years of age with an account at a financial institution	Percentage of adults above 25 years of age who have borrowed from a financial institution
India	56.3	8.8
Bangladesh	35.4	12.9
Pakistan	13.0	2.0
Sri Lanka	82.0	21.8
Malaysia	70.5	22.9
Nepal	37.3	13.8
Indonesia	36.3	15.4
Philippines	31.0	15.0

Note: The term “financial institution” includes banks, credit unions, post offices, and microfinance institutions.

Source: Global Findex database, World Bank.

While all three countries have fairly well-developed banking and microfinance sectors, the low borrowing rate indicates that there are still gaps in financing. This chapter focuses on the lending gap between microfinance loans and SME loans of commercial banks.

The study methodology consisted of interviews with key personnel from the microfinance and banking sectors in each of the three countries. Thirty-two interviews were conducted in all, with at least 10 interviews conducted in each country, mostly with chief executive officers of microfinance institutions and banks. The list of organizations is in Appendix A9. In addition, the study involved analysis of research reports, journal articles, and other public sources of information.

## 9.2 Gap between Microfinance and SME Finance in India

Financial exclusion is a widespread problem in India. According to the World Bank’s Global Findex database, in 2014, only 56.3% of individuals above the age of 25 years had an account and only 8.8% had a formal borrowing account.

The Indian microfinance sector comprises self-help groups and MFIs, which together account for 86.06 million members. Table 9.2 gives the shares of the two models in membership and gross loan portfolio. The self-help group model was originally promoted by the National Bank for Agriculture and Rural Development, the apex development bank for agricultural and rural finance. MFIs, on the other hand, have mainly been promoted by individual entrepreneurs. The lower share of the self-help group model in gross loan portfolio vis-à-vis their share in membership indicates a lower average loan size compared with the MFI model.

**Table 9.2: Microfinance Sector in India**  
(as of 31 March 2015)

Type	Number of Members (million)	Gross Loan Portfolio (Rs million)
Self-help group	54.2 (63%)	428.4 (55%)
Microfinance institution	31.8 (37%)	350.5 (45%)
<b>TOTAL</b>	<b>86.0</b>	<b>778.9 (\$11.7 billion)</b>

Source: T. Nair and A. Tankha. 2015. *Inclusive Finance India Report 2014*. New Delhi: Oxford University Press.

In recent times, MFIs incorporated as nonbanking financial companies (NBFC-MFIs) are the fastest-growing institutional form in the microfinance sector (Nair and Tankha 2015).

While recently the upper limit of microfinance loans has been increased to Rs100,000, the lower limit for SME financing by commercial banks is usually around 10 times this amount (Rs1 million).<sup>1</sup> There is therefore a considerable gap between these two sectors.

According to the 2013 survey of the National Sample Survey Organization, there are 57.7 million small business units, mostly organized as proprietorships in the manufacturing, trading, and service

<sup>1</sup> This was corroborated by interviewees in banking as well as microfinance sectors.

sectors. These units are estimated to employ around 120 million individuals. Inadequate finance is one of the key constraints to growth faced by these units according to a report by IFC (2012). The report estimates that the total finance gap of the micro, small, and medium-sized enterprise sector in India is around Rs3.57 trillion (\$53.6 billion).

### 9.2.1 Financing Avenues for Microfinance Graduates

The range of credit needs of the missing middle segment is between Rs0.1 million and Rs1 million. The players who cater to this segment in India are certain regional rural banks, some commercial banks, a few large NBFC-MFIs who can lend up to 15% of their net assets in loans that are larger than the limit prescribed for microfinance loans, and some specialized nonbanking financial companies (NBFCs) who cater to specific segments such as financing of commercial vehicles or equipment. However, there is still a large gap in the supply, because of which many missing middle entrepreneurs are unable to reach their full potential. Many of them depend on informal sources of financing. These include family and friends, who usually have a limited pool of funds, or moneylenders and chit funds, who often charge very high interest rates.

#### **Potential and Current Lenders to the Missing Middle Category**

The possible providers of finance for the missing middle category are NBFC-MFIs, NBFCs that specialize in certain types of financing, rural banks, and commercial banks.

#### ***Microfinance Institutions***

The main challenge that NBFC-MFIs or any other form of MFI will face when lending to this segment is that they need to develop the ability to carry out a detailed credit appraisal. MFI loans, being group based, have high repayment rates despite being collateral-free because of peer pressure; collection is in small, frequent installments at regular group meetings (weekly, fortnightly, or monthly). Moreover, there is a dynamic incentive to repay as loan sizes usually increase in subsequent loan cycles. Hence, the appraisal process for microfinance loans is not very detailed. The main steps in the appraisal process are (i) carrying out a group training where basic financial literacy is imparted and loan conditions are explained, (ii) checking the potential borrower's address by visiting them prior to the loan, and (iii) loan utilization checks. Lending to missing middle entities will be on an individual basis and the size of the loans will be larger; this will mean that the appraisal process for the loans will necessarily have to be different and much more detailed. If they want to enter this segment, MFIs need to have training

programs for their officers. Given the large numbers of field officers that need to be trained, e-learning programs coupled with classroom training and simulation exercises may need to be considered.

Friends of Women’s World Banking (FWWB) India during November 2014 to January 2015 carried out a pilot project in which capacity building and funding support was given to a credit society, Annapurna Mahila Multi-State Co-operative Credit Society, to enable 50 members of the cooperative to avail themselves of larger-value loans. Training was provided both for the members seeking larger loans and to the staff of the cooperative. The repayment of the loans provided is satisfactory and the project is likely to be mainstreamed soon. FWWB believes that capacity building needs to precede provision of larger-value individual loans to group microfinance customers.<sup>2</sup>

Another challenge that MFIs face is availability of funding, as providing larger loans will require them to access a larger volume of funds. Recent initiatives are expected to help, including the establishment of a specialized bank, called MUDRA Bank, for the purpose of funding organizations lending to MSMEs and provision of licenses to eight large NBFC-MFIs to start small banks. Once the NBFC-MFIs complete the required formalities and start operations, they will be allowed to accept deposits and as a result will have access to an additional source of funding, which is expected to reduce their average cost of capital. However, the new banks may face challenges in building trust among potential depositors. They may also be constrained in attracting deposits from some kinds of entities who are mandated to place their deposits in only certain kinds of banks.

Some NBFC-MFIs have developed credit appraisal skills and have been providing individual loans within the overall microfinance loan limit set by the Reserve Bank of India (RBI). These loans are usually given to star performers from among their group borrowers who run businesses that have potential to scale up. Some common examples of enterprises financed by group microcredit that show potential for scaling up are tiffin stalls, drinking water packaging companies, martial arts schools, and beauty parlors. The loan amount sanctioned is based on an assessment of the borrower’s cash flow. Unlike in the case of group-based loans, disbursement is not in cash but to the customer’s bank account. The customer is required to give standing instructions for payment of principal and interest.

Given the large market potential, some large NBFC-MFIs have started providing loans higher than the microfinance cap. As per RBI guidelines, they are permitted to lend up to 15% of their net assets in

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<sup>2</sup> Interview with the chief executive officer, Friends of Women’s World Banking, India.

loans that do not fall within the definition of microfinance loans, and so some of them have started providing higher-value loans to microfinance graduates. Grama Vidiyal Microfinance is one such MFI, which has been providing individual-based “business loans” and has found this to be a very good product. Other NBFC-MFIs have promoted an NBFC arm that caters to this segment. For example, Equitas Finance has been lending to this segment for the last 3 years. The loans are given on an individual basis and the tenure is usually 5 years. The experience has been good so far, with a very low level of nonperforming assets of less than 1%. Equitas Finance has trained its field officers on credit appraisal skills. Much of the credit appraisal is based on field visits and through observation and verification. The organization finds the cost of operation in the case of larger-value individual loans comparable with that of lower-value group loans.

### ***Nonbank Financial Companies***

Some NBFCs cater to niche segments within the missing middle. For example, there are NBFCs that focus on the financing of commercial vehicles, new and pre-owned. They usually operate through a dense network of branches with credit officers who are responsible for the entire transaction from identifying customers, valuing the commercial vehicle, and financing it to handling collection of principal and interest. These executives meet with the customer at least every month. Electronica Finance is an NBFC that focuses on financing asset acquisition by the missing middle. Appraisal is based on field visits, interviews with promoters, and checking of records and cash transactions. The financial data provided by the firm is cross checked with income tax returns and value-added tax returns (Manickaraj 2010). As loans are only provided for the purchase of equipment, disbursement of the loan is made directly to the equipment supplier. The down payment of 25% is collected up front from the customer and the NBFC pays the amount in full to the supplier.

As the missing middle is heterogeneous in nature, other niche segments within it need to be identified and specific products to cater to them need to be developed along with built-in risk mitigation measures.

### ***Rural Banks and Commercial Banks***

While currently 87% of the formal finance being accessed by the micro, small, and medium-sized enterprises is provided by banks, there is still a big gap in financing.

In general, the biggest barrier to banks in catering to this segment is the high-cost nature of their operations. As catering to missing middle customers typically involves considerable investment of employee time, it is often unviable given the small loan size.

While there is a provision for banks to use banking correspondents (or direct sales agents) to reduce their costs, it is often challenging to arrive at a satisfactory arrangement that is fair to both parties with equitable sharing of risk and return.

Another initiative of the RBI is permitting the issuance by banks of the Kisan (meaning farmer) Credit Card and the General Credit Card. These are credit facilities extended in the form of sanctioned limits for farmers and nonfarm small entrepreneurs, respectively.<sup>3</sup> In December 2013, the RBI issued guidelines directing banks to ensure that these facilities were directed to cater to entrepreneurial needs and not consumption needs. There are still no reports available on how effective this initiative is.

Rural banks cater to micro, small, and medium-sized enterprises in rural areas. The experience of the banks with such loans is mixed. Often it is found that loans given under government-sponsored programs have very low repayment rates. However, loans sourced by the bank officers that are not part of a government program have a good repayment rate.<sup>4</sup>

Regional rural banks that have been successful in this segment rely on field staff for identifying potential borrowers. For example, Pallavan Grama Bank in South India has periodic loan campaigns when officers from the regional office are in the branches expediting approvals for higher-value loans. For smaller loans up to a value of around Rs0.2 million, financial information is not relied upon and sanction of the loan is based on needs assessment by the field staff. For larger loans, sales tax registration details, income tax returns, and approvals from industry associations are mandatory. Part of the due diligence may also involve an assessment of suppliers and customers.

## 9.2.2 Policy Initiatives to Address the Gap

The Government of India has taken cognizance of the missing middle, especially in view of its potential for employment generation, an important policy objective to take advantage of the country’s demographic dividend.<sup>5</sup> A number of recent policy initiatives have sought to address this segment.

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<sup>3</sup> Limits are fixed for a 3-year period and unlimited withdrawals can be made within the limit. Each withdrawal needs to be repaid within 12 months.

<sup>4</sup> Discussion with Pallavan Grama Bank official.

<sup>5</sup> This refers to a situation when the working age population is larger than the nonworking age population.

### Broadening the Focus of the Microfinance Sector

Microfinance policy initiatives in India have focused on directing credit toward individuals with income below a certain minimum threshold and aimed at reaching underbanked areas in the country. For example, the guidelines for creation of special microfinance-focused nonbanking financial companies (NBFC-MFIs) issued in December 2011 specifically mentioned that 85% of their net assets<sup>6</sup> should consist of “qualifying assets.” Qualifying assets were in turn defined as loans given to individuals with income lower than a defined limit.<sup>7</sup> The loans had to be lower than Rs35,000 (\$525) in the first cycle and Rs50,000 (\$750) in subsequent cycles, within an overall limit of Rs50,000 on the total indebtedness of the borrower (Reserve Bank of India 2011). It was clear that the guidelines sought to ensure availability of credit to very low-income individuals at reasonable terms. Moreover, there were specific initiatives to encourage the development of credit in underserved areas. While NBFC-MFIs were required to have net owned funds of at least Rs50 million (\$0.75 million), the requirement was relaxed to Rs20 million in the northeastern region as it was one of the most underbanked areas.

Recently however, policy prescriptions have sought to broaden the target market of microfinance providers. These measures may have been prompted by the realization that given the low levels of formal borrowing in the country, it is quite likely that many individuals with income higher than that envisaged for microfinance customers may also be unbanked. The loan volumes required by such individuals are also likely to be higher than the upper end of microfinance loans.

In April 2015, the country’s central bank, the Reserve Bank of India (RBI) issued guidelines that permitted NBFC-MFIs to lend to individuals with rural household income of up to Rs100,000 (\$1,462) and semi-urban or urban household income of up to Rs160,000 (\$2,339) as against the limits of Rs60,000 and Rs120,000 previously noted. Similarly, the limit on the size of the microfinance loan was raised to Rs60,000 (\$900) in the first cycle and Rs100,000 (\$1,500) in subsequent cycles as compared with the previous guidelines of Rs35,000 and Rs50,000, respectively. Microfinance Institutions Network, the self-regulatory organization of the NBFC-MFIs, has currently suggested to its members to exercise caution in increasing loan sizes up to the revised cap of microfinance loans and only gradually increase loan sizes beyond Rs50,000. However, the average value of loans given by the

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<sup>6</sup> Net assets are total assets minus cash and bank balances and money market instruments.

<sup>7</sup> The annual income limit was Rs60,000 (\$900) in rural areas and Rs120,000 (\$1,800) in urban and semi-urban areas.

microfinance sector is far lower than the prescribed limit. In 2014, when the upper limit for lending was Rs50,000, the average loan outstanding per self-help group was Rs102,273. As each self-help group on average had 13 members, the average loan per individual member was Rs7,867. The average loan per individual MFI member is Rs9,961, though in the case of NBFC-MFIs, the average loan size is around Rs17,000. The upper limit for microfinance loans is relevant only in the case of a minority of MFI members whose needs are growing rapidly as their enterprises scale up.

### **MUDRA Bank Initiative**

To address the need for funding for micro, small, and medium-sized enterprises, in April 2015 the Micro Units Development and Refinance Agency (MUDRA) Bank, a public sector financial institution, was launched with funding of Rs200 billion for onlending and Rs30 billion for provision of credit guarantees. MUDRA Bank is a subsidiary of Small Industries Development Bank of India, the apex bank for the development of small industries in the country. The apex bank has assisted many MFIs, though going forward it plans to mainly act as a market maker for small industries and focus on providing venture capital for start-ups (*Economic Times* 2015). MUDRA Bank is to provide refinance to last mile<sup>8</sup> providers of finance for microenterprise loans. Commercial banks, regional rural banks, cooperative banks, NBFCs, and microfinance institutions are eligible to obtain refinance for loans under three categories: up to Rs50,000, Rs50,000 to Rs0.5 million, and Rs0.5 million to Rs1 million. The three categories are expected to cater to microenterprises at different stages of development, though 60% of MUDRA Bank’s funding is earmarked to cater to the first category. The loans are meant to be for nonfarm income-generating activities. By September 2015, in the first 6 months of operation, MUDRA Bank had reported disbursement of Rs240 billion. MUDRA Bank has also been envisaged as the unified regulator of the microfinance sector, though the legislation in this regard is yet to be passed.

The refinance facility from MUDRA Bank is expected to make available larger sums of money to enterprises in the missing middle. It is also expected to bring down the cost of the loans availed by them. The self-regulatory organization of NBFC-MFIs, Microfinance Institutions Network, estimated that MUDRA Bank finance could lower the cost of funds of MFIs by 3% to 4% from the current level of 12% to 14%. This in

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<sup>8</sup> The term “last mile provider” refers to the entity that ultimately interfaces with the customer as against other entities who merely act as financial intermediaries in the process of financial service delivery to unbanked populations.

turn will lower the interest rate charged by MFIs from the current level of 24% to 22% as there is a cap on the interest rate margin that MFIs can charge.<sup>9</sup>

### **Provision of Banking Licenses to Small Finance Banks**

In September 2015, the RBI gave licenses to 10 private entities to start small finance banks to cater to the financial needs of underserved segments such as small business units, small and marginal farmers, microentrepreneurs, and unorganized sector entities. Small finance banks are expected to have high-technology, low-cost operations. Eight of the entities that received licenses are NBFC-MFIs. The minimum paid-up capital of these banks is Rs1 billion (\$15.0 million). Small banks must direct 75% of their adjusted net bank credit<sup>10</sup> to sectors eligible for classification as “priority sector lending” by the RBI, while at least 50% of the loan portfolio is required to comprise loans and advances of value of up to Rs2.5 million. As a result of these requirements, small finance banks are expected to cater to the missing middle for whom these loan sizes would be appropriate. The sources of funds for these banks include deposits and refinance from MUDRA Bank.

### **Redefining Micro, Small, and Medium-Sized Enterprises**

In April 2015, a bill was introduced in Parliament that seeks to amend the definitions of micro, small, and medium-sized enterprises. In the manufacturing sector, investment in plant and machinery for micro, small, and medium-sized enterprises is currently capped at Rs25 million, Rs50 million, and Rs100 million, respectively. The bill proposes to increase these limits to Rs50 million, Rs100 million, and Rs300 million. Similarly, it seeks to increase the caps of Rs1 million, Rs20 million, and Rs50 million in plant and machinery for micro, small, and medium-sized enterprises in the services sector to Rs2 million, Rs50 million, and Rs150 million respectively. The bill is currently pending in Parliament (PRS 2015). As the earlier definition was set in 2006, amending the definition is a reasonable measure in view of inflation. Amendment of the definition will broaden the range of enterprises that can be classified as a micro, small, or medium-sized.

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<sup>9</sup> The cap is 10% for large MFIs (i.e., MFIs with loan portfolios higher than Rs1 billion) and 12% for others. The interest rates charged by MFIs will need to be the lower of the cost of funds plus the applicable maximum margin (10% or 12% as the case may be) and 2.75 times the average base rate of the five largest commercial banks by assets.

<sup>10</sup> Computation of adjusted net bank credit is defined by the RBI in its circular dated 23 April 2015.

Banks in India need to lend 40% of their loan portfolio<sup>11</sup> to the RBI-designated “priority sector.” A subtarget of 7.5% of adjusted net bank credit or credit equivalent amount of off balance sheet exposure, whichever is higher, has been set for lending to microenterprises, to be achieved in a phased manner by March 2017 (RBI 2015). Lending to micro and small enterprises is considered part of the priority sector, and expanding the definition of these entities will enable more missing middle entities to become eligible for lending from banks under this category. Assuming that the pool of funds available to banks to lend to this segment increases as a result of the MUDRA Bank initiative, an increased volume of funds may be expected to flow to these firms.

### 9.3 Gap between Microfinance and SME Finance in Bangladesh

In Bangladesh too, financial exclusion is widespread. According to the World Bank’s Global Findex database, only 35% of individuals above the age of 25 have an account and only 13% borrow from a formal financial institution.

Bangladesh’s Grameen Bank is a pioneer in the field of microfinance, having its origins in a small action research program of Prof. Muhammad Yunus in 1976, and hence the country is considered as the birthplace of microfinance. The microfinance sector in the country grew considerably in the 1990s and saw high growth until 2007. By 2008, there were signs that the market was nearing saturation (Chen and Rutherford 2013). During the years 2004–2007, 15% to 28% of active borrowers were added annually; thereafter, the four largest MFIs—ASA, BRAC, BURO (Basic Unit for Resources and Opportunities of Bangladesh), and Grameen Bank—consciously decided to slow down and stopped adding branches and staff. Chen and Rutherford (2013) describe this development as “a crisis averted” as the cutback on the part of these MFIs, which accounted for two-thirds of the microfinance supply in the past decade, prevented issues arising from aggressive growth in a saturated market from spiraling out of control.

In addition to Grameen Bank, which is incorporated as a bank, there are around 676 licensed nongovernment organizations involved

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<sup>11</sup> Priority lending refers to directed lending by commercial banks to certain sectors of the economy that are considered important from the development perspective such as agriculture, microenterprises, renewable energy, education, housing, and social infrastructure.

in microfinance (NGO-MFIs) in the country that cater to a total of 33.73 million members as of June 2014. The total loans outstanding amount to Tk403 billion (\$5.1 billion).

All microfinance providers in the country can also accept deposits, and the total savings as of June 2014 was Tk237 billion (\$3 billion). Borrowers, however, usually account for 70% to 80% of the membership of MFIs. The average microcredit loans size is Tk13,917 (\$177.3).

Even though there are a large number of microfinance providers in the country, the supply of microcredit is highly concentrated with the three largest ones. These three providers, Grameen Bank, ASA, and BRAC, account for roughly 61% of the members and around 60% of the loans outstanding (Table 9.3).

**Table 9.3: Microfinance Sector in Bangladesh**  
(as of June 2014)

	Number of Members (millions)	Gross Loan Portfolio (Tk billion)	Total Savings (Tk billion)
Grameen Bank	8.6 (30%)	87.7 (24%)	150.9 (57%)
ASA and BRAC	8.9 (31%)	140.4 (38%)	59.3 (22%)
Other nongovernment organization microfinance institutions (674 in number)	11.0 (39%)	137.6 (38%)	53.6 (20%)
<b>TOTAL</b>	<b>28.5</b>	<b>365.7</b> <b>(\$4.7 billion)</b>	<b>263.8</b> <b>(\$3.4 billion)</b>

Tk = Bangladesh taka.

Source: Based on data from Microcredit Regulatory Authority MIS database and Grameen Bank website.

Grameen Bank's deposits are significantly higher as it is permitted to accept deposits from members and nonmembers, while the others, being NGO-MFIs, can only accept deposits of members. This is because Grameen Bank is regulated by the central bank, Bangladesh Bank. The main regulator for the NGO-MFIs is the Microcredit Regulatory Authority (MRA), which was established in 2006.

All NGO-MFIs have to register with the MRA, which oversees them and disseminates data relating to them. The main sources of funding for NGO-MFIs is savings collected from clients, which accounts for around 34% of their funding. Other main sources of funding are loans from commercial banks (16%); Palli Karma-Sahayak Foundation, an apex development organization established by the government (11%); and donor funding (2%). The balance (37%) comes from the cumulative

surplus built up as a result of the MRA requirement that all the revenues generated by NGO-MFIs are reinvested into their microfinance programs (MRA 2014). The MRA has set a cap on interest rates of 27% on microloans and microenterprise loans provided by NGO-MFIs and also requires that the interest be calculated on a declining balance basis and not on a flat basis.<sup>12</sup> While most NGO-MFIs charge 27%, BRAC charges a lower rate of 26%, and Grameen Bank, which as a bank has access to more deposits, is able to charge an even lower rate of 20%.

### 9.3.1 Financing Options for Microfinance Graduates

In Bangladesh, loan amounts up to Tk50,000 (\$637) are usually considered as microcredit, and loans in excess of this amount are considered microenterprise loans (MRA 2014). Both types of loans may be provided by microfinance providers

Since 2007, Bangladeshi MFIs have realized the need to provide larger loans for some of their group members who have the capability to service them. Such customers are usually in the fields of small-scale manufacturing, retail stores, construction, and transport services. Many group members’ children also expressed interest in larger-value individual loans. BRAC and Grameen Bank were the earliest to launch individual loans to cater to them, and some other MFIs followed suit. Once MFIs started offering larger individual loans, they realized that besides some of their own group members, there was demand from other small entrepreneurs. Recently, some of them have also started catering to salaried individuals.<sup>13</sup>

While all MFIs are permitted to offer microenterprise loans, it is observed that only the large and medium-sized players are able to cater more to this segment (Table 9.4). BRAC and ASA account for 42% of the microenterprise loans of NGO-MFIs and the top 10 MFIs in the country account for around 49%. The paucity of funding for smaller MFIs is the major reason for this skewed distribution.<sup>14</sup>

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<sup>12</sup> If interest is calculated by the MFI on a flat basis (that is, interest is calculated in every time period on the entire principal without taking into account the installments of principal that have already been repaid by the borrower), then the total interest paid by the borrower is almost double of what it would be if it is calculated on a declining balance basis.

<sup>13</sup> Typically, this would be for individuals with salaries between \$70 and \$300 per month (communication with BRAC representative).

<sup>14</sup> Interview with the chief executive officer of Pally Bikash Kendra.

**Table 9.4: Microenterprise Loans in Bangladesh**  
(as of June 2013)

	Total Number of Microenterprise Loan Borrowers (thousands)	Gross Microenterprise Loan Portfolio (Tk billion)
Grameen Bank	704	22.9
BRAC	391	19.1
ASA	178	9.2
Top eight NGO-MFIs (other than BRAC and ASA)	138	5.0
Other smaller NGO-MFIs	246	34.4
<b>TOTAL</b>	<b>1,657</b>	<b>90.0 (\$1.1 billion)</b>

Tk = Bangladesh taka.

Source: Based on data from Microcredit Regulatory Authority MIS database and Grameen Bank website.

### Models Used for Microenterprise Loans

The microenterprise loan is usually offered as a distinct product on an individual basis distinct from a group microfinance loan. The rate of interest, however, is often similar for both products. For instance, in the case of BRAC, microloans, which usually range between Tk5,000 and Tk50,000, are termed Dabi (which means demand or what is rightfully ours) while microenterprise loans are higher than them and are called Progoti (or progress).

While BRAC's Dabi loans are provided using the group methodology with repayment typically being weekly at group meetings, the Progoti loans are given on an individual basis with repayments being made at branches on a monthly basis. Moreover, Dabi loans are given exclusively to women while Progoti loans are given to both men and women. Often, husbands of Dabi members take Progoti loans either singly or jointly with their wives. As against collateral-free Dabi loans, Progoti loans have notional security such as deposit of original land documents, trade license, shop owner's agreement, and national identity card. In addition, for Progoti loans, guarantees from one family member and one nonfamily person are sought.

Other MFIs that provide microenterprise loans also have distinct products. Most MFIs provide training to first-time customers of individual loans regarding how the product works. Integrated Development Foundation provides a 3-day training to customers that teaches them the fundamental concepts of costing and accounting. People's Oriented Program Implementation tries to facilitate forward and backward linkages for microenterprises to be financed by them.

### Experience of MFIs with Microenterprise Lending

Microenterprise loans represent only a small part of the portfolio of even large MFIs. For instance, in the case of BRAC, they account for only 7.4% of BRAC’s loan portfolio and are availed by only 2% of its borrowers. Similarly, ASA offers small business loans, which account for around 3.5% of its portfolio and are availed by a little less than 1% of its borrowers.

Repayment experience with microenterprise loans appears to be mostly good, with the MFIs interviewed (which offered microenterprise loans) reporting repayment rates of 97.0%–99.5%. While one large lender mentioned that its repayment rate on current microenterprise loans was marginally lower than that of group loans, another medium-sized one mentioned that the repayment rate on its microenterprise loans was marginally higher than that of group loans. Even relatively smaller MFIs<sup>15</sup> that had ventured into microenterprise lending reported that their experience was very good, with a recovery rate of 98.0%–99.5%.<sup>16</sup>

A major handicap in the Bangladesh microfinance sector is the absence of a credit bureau. The sector is reported to have numerous cases of multiple borrowing—namely cases where a borrower takes loans simultaneously from more than one MFI.<sup>17</sup> Khalily and Faruquee (2011) estimate that just over 30% of microfinance borrowers have loans from more than one MFI. As there is no credit bureau, MFIs are unable to ascertain precisely the debt levels of potential borrowers and hence they tend to be risk averse. As more MFIs start providing loans in the microenterprise segment, the risks are likely to rise.

BRAC is experimenting with a credit scoring model to examine if its usage can result in a more efficient and robust credit appraisal process.

### Financing Gap

It is estimated that there are around 800,000 microenterprises in the country and their demand for loans of Tk50,000–Tk300,000 in size is expected to be around Tk140 billion (\$1.8 billion) according to a paper by Ferarri (2007) based on a World Bank survey conducted in in 2007. This figure is likely to have increased substantially in the last 10 years.

Including the share of Grameen Bank, the supply of funds to this segment is around Tk90 billion. There is hence a significant financing gap for the missing middle.

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<sup>15</sup> These MFIs did not feature in the list of top 10 MFIs in Bangladesh.

<sup>16</sup> Interview with chief executive officers in February 2016.

<sup>17</sup> This phenomenon is referred to as overlapping in Bangladesh (Chen and Rutherford 2013).

### 9.3.2 Policy Initiatives to Address the Gap

#### Encouragement for MFIs to Provide Microenterprise Loans

MFIs are permitted to provide larger loans. The Microcredit Regulatory Authority tracks the number and volume of such loans and includes the information in its reports. Microenterprise loans were introduced by BRAC in the late 1990s and over the years more MFIs are becoming active in this segment, though the large players dominate the market.

#### PKSF Soft Loans for NGO-MFIs for Microenterprise Lending

Palli Karma-Sahayak Foundation (PKSF) is an apex development organization established by the Government of Bangladesh in May 1990. The organization provides funding to microfinance institutions. Besides the government, it also received funding from the World Bank and donors (Chen and Rutherford 2013). In 2001, the foundation started a program called Agrasor, under which it provides loans to its partner MFIs<sup>18</sup> for onlending microenterprise loans of up to Tk1.0 million. Microenterprises are defined as having investment up to Tk1.5 million (excluding land and building). The cumulative lending under this program until November 2015 is Tk34.0 billion (\$433 million). The lending during the fiscal year (FY) 2014-2015 was Tk5.5 billion and the loans outstanding under this program in June 2015 totaled Tk10.1 billion (\$128.6 million).

#### PKSF-IFAD Funded Training Programs for MFIs and Microentrepreneurs

Two programs to facilitate microenterprise loans have been implemented jointly by Palli Karma-Sahayak Foundation (PKSF) and the International Fund for Agricultural Development (IFAD). Finance for Enterprise Development and Employment Creation was implemented between 2008 and 2014 at a cost of \$57.8 million and involved training for MFIs on microenterprise appraisal and lending, strengthening microenterprise value chains, and business management training for microentrepreneurs (IFAD website).

A follow-on project, Promoting Agricultural Commercialization and Enterprises, is being implemented between 2012 and 2018 at a cost of \$92.7 million. It involves financing for onlending to microenterprises, value chain strengthening in more geographic locations, and technological and product adaptation assistance for microenterprises.

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<sup>18</sup> MFIs who have entered into a partnership agreement with them.

## 9.4 Gap between Microfinance and SME Finance in Pakistan

In Pakistan financial exclusion is higher than in the other two countries studied in this chapter. According to the World Bank’s Global Findex database, only 13% of individuals above the age of 25 have an account and only 2% have a formal borrowing account. As a result, policy makers have tried to develop the growth of microfinance in the country.

Pakistan Microfinance Network, a national network of retail players in Pakistan’s microfinance sector that collects and disseminates information on the sector, classifies the sector participants into three main categories: MFIs, rural support programs, and microfinance banks.

MFIs are nonbank, nongovernment organizations typically incorporated as trusts, societies, or nonprofit companies. Accordingly, they are registered under the Societies Act, Trust Act, or Companies Ordinance. This group also includes multinational NGOs such as BRAC Pakistan and ASA Pakistan. MFIs are not allowed to take deposits and are primarily involved in microcredit activities. However, in order to inculcate savings discipline in their members, some MFIs mobilize savings from their members for deposit in savings accounts of commercial banks. MFIs obtain their funding mostly from the Pakistan Poverty Alleviation Fund, a national-level independent agency set up to channelize funds from World Bank and donor agencies. While it originally provided subsidized funding, since 2012 it has been giving funds at market-related rates of interest.

Rural support programs (RSPs) are NGOs registered under the Companies Ordinance. They are differentiated from MFIs by the purely rural focus of their credit operations (Pakistan Microfinance Network 2011). RSPs are registered with and supervised by the Securities and Exchange Commission of Pakistan. They provide microfinance as part of a multidimensional program for rural development though they are not allowed to take deposits.

Microfinance banks (MFB) are licensed and supervised by the State Bank of Pakistan (SBP). They have to comply with minimum capital requirements<sup>19</sup> and have to have a capital adequacy ratio of 15% of risk-weighted assets. The first MFB was established in 2000 under a presidential decree, and since then another nine have been licensed under the Microfinance Institutions Ordinance, 2001. MFBs are authorized to accept and intermediate deposits from the public.

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<sup>19</sup> These range from PRs300 million for districtwide MFBs to PRs1,000 million for nationwide MFBs.

At the end of March 2014, the Pakistan microfinance sector had a gross loan portfolio of PRs61.1 billion (\$0.6 billion) and served 2.9 million active borrowers (Pakistan Microfinance Network 2014).<sup>20</sup> The sector is reported to have achieved a penetration of around 13.6% of the estimated microfinance market of 20.5 million. The estimate of the market size was made by Ghanghro and Khan (2015).<sup>21</sup> Table 9.5 gives the shares of the different segments of the sector.

**Table 9.5: Microfinance Sector in Pakistan**

	Members (million)	Gross Loan Portfolio (PRs billion)
Microfinance institutions	0.9 (31%)	12.9 (21%)
Microfinance banks	1.2 (42%)	36.8 (60%)
Rural support programs	0.8 (27%)	11.4 (19%)
<b>TOTAL</b>	<b>2.9</b>	<b>61.1 (\$0.6 billion)</b>

PRs = Pakistan rupees.

Source: Based on Pakistan Microfinance Network. 2013. Pakistan Microfinance Review 2012. [www.microfinanceconnect.info/assets/articles/PMR\\_2012\\_new.pdf](http://www.microfinanceconnect.info/assets/articles/PMR_2012_new.pdf)

Of the three main kinds of players in the Pakistan microfinance sector, only MFBs come under the supervision of the country's central bank, SBP, while the other two, RSPs and MFIs, register with other regulatory authorities. While RSPs and MFIs register with regulatory authorities, unlike MFBs, they are not actively supervised by the authorities they register with. It is expected that soon these entities will be brought under the supervision of the Securities and Exchange Commission of Pakistan.<sup>22</sup>

This dichotomy has created an uneven playing field. MFBs have the disadvantage of incurring higher costs for compliance with regulatory requirements than do RSPs and MFIs. For example, besides conducting an annual audit and preparing an annual report, MFBs have to build up reserves, contribute to a depositor protection account, provide for doubtful loans, and establish branches with sufficient security and vault features. On the other hand, MFBs have the advantage of being able to raise deposits unlike RSPs and MFIs.

<sup>20</sup> All figures quoted in this section are from Pakistan Microfinance Network (2013b).

<sup>21</sup> Some observers attribute the low penetration to the fact that currently only around 1% of microfinance in Pakistan is offered on Islamic finance principles (Ali 2013).

<sup>22</sup> Discussion with Pakistan Microfinance Network officials.

### 9.4.1 Financing Options for Microfinance Graduates

Given MFBs’ higher cost structure, in 2011 SBP permitted MFBs to seek approval to extend microenterprise loans of up to PRs500,000, as against the limit of PRs150,000 set earlier for general purpose loans (SBP 2012). SBP also provides a credit guarantee scheme to banks under which up to 40% of principal amounts are covered. These developments have enabled MFBs to expand their services to the low end of the SME segment. Microenterprise loans can be extended up to a maximum of 40% of the MFB’s loan portfolio to keep its focus on smaller microfinance loans. MFBs are, however, approaching this opportunity with caution due to the different appraisal skills required for it.

Tameer Bank and FINCA Bank were the earliest entrants and are now in the process of expanding their microenterprise lending. Few other banks are piloting programs. The Pakistan Microfinance Network has so far not released data regarding total microenterprise loans in the country but is expected to include reporting on these loans soon.<sup>23</sup>

#### Models Used for Microenterprise Loans

Tameer Bank commenced giving microenterprise loans in 2012. At present it has a loan portfolio of around PRs1 billion. Some of the loans are secured by deposits, government securities, or gold ornaments. Unsecured loans are also given based on the borrower’s cash flow. As many of the customers did not keep proper records and did not prepare accounts, Tameer Bank set up a verification department and trained its officers to ascertain the cash flow based on observation and detailed discussions with the potential borrowers. The verification officer spends time in the field educating potential customers on how to differentiate between personal expenses and business expenses and other such matters. Then together with the potential customer, they draw up a cash flow statement for the enterprise. A decision regarding the loan application is made thereafter. As a result, even customers who are eventually declined are given some basic training that may help them improve their financial management. The bank has consciously separated the sales and verification functions so that the verification officer is not under the pressure of sales targets. Verification officers specialize in specific industries from which Tameer Bank often receives loan applications. Examples include furniture manufacturing, steel frame making, craftsmanship, and apparel. For each industry, senior management studies a sample of firms and helps draw up a typical

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<sup>23</sup> Conversation with chief executive officer, Pakistan Microfinance Network.

cash flow statement. Verification officers are carefully selected from existing loan officers based on performance and temperament. Their performance is monitored on a continuous basis. If there are concerns regarding performance, further training is provided. The model has shown satisfactory results with defaults of around 0.2%. The average loan size is around PRs200,000 though loans go up to PRs450,000. The average loan size is observed to be rising year on year. Even though the detailed verification process leads to a higher cost structure, the bank benefits by way of low loan recovery costs.<sup>24</sup> Based on its experience with lending to microenterprises, the bank officials feel that the electricity shortage in the country is a big constraining factor in the performance of small enterprises as they usually do not own backup electricity sources.

FINCA Bank launched microenterprise loans in September 2014 on a pilot basis. Both secured and unsecured loans were offered. Unsecured loans were given on the basis of the cash flow of the business. The bank has had good experience with its microenterprise loans, with defaults less than 0.5%, and hence has applied for permission to offer the product on a formal basis in all its branches.

Khushhali Bank also commenced microenterprise lending on a pilot basis in January 2015. Similarly, the product is being piloted by a few other banks.

### **Financing Gap**

While estimates of the financing gap are not available, there are an estimated 3.8 million micro, small, and medium-sized enterprises in Pakistan, of which 70% are small enterprises (Pakistan Microfinance Network 2013a). Most of these small enterprises are expected to be unbanked.

## **9.4.2 Policy Initiatives to Address the Gap**

### **Acknowledgment of the Need for Larger Microenterprise Loans**

The State Bank of Pakistan in its 2011 document entitled *Strategic Framework for Sustainable Microfinance in Pakistan* acknowledged the importance of microfinance providers offering enterprise loans so as to promote employment generation. This later resulted in permission for MFBs to seek approval to extend microenterprise loans of size up to PRs500,000 (SBP 2012).

In May 2015, the State Bank of Pakistan released the National Financial Inclusion Strategy in collaboration with the Ministry of

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<sup>24</sup> Discussion with the deputy chief executive officer of Tameer Bank.

Finance and the Securities and Exchange Commission of Pakistan. The document notes the decline of private sector credit in real terms over the last 5 years and its skew in favor of large enterprises. The document calls for an increase in lending to micro and small enterprises and emphasizes the need to provide training for officials of MFBS and MFIs in order to enter this segment.

### **Promotion of Initiatives to Finance Low-Cost Private Schools**

In 2013, the Pakistan Poverty Alleviation Fund supported the provision of a microcredit product through its partner MFIs for establishment of low-cost private schools. The product has a tenure of 12 to 24 months with a 3-month grace period and carries an annual interest rate of 27% (Haq and Ali 2014). Sometimes technical assistance in development of curriculum and training of teachers is also provided. The low-cost private school segment has been recognized as an important part of the microenterprise landscape due to the challenge faced by the country in increasing school enrollment and literacy. This microfinance product has been successfully piloted by Kashf Foundation and Tameer Bank.

### **Pakistan Microfinance Investment Company**

In July 2016, the Pakistan Microfinance Investment Company—promoted jointly by the Pakistan Poverty Alleviation Fund, the UK’s Department for International Development (DFID), and KfW Development Bank—is expected to be operational. The company will help mobilize funds from investors to channelize into MFIs. This is expected to eventually reduce the interest rate on microfinance loans, which currently ranges from 23% to 30% per annum. The greater availability of funding to MFIs through this initiative is also expected to increase the penetration rate of microfinance in the country from the current rate of 13.6%. The Microfinance Growth Strategy 2020 had estimated a requirement of \$3 billion by the sector in order to reach 10 million borrowers (around 50% of the potential market). To start with, the Pakistan Microfinance Investment Company will have funding of PRs6 billion (\$57.3 million), though this amount may increase as more investors are expected to contribute (Ahmed 2016).

## **9.5 Challenges in Lending to the Missing Middle and Possible Ways to Address Them**

The biggest challenge faced in lending to the missing middle firms in the three countries is the high degree of informality of their operations.

In India, a survey of 13,177 potential missing middle customers by a large urban-based NBFC-MFI, Janalakshmi Financial Services, found that 90% of them had never filed an income tax return, 67% had not maintained a book of accounts, and 65% had no enterprise registration of any form (Jana Foundation 2013). This informality is a primary reason for their financial exclusion, as banks typically ask for various documents and records before lending.

Another important reason for the lack of finance for missing middle entities is that they are unable to offer collateral to lending institutions. Even if they have property, often the accompanying papers and documents may not be complete, making it hard for lenders to create a title and mortgage it. As a result, lending to them has to be based on an assessment of their cash flows.

However, assessment of cash flows of these entities is not easy because there is information asymmetry with regard to their transactions; because they are cash based, there are often no records. This makes it hard for financial institutions to obtain a clear picture of their volumes.

Successful models in all three countries have the following two features in common:

- (i) Credit appraisal of potential borrowers involves a lender's officers spending considerable time in observing the business, interviewing the promoters, cross checking records, analyzing the business model, and assessing the suppliers and customers. Often the lender's officers have to themselves draw up cash flow statements for the potential borrowers.
- (ii) Assessment often involves customer education on financial accounting practices, either formally or informally.

Other factors that have contributed to the success of some lenders include the following:

- (i) acceptance of notional security such as original land documents and identity cards,
- (ii) separation of the credit function from the sales function within the lending organization,
- (iii) developing in-house model cash flow statements for specific sectors that are commonly financed, and
- (iv) creation of forward and backward linkages for potential customers (i.e., facilitating partnerships of customers with input suppliers and end users on favorable terms).

These measures call for upfront investment in employee time before obtaining any financial returns from the enterprise, and hence will require top management commitment to building a robust

microenterprise lending model. In the long term the benefits of this strategy can pay off by way of potential repeat business as well as savings in recovery and loan write-off costs.

Given the high-touch nature of the lending to this segment and the kind of hand-holding and guidance it requires, MFIs are well placed to handle this challenge. However, many of them have for many years based their operations on the one-size-fits-all group model, and therefore moving to individual lending may require considerable investment in training and developing new management information systems. Women’s World Banking, a global not-for-profit organization, has developed resources for this purpose. For example, a detailed how-to guide on introducing individual lending in institutions that currently provide group loans has been made available (Dellien et al. 2005).

The following measures could help increase availability of finance to missing middle enterprises:

1. In all three countries it has now become easier for microenterprises to open and operate bank accounts due to the availability of mobile-based digital finance and debit cards.<sup>25</sup> Hence, it should be possible for them to switch to account-based transactions, though they may not do so immediately as their entire ecosystem, including suppliers and customers, needs to change. Intervention from NGOs and government may be required to effect this change.
2. Another way of financing small enterprises is to analyze their value chains and finance the various participants in the chain with a view to improving the overall efficiency of the chain. This is referred to as value chain financing. It involves assessing the enterprise’s suppliers and customers and financing all of them as a cluster so as to reduce overall risk for the lender.<sup>26</sup>
3. Missing middle entities may often need new customized financial products to address their needs and constraints. For instance, given their tight financial situation, they may need an arrangement in which excess cash flow in their accounts at any point of time can be used to reduce their loan liability and save on interest payments.<sup>27</sup>
4. Many missing middle entities are run by one or two individuals and hence are exposed to key person risk. Potential lenders

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<sup>25</sup> In India, a Rupay debit card is provided to every adult savings account holder; in Pakistan, digital finance has grown considerably; and in Bangladesh, bKash, a mobile banking initiative of BRAC Bank, is growing fast.

<sup>26</sup> Discussion with the chief executive officer of Samunnati Financial Services.

<sup>27</sup> Discussion with the chief executive officer of BASIX group.

may require them to seek key person insurance or require them to develop a succession plan.

5. In India and Pakistan, as most large microfinance providers are now reporting to credit bureaus, if the individuals have borrowed from these institutions in the past, their credit histories will now be available. Another way in which identities and creditworthiness can be checked is by looking at utility and mobile telephone bills and their payment history.
6. Over time, specialized credit rating agencies focusing on small firms may be expected to develop. In India, SMERA—a joint venture between the Small Industries Development Bank of India, Dun and Bradstreet, and some commercial banks—has been set up for rating micro, small, and medium-sized enterprises (ASSOCHAM–SMERA 2015).

## 9.6 Conclusions

All three countries have sizable missing middle segments with considerable employment potential. As employment generation is an important goal for all three countries, catering to the missing middle is a priority and this is why it is on the policy agenda.

In India, the infrastructure to cater to this segment is being put in place. With the MUDRA Bank initiative, funding is not expected to be a major constraint. With nine new MFIs-turned-small-banks entering the scenario, the high-touch microfinance model can be combined with the resources of a bank. As all large MFIs and banks report to credit bureaus, sharing of information should not only prevent multiple lending but also help first-time borrowers build credit histories. Because lending to this segment is relatively new in the country, market studies and experimentation with various models may be required. Unlike in the case of group lending, variations in models in different regions of the country may be required, as business practices may vary.

Bangladesh, being the earliest microfinance market, has rightfully been the first to observe and address the needs of microfinance graduates. Larger MFIs dominate the segment as smaller ones are constrained by availability of funds. While MFIs are trading carefully in this segment, the experience with the loans seems mostly positive. The lack of a credit bureau increases risk levels considerably and is a significant drawback in the Bangladesh microfinance sector. This preexisting high risk reduces the incentive for lenders to provide larger-value loans. It is important that this lacuna is addressed early. The prevailing uncertain political climate in Bangladesh also increases the riskiness of microenterprise

loans as small businesses are often adversely affected by shutdowns and sometimes sustain damage during political disturbances.

In Pakistan, microfinance banks have commenced providing microenterprise loans and two banks are in the process of scaling up the product due to the success of their early initiatives. As the loan sizes and number of loans increases, the availability of a credit bureau in the country should help lenders. An area for concern is that the overall penetration of the microfinance sector in the country is low. The recent efforts being made to increase funding for MFIs may be helpful in this regard. The political disturbances in the country and the prevailing shortage of electricity are risk factors that could affect the performance of microenterprise loans.

In all three countries, governments need to support lenders with funding options, make reporting to credit bureaus compulsory, fund financial literacy campaigns targeted at microenterprises, introduce measures to reduce use of cash-based transactions, and make registration of enterprises easy and universal.

Catering to the financing needs of missing middle firms has great potential to invigorate South Asian economies, making them more inclusive and dynamic.

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# 10

## Finance for MSMEs in India: Sources and Challenges

*Charan Singh and Kishinchand Poornima Wasdani*

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### 10.1 Introduction

Micro, small, and medium-sized enterprises (MSMEs) have gained increased attention in India in recent times, considering their strategic importance to the economy and the country. MSMEs play an important role in generating employment—48.8 million MSMEs in the country provide employment to 111.4 million people. MSMEs in the manufacturing sector alone produce more than 6,000 products and contribute 7.7% of the gross domestic product (GDP) of the country. Similarly, MSMEs in the services sector contribute 27.4% of the country's GDP.

In spite of their contribution, MSMEs in India face several challenges. They often need to keep pace with rapidly changing technologies and face the risk of becoming technologically obsolete. They also have to face high costs of credit and are usually unable to identify their key competitive strengths to maintain product standards and quality. MSMEs also need to deal with the issue of protection of their intellectual property and with the scarcity of skilled workers. Finally, studies on MSMEs have identified the importance of the availability of sources of finance and the accessibility to these sources as the most crucial factors to promote growth of MSMEs in developing economies. In the Indian context, both of these issues pose inherent challenges to financing of MSMEs due to lack of awareness of funding schemes among MSME entrepreneurs and the limited role of venture capitalists, nonbanking financial companies (NBFCs), foreign banks, angel investors, and initial public offerings in financing MSMEs.

In view of the fact that banks are the predominant source of finance in India, the Reserve Bank of India includes micro and small

enterprises in the list of priority lending sectors. Banks have also been advised to achieve a year-on-year growth of 20% in credit to micro and small enterprises and an annual growth of 10% in the number of microenterprise accounts. In view of such policies, this study attempts to understand whether such incentives and schemes have percolated down to the MSMEs and if entrepreneurs are aware of them.

While carrying out preliminary interviews with entrepreneurs for this study, it became apparent that MSMEs have different types of requirements at different stages of their life cycle. This led the authors to establish a better understanding of different sources of finance used by MSMEs during different stages of their life cycle and to explore the challenges in accessing these sources. As there were no studies that captured the financial needs of MSMEs at different stages of their existence, this study is a first-of-its-kind attempt to investigate these aspects. Thus, the chapter focuses on the sources of finance used by MSMEs during different stages of the enterprise life cycle, and on the awareness and usage of different financial schemes made available by government.

The research objectives are threefold: (i) to identify the different sources of finance used and the purposes they are used for at different stages of the MSME life cycle, (ii) to identify challenges faced by MSMEs while accessing finance from different sources at different stages of their life cycle, and (iii) to identify factors that lead to higher financial awareness.

## 10.2 Review of Literature

The predominant sources of finance used by MSMEs are bank loans; loans from nonbanking institutions (e.g., NBFCs); venture capital; microfinance institutions; loans from family, relatives, and friends; equity finance; and own funds (Mallick et al. 2010; International Finance Corporation 2012; ADB 2014).

According to International Finance Corporation (2012), the supply of finance to the MSME sector is estimated to be Rs32.5 trillion. This total comprises contributions from informal finance, formal finance, and self-finance. Informal sources and self-finance contribute Rs25.5 trillion to the sector, of which informal finance accounts for Rs24.4 trillion. In other words, 78% of the finance used by MSMEs is met by informal sources and self-finance. The remaining 22% (Rs6.9 trillion) is provided by banks and NBFCs, of which banks provide the bulk (91.8%).

It is unlikely that the financial services offered by banks sufficiently address the requirements of early-stage small and medium-sized enterprises (SMEs) (Banerjee 2006). There are several conditions that hinder the provision of bank credit to early-stage SMEs in India. Early-stage SMEs do not have an established credit history and have unstable equity patterns. Biswas (2014) noted that access to external finance apart from banks is costly and limited, and poses a challenge to SMEs, although it is essential for the maintenance of long-term opportunities and targets. These external loan products also require collateral and are highly priced. SMEs use finance from NBFCs and informal sources at higher rates of interest, particularly in the early stages.

The dominance of the informal sector in addressing the financial requirements of MSMEs is due to the inherent limitations of formal sources of finance. The Asian Development Bank (2014) has pointed out that barriers to accessing finance by SMEs in India from formal institutions include the requirement for collateral or a guarantee, inflexible policies, high rates of lending, complicated procedures, and entrepreneurs' lack of financial knowledge of applicable schemes. Ambrose (2012) also identified barriers to effective financial assistance to SMEs, which included absence of collateralized security, and the regulatory framework. In addition, the unavailability of skilled workers, the lack of infrastructure, and an inability to raise capital through the stock market (especially for MSMEs with a net worth of less than Rs100 million (about \$1.5 million) are other challenges (Lahiri 2012). Barriers have also been examined in the context of gender (Irwin and Scott 2010), firm size, the length of a lending relationship, and the use of overdraft credit (Bebczuk 2004). The Reserve Bank of India (2005) identified the following issues in financing SMEs: (i) inadequate access to finance by tiny firms due to lack of financial information and nonformal business practices, with a lack of access to private equity, venture capital and secondary market instruments; (ii) fragmentation of markets with respect to their inputs as well as vulnerability of products due to market fluctuations; (iii) lack of easy access to interstate and international markets; (iv) limited access to technology and product innovations, and lack of awareness of global best practices; and (v) considerable delays in settlement of dues and payment of bills by large-scale buyers.

The perception of an SME as a high-risk and commercially unviable proposition to lend to has resulted in only a few SMEs receiving formal financial assistance (Ambrose 2012). Prasad (2006) highlighted that Indian banks in particular are not inclined to finance small enterprises, due to reasons such as the inability to provide collateral, high levels of nonperforming assets, high transaction costs, and the inability to verify the creditworthiness of applicants.

Grant Thornton India and FICCI (2011) concluded that the cost of capital is high for MSMEs, and that there is a need to reduce the time and documentation required for procuring finance. Lahiri (2012) pointed out that with MSMEs' rising need for short-term and long-term capital, banks should move toward more innovative methods of lending to provide for those firms' financial needs.

In light of the abovementioned barriers, the Government of India (2015b) initiated several policy measures: (i) achievement of universal financial inclusion of MSMEs in a time-bound manner, ensuring that every registered MSME has a bank account linked to the Udyog Aadhar; (ii) operationalization of an Rs100 billion equity fund for the MSME sector; and (iii) expanded coverage and enhanced utilization of credit guarantee schemes with inclusion of a wider set of credit providers such as NBFCs and microfinance institutions, which could involve a sevenfold increase in the corpus from Rs40 billion to Rs280 billion.

## 10.3 Methodology

### 10.3.1 Description of the Sample

The study was based on primary data collected through a survey. A structured questionnaire was completed by 85 entrepreneurs (business owners) of MSMEs through interviews, mainly during in-person visits but also conducted online and via telephone, largely from selected industrial areas and surrounding suburbs of Bangalore. Most of the enterprises were based in Bangalore (the Silicon Valley of India) and a few were based in Mumbai. In Bangalore, in-person visits to collect data were made to N.S. Palya Industrial Layout, Peenya Industrial Layout, and Weaver's Colony (power-loom cluster), and the commercial areas of the suburbs of Malleswaram, Rajajinagar, and Avenue Road. Telephone and online interviews were used to collect data from enterprises located in Mumbai.

This study used non-probabilistic judgmental sampling. The data was collected from entrepreneurs who had a bank account (either savings or current) to ensure a minimum financial awareness. The survey was carried out in September and October 2015. Percentage analysis was used to draw inferences from the data collected.

This study uses a novel approach in assessing the sources of finance in different stages of the MSME life cycle. The stages of the enterprise that have been defined for this study are (i) start-up, (ii) survival, (iii) growth, and (iv) sustenance. Those in the start-up stage are less than

3 years of age, and those in the survival stage are 3–6 years of age. The entrepreneur's focus in the start-up and survival stages is on establishing the enterprise in the marketplace and breaking even with regard to initial investments made. Entrepreneurs who have crossed the start-up and survival stages then focus on expanding the reach of their enterprises into newer markets in the growth stage. The business later enters the sustenance stage, when it has an established presence in certain markets and growth has plateaued. Those entrepreneurs whose enterprises are more than 6 years old were encouraged to report sources of finance used and challenges faced in accessing finance in respective stages—growth or sustenance—depending on their own assessment of the stage of their enterprise.

A majority of enterprises in the sample were at the sustenance stage, followed by those in the growth stage. The fewest were in the survival stage. Of the 85 enterprises, there were 49 microenterprises, of which 10 were in the start-up stage, 7 in the survival stage, 10 in the growth stage, and 22 in the sustenance stage. The 33 small enterprises included 4 each in the start-up and survival stages, 15 in the growth stage, and 10 in the sustenance stage. Only 3 medium-sized enterprises participated in the survey, with 2 in the growth stage and 1 in the sustenance stage (Table 10.1).

**Table 10.1: Life Cycle Stages of the Enterprises in the Sample**  
(%)

Stage of the Enterprise	Micro (N = 49)	Small (N = 33)	Medium (N = 3)	Total (N = 85)
Start-up (<3 years)	20.4	12.1	0.0	16.5
Survival (3–6 years)	14.3	12.1	0.0	12.9
Growth (>6 years)	20.4	45.5	66.7	31.8
Sustenance (>6 years)	44.9	30.3	33.3	38.8

Source: Authors.

### 10.3.2 Sector-Wise Distribution of Enterprises in the Sample

The bulk of enterprises in the start-up and survival stages were from the services sector, while enterprises in the growth and sustenance stages were almost equally distributed between manufacturing and services (Table 10.2).

**Table 10.2: Sector-Wise Distribution of Enterprises in the Sample (%)**

Stage of the Enterprise	Start-Up (<3 years) (N = 14)	Survival (3–6 years) (N = 11)	Growth (>6 years) (N = 27)	Sustenance (>6 years) (N = 33)	Total (N = 85)
Manufacturing	35.7	36.4	55.6	54.5	49.4
Services	64.3	63.6	44.4	45.5	50.6

Source: Authors.

### 10.3.3 Compliance and Listing Characteristics for Enterprises in the Sample

The enterprises had different legal and financial compliance and listing characteristics. At least half of the enterprises were registered, and this proportion was higher for enterprises in the survival and growth stages. These enterprises were registered possibly under one or more laws such as sales tax, value-added tax, and the Shops and Establishments Act, or were registered as an MSME with the concerned department in the respective state. Enterprises that were not registered as MSMEs with the concerned department were classified by the authors as using investment limits specified under the Micro, Small and Medium Enterprises Development Act of 2006 (Appendix A.10).

A similar proportion of enterprises in the start-up (14.3%) and growth (14.8%) stages were credit rated. For those in the survival stage, only 9.1% were credit rated, which implies that credit rating of enterprises at this stage was not a priority for the owners.

Only a few enterprises (7.1%) in the start-up stage were listed. None of the enterprises in the other stages were listed (Table 10.3).

**Table 10.3: Enterprise Compliance and Listing Characteristics (%)**

Enterprise Characteristic	Start-Up (<3 years) (N = 14)	Survival (3–6 years) (N = 11)	Growth (>6 years) (N = 27)	Sustenance (>6 years) (N = 33)	Total (N = 85)
Enterprise registered	50.0	81.8	88.9	63.6	71.8
Enterprise credit rated	14.3	9.1	14.8	12.1	12.9
Enterprise listed	7.1	0.0	0.0	0.0	1.2

Note: Data reflects individual responses from entrepreneurs; figures may not add up to 100%.

Source: Authors.

## 10.4 Sources of Finance and Challenges in Accessibility

### 10.4.1 Finance Used by MSMEs in Different Stages of the Life Cycle

The survey results revealed the major financial needs of MSMEs at different stages of their life cycle and the predominant sources of finance used to meet those requirements. Enterprises were not restricted to reporting this data for the current stage of their life cycle but could also report perceptions and experiences for other stages. The values have been computed as the percentage of enterprises reporting the sources of finance used in different stages. Therefore, the total of all reporting enterprises will be different from the total number of enterprises in the sample (Table 10.4).

**Start-up stage:** Enterprises in this stage reported the use of funds from personal and family sources, from friends, and from public (i.e., government-owned) banks largely for the purpose of working capital. The other highly reported use of an institutional source was public banks for collateral financing. This implied a high degree of preparedness or risk aversion, or both, while starting an enterprise.

**Survival stage:** Working capital, short-term loans, and overdrafts were the primary purposes for which enterprises in the survival stage sought financial assistance. Finance for working capital was sourced largely from public banks and moneylenders, followed by personal funds and private banks. Private banks were also used to secure short-term loans and overdraft facilities. Enterprises also reported use of moneylenders, though to a lesser extent. The trend of using formal sources or trusted informal sources seemed to continue from that reported by enterprises in the start-up stage. Enterprises in this stage would be looking to pay off debts, for which they would require smooth day-to-day functioning with adequate availability of working capital for the same.

**Growth stage:** Enterprises at this stage required working capital, collateral financing, and short-term loans. Working capital was sourced from public banks, personal and family sources, and to a lesser extent from private and cooperative banks. Collateral financing was obtained from public banks, and to a lesser extent from cooperative banks. Private and cooperative banks were used for obtaining short-term loans, although the use of moneylenders did find a mention. This observation

**Table 10.4: Major Sources of Finance Used by Enterprises in Different Stages**  
(%)

Enterprise Characteristic	Sources of Finance	Start-Up Stage (N = 45) <sup>a</sup>	Survival Stage (N = 11)	Growth Stage (N = 25)	Sustenance Stage (N = 31)
Working capital loan	Personal funds/savings	64.4	18.2	12.0	19.4
	Money borrowed from friends	15.6	0.0	0.0	12.9
	Public banks	13.3	27.3	28.0	16.1
	Family wealth	11.1	0.0	12.0	3.2
	Moneylenders	4.4	27.3	4.0	6.5
	Private banks	2.2	18.2	8.0	9.7
	Cooperative bank	0.0	0.0	8.0	19.4
Collateral financing	Public banks	17.8	0.0	20.0	3.2
	Cooperative banks	2.2	0.0	8.0	12.9
Short-term loan	Moneylenders	0.0	9.1	8.0	3.2
	Private banks	0.0	9.1	16.0	6.5
	Cooperative banks	4.4	0.0	12.0	9.7
Overdraft	Public banks	6.7	0.0	4.0	6.5
	Private banks	2.2	9.1	4.0	3.2
	Cooperative banks	0.0	0.0	4.0	3.2
	Personal funds/savings	0.0	0.0	0.0	3.2
Long-term loan	Moneylenders	2.2	0.0	0.0	0.0
	Public banks	2.2	0.0	0.0	6.5
	Private banks	2.2	0.0	0.0	0.0
	Cooperative banks	2.2	0.0	4.0	6.5
	SIDBI	0.0	0.0	4.0	0.0
	Personal funds/savings	0.0	0.0	0.0	3.2

SIDBI = Small Industries Development Bank of India.

<sup>a</sup> As enterprises could report the sources of finance used in multiple life-cycle stages, the sum total of enterprises reporting the data may vary from the total number of enterprises in the sample.

Source: Authors.

possibly means that enterprises were more focused on their specific financial needs and the sources required to fulfill them. The dominant use of public banks for collateral financing and the use of the banking system and family wealth to meet working capital needs are indicative of the role played by trust in securing this type of finance. As cooperative banks were also mentioned as a source to fulfill multiple financial needs of enterprises at this stage, it needs to be seen if these banks' policies and procedures are conducive to providing the quick access to short-term finance needed by enterprises in the growth stage.

**Sustenance stage:** Enterprises in this stage reported the use of finance from personal funds, cooperative banks, public banks, and private banks for the purpose of working capital. Cooperative banks were also used for collateral financing and to secure short-term loans. Working capital, collateral financing, and short-term loans seem to dominate the landscape of requirements of enterprises at this stage. This continues the trend, noted above, of using finance from sources that are perceived to be trusted by enterprises. An enterprise in this stage would choose to borrow from sources with which it has well-established relationships and those which could be trusted. Enterprises at this stage reported the dominant use of cooperative banks for working capital, collateral financing, and short-term loans, and it would be interesting to examine the reasons for this prevalence.

### Sources of Finance Not Used by Enterprises in Different Stages

A number of sources of finance were not used by enterprises in different stages of the life cycle (Table 10.5). Enterprises from all four stages did not avail themselves of financing from angel investors, other entrepreneurs, foreign banks, initial public offerings, pawnbrokers, and venture capitalists. In the survival stage, the number of unused sources of finance was more pronounced than in other stages, suggesting that

**Table 10.5: Sources of Finance Not Used by Enterprises in Different Stages**

Source of Finance	Start-Up	Survival	Growth	Sustenance
Angel investors	X	X	X	X
Another entrepreneur	X	X	X	X
Cooperative banks	✓	X	✓	✓
Family wealth	✓	X	✓	✓
Foreign banks	X	X	X	X
Initial public offering	X	X	X	X
Microfinance institutions	✓	X	X	✓
Money borrowed from friends	✓	X	X	✓
Money borrowed from relatives	✓	X	X	✓
Pawnbrokers	X	X	X	X
SIDBI	X	X	✓	X
Venture capitalists	X	X	X	X

✓ – used, X – not used.

SIDBI = Small Industries Development Bank of India.

Source: Authors.

enterprises at this stage were quite risk averse and intent on breaking even with their existing level of investment, which had been financed previously by other sources.

### 10.4.2 Challenges in Accessing MSME Finance

Enterprises were asked to report the challenges they faced in accessing finance, including in stages other than their current stage. A scale of 1–3 was used, in which 1 means not at all challenging, 2 is manageable, and 3 is challenging. Percentage values were calculated from the number of enterprises rating an issue challenging and the total number of enterprises that rated at least one issue challenging at each stage (Table 10.6).

**Table 10.6: Challenges in Accessing Finance at Different Life Cycle Stages**  
(%)

Challenges	Start-Up Stage (N = 24) <sup>a</sup>	Survival Stage (N = 11)	Growth Stage (N = 24)	Sustenance Stage (N = 30)
Difficulty in collateral/ guarantee	87.5	63.6	54.2	83.3
High rates of lending	54.2	45.5	54.2	50.0
Procedural complications	70.8	63.6	45.8	63.3
Lack of knowledge about available schemes	75.0	54.5	62.5	60.0
Lengthy processing time for the loan application	87.5	54.5	45.8	60.0
High service fees for processing loan requests	62.5	54.5	58.3	56.7
Difficulty in procuring/ completing the required documentation	62.5	54.5	50.0	56.7
Lack of available infrastructure	41.7	0.0	4.2	10.0
Lack of availability of skilled workers	29.2	0.0	8.3	13.3
Absence of current account (active for 6 months)	16.7	18.2	8.3	0.0
No formal accounting system	20.8	18.2	12.5	3.3
Tax compliance issues	16.7	18.2	16.7	16.7
Labor law compliance issues	12.5	0.0	12.5	16.7
Registration of enterprise	12.5	0.0	20.8	16.7

<sup>a</sup> As enterprises could report the sources of finance used in multiple life-cycle stages, the sum total of enterprises reporting the data may vary from the total number of enterprises in the sample.

**Start-up stage:** Major challenges in accessing finance reported by enterprises in this stage included the difficulty in providing collateral or a guarantee, processing time for loan applications, lack of knowledge about available schemes, and procedural complications, in that order. Enterprises also felt that high service fees for loan requests and difficulty in completing required documentation were challenges. Enterprises in the start-up stage may not be able to provide collateral for a loan and they lack knowledge about available schemes, which may hinder them from choosing the most effective option for financial assistance.

**Survival stage:** The major challenges encountered by enterprises at this stage were similar to those reported by enterprises in the start-up stage, though the order was different. The difficulty in providing collateral or a guarantee and procedural complications were jointly rated the highest. The four issues of lengthy processing time, lack of knowledge about available schemes, high service fees for processing loan requests, and difficulty in completing the required documentation were rated to be equally challenging. Enterprises in this stage would usually be looking to break even with regard to investments made at start-up, and would also like to grow in their markets. They would therefore need working capital to meet their day-to-day needs. These enterprises cannot be expected to provide collateral, and would be hindered by complicated procedures and delays in loan disbursements. They also continue to lack knowledge of available financial assistance schemes.

**Growth stage:** Major challenges reported by enterprises in this stage included a lack of knowledge about available schemes, high service fees for processing loan requests, difficulty in provision of collateral or guarantee, high rates of interest, and difficulty in completing the required documentation.

As there would be both working capital and short-term loan requirements for enterprises in this stage, a lack of knowledge regarding specific schemes could hinder owners from making the most appropriate choice of financing for their enterprise. Though enterprise owners may be more inclined to seek formal financial assistance, high service fees and high rates of interest could be a deterrent. Enterprises in the growth stage also would be in a state of rapid transition and therefore the need to provide documentation for securing financial assistance would be a deterrent to accessing funds.

**Sustenance stage:** Common challenges to accessing finance reported by enterprises in this stage included difficulty in provision of collateral or a guarantee, procedural complications, lack of knowledge about

available schemes, lengthy processing time for loan applications, high service fees for processing loan requests, and difficulty in completing required documentation. A reasonable number of enterprises also reported high rates of interest to be a challenge. Although entrepreneurs in this stage reported procedural difficulties, processing time, and high rates of interest to be challenges in accessing finance, the role of a lack of knowledge about available schemes and its influence on other challenges needs to be examined. The entrepreneurs were concerned about the requirement to have collateral or security. This would suggest that banks or lending institutions need to be more realistic about lending to MSMEs that have already established themselves in the market.

To summarize, MSMEs face numerous challenges at each stage of the life cycle. Each issue regarding financing was rated *challenging* by at least one enterprise in both the start-up and growth stages. In the survival stage, enterprises did not feel that infrastructure, labor, labor law compliance, or enterprise registration were challenges in accessing finance. Enterprises in this stage have access to adequate labor and infrastructure. Enterprises in the sustenance stage would most likely have active current accounts, and therefore did not feel that to be a challenge (Table 10.7).

### **Other Challenges: Processing Times and Fees**

Enterprises were asked to report loan processing times and processing fees, and to rate the experiences they had with banks, nonbanking financial companies (NBFCs), and microfinance institutions. This was done to assess the ease of access with which enterprises were able to secure financial assistance from formal financial institutions.

Enterprises in the start-up stage reported a very high average processing time for bank loans. The average value was, however, influenced by the highest reported time, which was 1 year. The average time taken for loan processing was low for NBFCs and microfinance institutions at 4 and 10 days, respectively. The lone reporting enterprise in the survival stage reported a processing time of 1 day for loans taken from a microfinance institution. For enterprises in the growth stage it took 35 days to secure a loan from a bank, which was nearly six times the period for NBFCs (6 days).

In the sustenance stage, banks took on average one-and-a-half times longer than NBFCs to process loan requests for MSMEs. Microfinance institutions were reported to take 1 week on average. The average processing time for loan requests by banks for enterprises in the survival and growth stages were similar (Table 10.8). Although quicker to process loan requests than banks on average, NBFCs took almost four times longer at this stage than at the growth stage. It may be premature to

**Table 10.7: Challenges Faced by MSMEs in Accessing Finance**

Source of Finance	Start-Up	Survival	Growth	Sustenance
Difficulty in collateral/ guarantee	✓	✓	✓	✓
High rates of lending	✓	✓	✓	✓
Procedural complications	✓	✓	✓	✓
Lack of knowledge about available schemes	✓	✓	✓	✓
Lengthy processing time for the loan application	✓	✓	✓	✓
High service fees for processing loan requests	✓	✓	✓	✓
Difficulty in procuring/ completing the required documentation	✓	✓	✓	✓
Lack of available infrastructure	✓	X	✓	✓
Lack of availability of skilled labor	✓	X	✓	✓
Absence of current account (active for 6 months)	✓	✓	✓	X
No formal accounting system	✓	✓	✓	✓
Tax compliance issues	✓	✓	✓	✓
Labor law compliance issues	✓	X	✓	✓
Registration of enterprise	✓	X	✓	✓

✓ = challenging, X = not challenging.

MSMEs = micro, small, and medium-sized enterprises.

Source: Authors.

conclude anything with regard to microfinance institutions considering the small number of enterprises reporting on this aspect. It is possible, however, that a higher degree of due diligence on the part of banks and NBFs could be the cause for the longer processing times for enterprises at the growth and sustenance stages.

Very few enterprises in the start-up and survival stages reported loan processing fees. In the survival stage, only one enterprise reported a fee for loans taken from microfinance institutions. The number of reporting enterprises in the growth and sustenance stages was significantly higher compared with the start-up and survival stages. In the start-up stage, the processing cost for loans by banks was reasonably low. The average processing costs for bank loans to enterprises in the growth stage was nearly double that for enterprises in the sustenance stage, though the median values were comparable. The average processing fee for loans

**Table 10.8: Average Loan Processing Times for Loans Sought from Banks, NBFCs, and MFIs**  
(days)

Stage of Enterprise	Source of Finance Used	Mean	Minimum	Maximum	Median	No. of Responses
Start-up	Bank	114	2	365	44	4
	NBFC	4	1	7	4	2
	MFI	10	10	10	10	1
Survival	MFI	1	1	1	1	1
Growth	Bank	35	15	73	29	18
	NBFC	6	3	9	6	5
Sustenance	Bank	38	22	82	33	30
	NBFC	24	14	33	24	3
	MFI	7	7	7	7	1

MFI = microfinance institution, NBFC = nonbanking financial company.

Source: Authors.

from NBFCs was negligible for start-up enterprises, but increased significantly for enterprises in the growth stages, with the cost being almost three times the average processing cost for enterprises in the sustenance stage. The average processing cost of loans from microfinance institutions was significantly higher for enterprises in the survival stage when compared with the sustenance stage. Though average cost of processing reported in the case of banks was higher, a larger number of reporting enterprises suggested a preference for seeking financial assistance from banks. It is possible that NBFCs were considered the second-best option for enterprises in the growth and sustenance stages (Table 10.9).

## 10.5 Analysis of Financial Accessibility

### 10.5.1 Factors Influencing Financial Access

Enterprises were also asked to report ease of financial accessibility with regard to three anchored choices: the proximity of a bank or financial institution to the enterprise's location, approachability of the bank or financial institution, and the simplicity of the process to access finance.

The proximity of a financial institution was found to positively influence the opinion of financial accessibility of a large number of

**Table 10.9 Average Processing Cost of Loans  
by MSMEs from Banks, NBFCs, and MFIs**  
(Rs thousands)

Stage of Enterprise	Source of Finance Used	Mean	Minimum	Maximum	Median	No. of Responses
Start-up	Bank	3.50	2.00	5.00	3.50	2
	NBFC	0.00	0.00	0.00	0.00	1
Survival	MFI	10.00	10.00	10.00	10.00	1
Growth	Bank	80.03	7.17	290.00	25.83	16
	NBFC	18.83	15.08	22.58	18.83	5
Sustenance	Bank	42.05	3.67	150.00	22.52	20
	NBFC	6.88	1.25	12.50	6.88	3
	MFI	1.00	1.00	1.00	1.00	1

MFI = microfinance institution, NBFC = nonbanking financial company, MSMEs = micro, small, and medium-sized enterprises, Rs = Indian rupees.

Note: Exchange rate \$1.0 = Rs65.63 (3 November 2015).

Source: Authors.

enterprises in the growth and sustenance stages. Enterprises in these stages would most likely have immediate financial requirements and so perceive the proximity of a financial institution to be a significant positive factor.

Enterprises in the start-up, growth, and sustenance stages rated highly the approachability of formal financial institutions in influencing financial access. The rating of this factor in influencing financial access was lowest for enterprises in the survival stage. It is probable that the enterprises in the survival stage were keen to break even and pay off their debts, and felt that having a good relationship with a financial institution with whom they had started out, irrespective of location or approachability, was more important.

A high proportion of enterprises from all four stages reported simplicity in processes to be advantageous in helping them secure access to finance (Table 10.10).

Enterprises were also asked to report qualitative details on the following four issues: factors that encourage financial access, factors that impede financial access, whether they expected government to do anything for financing their enterprise, and government support required for financing their enterprise. A cross-section of responses provided by enterprises is provided.

**Table 10.10: Key Factors Influencing Financial Access**  
(%)

Key Factor	Start-Up Stage (N = 14)	Survival Stage (N = 11)	Growth Stage (N = 27)	Sustenance Stage (N = 33)
Proximity of a bank or financial institution to the location of the enterprise	50.0	45.5	74.1	57.6
Ease of approachability of the bank or financial institution	71.4	54.5	92.6	72.7
Simplicity of the process to access finance	78.6	63.6	92.6	81.8

Note: As enterprises could report the sources of finance used in multiple life-cycle stages, the sum total of enterprises reporting the data may vary from the total number of enterprises in the sample.

Source: Authors.

## 10.5.2 Factors That Encourage Financial Access

**Start-up stage:** Enterprises highlighted the need for loans without collateral, affordable interest rates, and loan guarantees provided by government. They also reported the need for guidance by personnel from the financial institution, and the need for a paradigm shift by which financial institutions view MSMEs as prospective customers rather than as an interference. A few entrepreneurs emphasized that financiers should have faith in lending to businesses that had continued to operate in the same place for generations.

**Survival stage:** Enterprises asked for provision of quick finance and flexibility in the repayment schedule.

**Growth stage:** Enterprises emphasized the need for information on MSME finance schemes and the need for banks and other financial institutions to deliver the benefits prescribed through these schemes, especially those that involve minimal or no collateral. The role of a good relationship with a bank in securing access was also highlighted. Respondents also felt that approved or empaneled suppliers with long-term experience of supplying to the government must get preference over others while taking advantage of assistance through MSME finance schemes.

**Sustenance stage:** The primary concern reported by enterprises was the interest rate. Respondents felt that their relationship with public banks

was better (because it was more personalized) compared with private banks. There was also concern regarding the time needed to process loan requests, with some enterprises resorting to taking gold loans for meeting immediate financial requirements.

### 10.5.3 Factors That Impede Financial Access

**Start-up stage:** The major concern was the delay in the processing of loan applications. Business owners also felt that it was not practical to frequently visit banks for clarifications, and that the role of agents in the system needs to be minimized.

**Survival stage:** The primary concerns were complications in the process and the response of bankers.

**Growth stage:** Enterprises reported that bank officials had a very bad attitude toward them because nonperforming assets of MSME schemes were increasing and managers were averse to considering their applications for finance. Two major issues were the long time needed to process applications and inadequate information provided about available government schemes. Owners also noted that small businesses are generally volatile in nature, which add to their vulnerability and mean that capital requirements vary throughout the year, and that the nature of their operations was not recognized or factored into the lending decisions made by financial institutions.

**Sustenance stage:** Enterprises highlighted high interest rates as an impediment to financial access. Two other key issues that caused problems were (i) lack of understanding on the part of financial institutions of the sector in which enterprises operated and the corresponding policies needed; and (ii) red tape involved in hierarchical processing of loans (i.e., moving loan applications from one branch to another), thereby causing a loss of time. Enterprises also suggested that recovery of payments from customers must be enforced through proper implementation of laws.

### 10.5.4 Government Support Required for Financing Enterprise

**Start-up stage:** Support required by start-up enterprises included lowering interest rates for finance provided directly by the government. Respondents from the power-loom cluster felt that weavers must be

included on par with agriculturists in terms of securing government loans.

**Survival stage:** Enterprises felt that the government needed to provide loans at lower interest rates and also consider loan subsidies.

**Growth stage:** Enterprises were of the opinion that government must keep business owners informed of MSME schemes and eligibility requirements. Many respondents felt that the implementation of the goods and services tax would help in the resolution of payment-related issues, and that red tape hampered value-added tax payments and annual license renewal. They also felt that bank managers and government representatives must meet with MSME owners periodically to communicate features of various schemes, including eligibility, and to streamline the MSME registration process.

**Sustenance stage:** Enterprises highlighted the need for proper communication of MSME finance schemes and their eligibility, and for the provision of financial subsidies to entrepreneurs whose enterprises cater to the needs of government departments and public sector enterprises. Other key issues included proper implementation of tax schemes, minimizing delayed payments from customers, and catering to industry-specific issues and requirements. Examples included delays in providing credit to travel agents for government-sponsored travel and to weavers for the procurement of computerized equipment for power looms.

### 10.5.5 Expectations of Government Support to Finance Enterprise

**Start-up stage:** Enterprises felt that the government should provide proper information regarding MSME schemes and should provide financial assistance to MSMEs after evaluating their ideas and verifying their financial status.

**Survival stage:** Respondents felt that the government should support the expansion of business by providing capital for business owners.

**Growth stage:** Enterprises wanted the government to strictly enforce laws, including proper implementation of tax schemes (income and sales tax), and to provide a single-window system for labor-related issues such as provident fund, employees' state insurance, and tax deduction at source (i.e. the workplace). They also wanted easier internet banking, a reduced role for mediators (agents), and loans with lower

interest rates for businesses operating out of rented premises. There was also a suggestion for the government to assist in the transition of enterprises operating in industries offering standard or traditional products to the next higher stage (e.g., from a small enterprise to a medium-sized enterprise). This transition would help other enterprises in receiving benefits under the MSME category.

**Sustenance stage:** Business owners felt the government should assess the genuineness of any need before providing financial assistance. There were also innovative suggestions including the funding of research and development for new technology, and industry-specific training programs. Enterprises also wanted a guaranteed method of repayment in case of financing through government schemes that would take into account business fluctuations. Other issues included competitive pricing of raw material and machinery parts for MSMEs, checking of property registration of the loan applicant, and the need to increase the upper threshold in defining MSMEs so that the Credit Guarantee Fund Trust for Micro and Small Enterprises scheme could be better utilized.

### 10.5.6 Experiences in Seeking Financial Assistance from Financial Institutions

Enterprises were asked to rate their loan-seeking experience with banks, nonbanking financial companies (NBFCs), and microfinance institutions on a scale of 1–3 with 1 meaning *bad*, 2 meaning *neutral*, and 3 meaning *good*. In the case of banks, a high proportion of reporting enterprises in the start-up stage rated their experiences good, through this proportion declined for enterprises in the growth and sustenance stages. Close to half of enterprises in the growth stage reported their experience with banks as either *bad* or *neutral*, while this proportion was more than half for enterprises in the sustenance stage. In the case of NBFCs, a similar proportion of enterprises in the start-up, growth, and sustenance stages rated their experience *good*. The only reports of bad experiences with NBFCs were from enterprises in the growth stage. Very few enterprises rated their experiences with microfinance institutions. The lone reporting enterprises in the start-up and survival stages rated their experiences *good* and *neutral*, respectively, while the rating was split between *good* and *bad* for the two reporting enterprises in the sustenance stage. More than half of enterprises rated their experiences with banks, NBFCs, and microfinance institutions *good*, with the exception of the rating for banks by enterprises in the sustenance stage (Table 10.11).

**Table 10.11 Experience Rating of MSMEs while Seeking Financial Assistance from Banks, NBFCs, and MFIs**  
(%)

Source of Finance Used	Experienced Rating	Start-up Stage	Survival Stage	Growth Stage	Sustenance Stage	Total
Bank	Bad	20.0	...	19.0	33.3	27.1
	Neutral	20.0	...	23.8	24.2	23.7
	Good	60.0	...	57.1	42.4	49.2
	No. of Responses	5	0	21	33	59
Nonbanking financial company	Bad	0.0	...	20.0	0.0	9.1
	Neutral	33.3	...	20.0	33.3	27.3
	Good	66.7	...	60.0	66.7	63.6
	No. of Responses	3	0	5	3	11
Microfinance institution	Bad	0.0	0.0	...	50.0	25.0
	Neutral	0.0	100.0	...	0.0	25.0
	Good	100.0	0.0	...	50.0	50.0
	No. of Responses	1	1	0	2	4

MSMEs = micro, small, and medium-sized enterprises, MFI = microfinance institution, NBFC = nonbanking financial company.

Source: Authors.

## 10.6 Analysis of Financial Awareness

The level of financial awareness among entrepreneurs was captured by their awareness of well-known financial schemes for MSMEs. The schemes included the Credit Guarantee Fund Trust for Micro and Small Enterprises Scheme, the Credit Linked Capital Subsidy Scheme for technology upgradation, and the Growth Capital and Equity Assistance Scheme of the Small Industries Development Bank of India (SIDBI). The questions were dichotomous requiring a “yes” or “no” response. A composite score for the level of awareness was then computed. The entrepreneurs were also asked whether they had availed themselves of any of the schemes for their enterprises. Each entrepreneur reported his or her level of educational attainment with the following choices: less than 10 years; 10 years (i.e., secondary school leaving certificate); 12 years (pre-university college); bachelor’s degree; master’s degree; professional qualifications (e.g., chartered accountant or company secretary); or another level of education, such as a technical diploma.

### 10.6.1 Awareness of Schemes

The awareness score indicates the number of MSME financing schemes that the enterprise could recognize. The results are presented in Table 10.12. Most enterprises—47 of the 85 surveyed—were not aware of any schemes, while nearly all of the other enterprises were aware of 1 to 4 schemes. The highest proportion of entrepreneurs in each educational category was not aware of any schemes. Business owners with a bachelor's degree had greater awareness than those with a lower level of education. These overall results suggest that MSMEs have a very low awareness of schemes that could benefit them by providing access to formal credit.

**Table 10.12: Awareness of Schemes**  
(%)

Entrepreneur Qualification →						
Awareness Score <sup>a</sup> ↓	10th/SSLC (N = 24)	12th/PUC (N = 4)	Bachelor's Degree (N = 25)	Master's Degree (N = 6)	Professional Qualification (CA/CS) (N = 2)	Others (N = 24)
0	70.8	75.0	40.0	66.7	50.0	50.0
1	20.8	0.0	16.0	16.7	0.0	33.3
2	4.2	0.0	24.0	16.7	50.0	0.0
3	4.2	25.0	8.0	0.0	0.0	12.5
4	0.0	0.0	4.0	0.0	0.0	4.2
6	0.0	0.0	4.0	0.0	0.0	0.0
9	0.0	0.0	4.0	0.0	0.0	0.0

CA/CS = chartered accountant/company secretary, PUC = pre-university college, SSLC = secondary school leaving certificate.

<sup>a</sup> Awareness score is the total number of schemes that the respondent reported awareness of.

Source: Authors.

### 10.6.2 Use of Schemes

The proportion of schemes availed by MSMEs is provided in Table 10.13 and is differentiated by educational attainment. Overall, only 10 of the 85 enterprises have obtained finance through an MSME credit support scheme. Entrepreneurs with less than a bachelor's degree were less likely to have availed themselves of such a scheme for their enterprises than those entrepreneurs with higher qualifications.

**Table 10.13: Use of Schemes**  
(%)

No. of Schemes Availed	10th/ SSLC (N = 24)	12th/PUC (N = 4)	Bachelor's Degree (N = 25)	Master's Degree (N = 6)	Professional Qualification (CA/CS) (N = 2)	Others (N = 24)
0	95.8	100.0	80.0	83.3	50.0	91.7
1	4.2	0.0	20.0	16.7	50.0	8.3

CA/CS = chartered accountant/company secretary, PUC = pre-university college, SSLC = secondary school leaving certificate.

Source: Authors.

## 10.7 Conclusions

The study found that the source of finance utilized by an MSME depends on its current stage in the enterprise life cycle. Four stages were identified: start-up, survival, growth, and sustenance.

Enterprises in the start-up stage use funds from personal savings, friends, and family, primarily for the purpose of working capital. They also use public sector banks for working capital and collateral financing. Finance was sourced from trusted informal sources (personal, family, and friends) and trusted formal sources (public banks). Particularly in the case of trusted informal sources, there would be reduced pressure in case of difficulties in repayment.

Enterprises in the survival stage use moneylenders and public banks, followed by personal funds and private banks, primarily for the purpose of working capital. Private banks and moneylenders are also used to secure short-term loans. Enterprises in this stage would be looking to break even with regard to investments made and would therefore seek to meet their specific requirements through both informal and formal sources. Short-term requirements were probably sourced from private banks and moneylenders due to their ready availability and quick disbursement.

Enterprises in the growth stage use public banks for working capital and collateral financing, and they use private banks for short-term loans. The move toward private banks is possibly due to greater financial need and an increase in the ability of enterprises at this stage to afford the higher cost of finance.

Enterprises in the sustenance stage use personal funds, cooperative banks, public banks, and money borrowed from friends, again primarily for working capital. Cooperative banks were also used for short-term loans and collateral financing. Business owners are more aware of

meeting specific financial needs from specific sources. The degree of conservatism in the sourcing of finance is exemplified by the use of trusted informal sources (personal wealth and friends) and formal sources (public banks and cooperative banks) for working capital in this stage as well.

In a nutshell, sources of finance used across the various stages of the life cycle are limited largely to personal funds; family wealth; friends; moneylenders; and the banking system, comprising public, private, and cooperative banks.

The major common challenges faced in accessing finance by enterprises in the start-up and survival stages were difficulty in provision of collateral or a guarantee, lengthy loan processing, and a lack of knowledge about available schemes. Enterprises in both these stages had not yet fully established their businesses and so were not in a position to either provide collateral or security or endure complex loan procedures.

In the growth stage, the major challenges in accessing finance were a lack of knowledge about available schemes, high service fees for processing loan requests, difficulty in providing collateral or a guarantee, and high interest rates. The financial needs of enterprises seeking to expand and grow into newer markets may be different, and they may be on the lookout for short-term capital that could be borrowed at more competitive rates. This is also a stage in which entrepreneurs would feel the limitations of not having explored available options in terms of MSME finance schemes due to their lack of awareness in the earlier life-cycle stages of their enterprise.

For enterprises in the sustenance stage, the major challenges are the difficulty in providing collateral or a guarantee, procedural complications, lack of knowledge about available schemes, and lengthy processing times for loan applications. A lack of knowledge of available MSME finance schemes, together with collateral requirements for loans, were common challenges in this stage, as in the other stages. It was interesting to find that financial institutions would insist on collateral from enterprises that have established themselves in the market over a period of time, and that goodwill was not considered sufficient.

While considering the owner's educational qualifications, it was found that those business owners with a bachelor's degree had higher awareness of MSME finance schemes than business owners who had other levels of qualifications. More educated business owners were also more likely to avail themselves of such schemes for their enterprises.

## 10.8 Recommendations

The government, enterprises, and financial institutions are all stakeholders in the development of the MSME sector. This section provides recommendations for each group of stakeholders based on qualitative feedback obtained from the respondents.

### Recommendations for the Government

**Enhance financial awareness.** Adequate and timely information about MSME schemes needs to be actively disseminated through advertisements in newspapers and magazines and on television. The government could consider starting a dedicated TV channel to address MSMEs' need for information and to communicate policies.

**Reduce documentation.** It would be better to do away with complex documentation requirements for seeking financial assistance and replace them with simpler procedures like a “know your customer” form that captures basic information of the owner or enterprise that can be utilized by all financial institutions.

**Ease legal requirements.** There is an urgent need to ease the burden of legal compliance on MSMEs, at least in the first 3 years of their existence.

**Enhance sensitivity in lending institutions.** There is a need to build the capacity of lenders so that they are more sensitive to the specific needs of enterprises in different sectors and at the different stages of the enterprise life cycle.

**Ensure that tax policies are fully implemented.** By doing so, there will be an emphasis on enhancing the visibility of transactions and this would provide a more accurate idea of the transaction history of the enterprise involved, thus helping determine its creditworthiness.

**Support credit enhancement.** Expand credit guarantee schemes so that they are available to MSMEs.

**Enforce rules for delayed payment.** Ensure proper action against defaulters and against those who make delayed payments to MSMEs. A delay in payment affects cash flow to the MSME and also negatively impacts its ability to process other orders. There is also a need to determine repayment periods carefully based on the nature of the sector

in which the MSME operates, especially in sectors with high seasonality of production.

## Recommendations for Financial Institutions

**Realign approach toward MSMEs.** Financial institutions need to change their perspective from that of being just a lender to that of being a strategic business partner. They must try to establish long-term relationships with those MSMEs that have the potential to be successful. Banks must not adopt a negative attitude toward MSMEs despite high levels of nonperforming loans from past lending experiences.

**Promote financial awareness.** An enterprise's transaction history with financial institutions plays a crucial role in determining the enterprise's creditworthiness. Financial institutions can invest in training for loan officers so that they can communicate their institution's policies effectively to MSMEs.

**Relax the need for collateral.** Explore alternatives to requesting collateral, especially from enterprises in the early stages of the life cycle.

**Expand financial schemes for MSMEs.** Build up a corpus of funds that can be provided to MSMEs in need of a sudden capital infusion. Also examine different and flexible repayment arrangements for loans disbursed to MSMEs.

**Reduce documentation requirements.** Consider reducing the burden of documentation required for MSME loan applications. As nonbanking financial companies can provide loans with less documentation, banks need to consider changing their approach toward MSMEs.

## Recommendations for Entrepreneurs

**Use proper accounting practices.** Maintain a proper and robust accounting system, as this can increase the chance of accessing credit by providing a transparent basis for a lender to assess the viability and profitability of the enterprise.

**Register the enterprise.** Ensure that the enterprise is registered and that all registrations and licenses are renewed periodically.

**Create prototypes and obtain patents.** Prepare a prototype and try to patent the product. Approach the enterprise's accelerator or venture

capitalists for financial assistance only after a prototyping cycle is complete.

**Develop networks and markets.** Entrepreneurs should participate actively in trade fairs and industry events for both showcasing their products or services and for enhancing their financial awareness.

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### Appendix A.10: Classification of Micro, Small, and Medium-Sized Enterprises in India

Classification	Manufacturing Enterprises (Investment Limit in Plant and Machinery)	Service Enterprises (Investment Limit in Equipment)
Microenterprise	Rs2.5 million	Rs1 million
Small enterprise	Rs50 million	Rs20 million
Medium-sized enterprise	Rs100 million	Rs50 million

Rs = Indian rupees. Exchange rate: \$1.00 = Rs65.63 (3 November 2015).

Source: Government of India, Ministry of Micro, Small and Medium Enterprises. 2015. *MSME at a Glance*. New Delhi.

# 11

## Role of the Credit Risk Database in Developing SMEs in Japan: Ideas for Asia

*Satoshi Kuwahara, Naoyuki Yoshino, Megumi Sagara,  
and Farhad Taghizadeh-Hesary*

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### 11.1 Introduction

Small and medium-sized enterprises (SMEs) are the backbone of the Japanese economy and other Asian economies. More than 99% of businesses in Japan are SMEs, and they employ almost 70% of the workforce and account for more than half of economic output (Yoshino and Taghizadeh-Hesary 2015).<sup>1</sup> In Asia during the period 2007–2012, SMEs accounted for 98% of all enterprises and 38% of gross domestic product on average, employing 66% of the national labor force (ADB 2014). SMEs also contribute significantly to trade. Thirty percent of total exports were accounted for by SMEs in Asia on average during the same period. In the People’s Republic of China, SMEs contributed 42% of exports in 2012 and grew just under 7% annually over the previous 5 years. In Thailand, these firms accounted for 29% of exports in 2012. SMEs that are part of global supply chains promote international trade and mobilize domestic demand (ADB 2014).

Due to the significance of SMEs for Asian economies, it is important to find ways to provide them with access to finance. Asian economies are characterized as having bank-dominated financial systems and capital markets that are not well developed, particularly in the area of venture

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<sup>1</sup> One of the growth strategies in Abenomics is to support SMEs by making their access to finance easier (Yoshino and Taghizadeh-Hesary, 2014a, 2014b). On new methods of financing SMEs, see Yoshino (2013) and Yoshino and Taghizadeh-Hesary (2014c).

capital. Consequently, banks are the main source of financing. Although the soundness of banking systems has improved significantly since the 1997–1998 Asian financial crisis, banks have been cautious about lending to SMEs. Start-up companies, in particular, are finding it increasingly difficult to borrow money from banks because of strict Basel capital requirements. Riskier SMEs also face difficulties in borrowing from banks (Yoshino 2012). One of the ways to ease bank financing to SMEs is to construct a rich, nationwide SME database in order to reduce information asymmetry and to provide scoring models, through which banks can recognize healthy SMEs from unhealthy ones.

There is a successful example of such a database in Japan, the Credit Risk Database (CRD) of the CRD Association. The CRD Association is a membership-based institution whose members support the database by providing data from SME financial statements. Maehara (2013) explains the involvement of the public sector in the establishment of the CRD. The Small and Medium Enterprise Agency of the Ministry of Economy, Trade and Industry allocated just over ¥1.3 billion (about \$11 million) in supplementary funding for the 1999 and 2000 fiscal years for the development and demonstration of the systems required for the CRD. In addition to funds, the government also provided human resources to establish the CRD. As the membership of the CRD has increased, the funding contribution of the public sector has been reduced.

The purpose of the CRD is to mitigate information asymmetry between SMEs and lenders (or guarantors) and contribute to the provision of funds based on the appropriate pricing. Japan's credit guarantee corporations (CGCs), the main members of the CRD, have used the CRD scoring models created since April 2006. The credit guarantee fees were uniformly set at 1.35% before then. Subsequently, they were diversified to a classification of nine fees ranging from 0.50% to 2.20% based on SMEs' creditworthiness. It brought a lower fee than before for healthier SMEs and more financing opportunities for less healthy SMEs. The CGCs decide credit guarantee fee rate classification by the CRD scoring models.

There are two types of credit information centers in the world. One type is credit bureaus and credit registries, the other is credit risk databases. Private credit bureaus are predominant in the United Kingdom (Experian), the United States (Dun & Bradstreet and TransUnion), and Japan (TSR and TDB). Public credit registries are predominant in Asia, Europe, and South America. Although there are four credit risk databases in Japan (RDB, CRITS, SDB, and CRD), we do not know of any in other countries. The two types of credit information center have different purposes. The purpose of private credit bureaus and public credit registries is to build a blacklist sharing scheme and

contribute to the reduction of delinquency and nonperforming loans through discipline of borrowers. The purpose of credit risk databases is to mitigate information asymmetry and contribute to the provision of funds based on the appropriate pricing.

In this chapter, we explain the functions of the CRD, one of the credit risk databases in Japan. Its framework, characteristics, and services can provide a useful example for other East Asian countries seeking to create a large, high-quality database to support lending to SMEs.

## 11.2 What Is the Credit Risk Database?

### 11.2.1 Membership System

The CRD Association is a membership system that is composed of CGCs, financial institutions, and others. The number of members has grown from 58 at the time of establishment in 2001 to 180 currently (Table 11.1).

At first, CGCs were the core members of the CRD and were then joined by financial institutions. There are currently 51 CGCs in Japan. When SMEs try to borrow from financial institutions, they often need a guarantee, which is provided by the CGC. CGCs decide whether to guarantee a loan mainly after reviewing the SMEs' financial statements. Therefore, CGCs accumulate many financial statements and also information about SMEs' defaults.

The CRD Association has therefore accumulated millions of financial statements and default information from across the country by getting all CGCs to join the association.

**Table 11.1: Membership Composition**

Category	Number of Members
Credit guarantee corporations	51
Government-affiliated financial institutions	3
Private financial institutions	114
Credit-rating agencies, etc.	7
Government institutions	5
<b>Total</b>	<b>180</b>

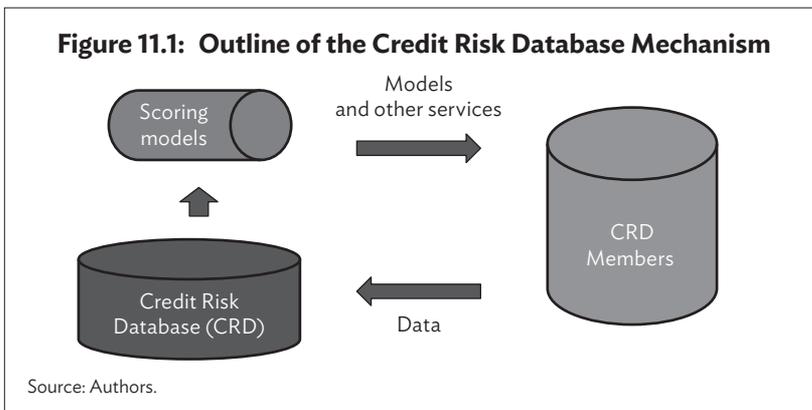
Note: Numbers are as of 1 April 2016.

Source: Credit Risk Database. [www.crd-office.net/CRD/en/index.html](http://www.crd-office.net/CRD/en/index.html)

In addition, many SMEs borrow from banks and other financial institutions without a guarantee. In these cases, SMEs submit financial statements to banks not only at the time of borrowing but also during loan monitoring. The inclusion of information from such nonguaranteed lending has allowed the CRD to hold a wider range of borrowers and multiple financial statements for each borrower. At present, the CRD is the largest depository of SME credit information in Japan.

### 11.2.2 Mechanism of the Credit Risk Database

The CRD Association is organized as a nonprofit membership organization funded by membership fees. The CRD members offer their data, which are stored in the database after cleaning and consolidation. Using the data, the CRD builds scoring models that calculate the credit risk of SMEs. It maintains the quality of the scoring models by periodically validating the accuracy of its models. The CRD members use the scoring models at their institutions. In addition, members can access other services including statistical information services, sample data services, management consulting support services, and consulting services (Figure 11.1).



### 11.2.3 Data Collection

The CRD contains information on both incorporated and sole-proprietor SMEs. Currently there are statements from more than 3 million SMEs in the database. (Table 11.2). Given that the number of SMEs in Japan is around 4 million, the database contains information on a full three-quarters of the enterprise population. Because borrowers provide

**Table 11.2: Accumulated Data**

	Borrowers		Financial Statements	
	Number	Default Information	Number	Default Information
Incorporated SMEs	2,299,000	354,000	17,642,000	2,511,000
Sole-proprietor SMEs	1,131,000	164,000	4,779,000	693,000
<b>Total</b>	<b>3,430,000</b>	<b>518,000</b>	<b>22,421,000</b>	<b>3,204,000</b>

SME = small and medium-sized enterprise.

Note: Data as of 31 March 2016.

Source: Credit Risk Database. [www.crd-office.net/CRD/en/index.html](http://www.crd-office.net/CRD/en/index.html)

financial statements covering several years, the number of financial statements is more than 20 million.

The CRD accumulates default data in six categories: (i) 3 months or more in arrears, (ii) de facto bankruptcy,<sup>2</sup> (iii) bankruptcy, (iv) subrogation, (v) substandard, and (vi) potential bankruptcy. It chooses a suitable combination of categories according to the purpose such as building a scoring model, analyzing data, and so on.

The data can be divided by region and sector as shown in Table 11.3. Regions are divided into 6 groups and businesses into 13 groups.

## 11.2.4 Creating the Database

The CRD holds SME financial data in anonymous form (Box 11). The quality and size of the database are fundamental to the quality and reliability of the CRD's services, such as its scoring models, and the best efforts are made to collect accurate data. To ensure the accuracy of the data, the CRD checks the accounting consistency across figures in financial statements submitted by members, and carries out data cleaning processes twice to eliminate any data problems.

After such processes, the CRD consolidates data from the same borrowers. Since the CRD collects data in an anonymous form, items such as the first Japanese character of company names, establishment dates, postal codes, and so on are used in the consolidation process instead of company names themselves. These cleaning and consolidating processes enable the creation of a high-quality database where the quality of the data can be continuously monitored.

<sup>2</sup> Debt category used internally by the lender (bank or other financial institution).

**Table 11.3: Number of Incorporated SMEs  
by Sector and Region in the CRD  
(‘000)**

Type of Business	Region						Total
	Hokkaido and Tohoku	Kanto	Chubu	Kinki	Chugoku and Shikoku	Kyushu and Okinawa	
Construction	63	161	82	79	47	52	484
Manufacturing	30	126	79	82	31	23	370
Information and communications	3	35	5	8	2	3	57
Transport and postal activities	10	27	12	17	9	8	84
Wholesale	25	112	45	65	21	24	291
Retail trade	40	94	49	50	32	34	299
Real estate and goods rental and leasing	14	69	21	44	14	15	178
Scientific research, professional, and technical services	9	45	12	18	8	10	101
Accommodation, eating, and drinking services	13	41	19	17	10	10	110
Living-related and personal services and amusement services	6	23	9	11	5	6	60
Medical, health care, and welfare	8	20	9	13	8	9	67
Services, not elsewhere classified	16	63	25	29	13	15	162
Others	6	11	5	5	4	5	36
<b>Total</b>	<b>244</b>	<b>827</b>	<b>371</b>	<b>438</b>	<b>204</b>	<b>215</b>	<b>2,299</b>

CRD = credit risk database; SME = small and medium-sized enterprise.

Note: Figures represent the number of borrowers. Some borrowers who changed region or business type are counted twice. Data as of 31 March 2016.

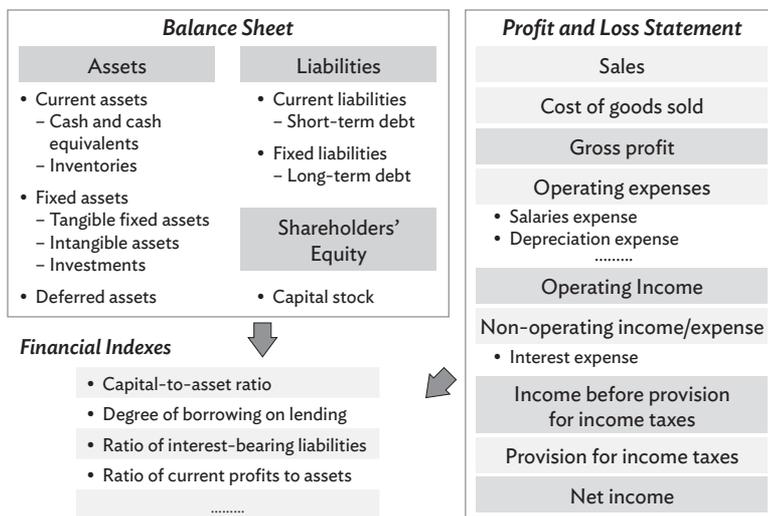
Source: Credit Risk Database. [www.crd-office.net/CRD/en/index.html](http://www.crd-office.net/CRD/en/index.html)

## 11.2.5 Model Building

The CRD Association uses the data to build statistical models. During the past 10 years, the association has built five scoring models and is now adding a sixth. Model 3, which assesses the credit risk of incorporated SMEs, and model 4, which assesses sole proprietors, has been in use in the credit supplementation system since April 2006. The credit

### Box 11: Collected Data and Financial Indexes Created from Credit Risk Database

#### Financial data (B/S, P/L)



The diagram shows the type of data content submitted by members to the Credit Risk Database (CRD).

Members submit data composed of up to 59 items from the balance sheet (minimum 26) and up to 26 items from the profit and loss statement (minimum 9). Thus, the CRD can build a database that is rich in content in addition to being large in scale. This helps to build the robust scoring models for the CRD members for calculating the credit risk of small and medium-sized enterprises.

Moreover, the CRD requests some nonfinancial data and default data. The CRD employs an explanatory variable involving nonfinancial data in the scoring model for sole proprietors. In addition, nonfinancial data are often used as one of the factors in defining the sample and generating statistics information.

The types of data collected by private credit bureaus and public credit registries are limited mainly because they deal with personally identifiable information. For example, the Credit Bureau of Bank Negara Malaysia is a public credit registry that collects credit information such as type of credit facilities used, credit limit, outstanding balance, conduct of account, legal action status, and so on.

B/S = balance sheet; P/L = profit and loss statement.

Source: Authors.

guarantee system and credit insurance system constitute the credit supplementation system. The credit insurance system covers the risk that the credit guarantee system may suffer from the bankruptcies of SMEs, by using insurance offered by the Japan Finance Corporation. Models 3 and 4 have been used to decide the schedule of credit guarantee fees that SMEs pay the credit guarantee corporations (CGCs) and the schedule of credit insurance fees that the CGCs pay the Japan Finance Corporation.

Estimations by models 3 and 4 use logistic regression (logit model). Logit models are common methods used in building scoring models for the assessment of credit risk. Both models produce an estimated probability of default for each SME. Model 3 in particular produces multiyear, cumulative estimated probabilities of default, which give the probability of default occurring within 2 and 3 years, in accordance with the longer-term prospects of the SME.

Model 3 and model 4 were built using a large amount of data. Model 3, for incorporated SMEs, was built from data from 2.93 million financial statements and about 40,000 defaults. Model 4, for sole-proprietor SMEs, was built from about 1.2 million financial statements and about 20,000 defaults. This enables models to be stable and robust.

Financial indexes, such as the capital-to-asset ratio, degree of dependency on loans, ratio of interest-bearing liabilities, and so on, were created from financial statements. Financial indexes that correlate with defaults were chosen and used to build the scoring models. In building model 4, the CRD Association utilized qualitative data in order to supplement the financial indexes.

Because the financial statements of incorporated SMEs have less missing data and are more precise than those of sole proprietorships, the accuracy of model 3 is higher than that of model 4. However, both have performed well since they were built.

The CRD Association conducts annual validation tests of scoring models and makes efforts to keep high accuracy ratios through the modification and construction of new models in response to changes in the environment of SMEs.

## 11.3 Why Was the Credit Risk Database Established?

### 11.3.1 Remedy for Asymmetric Information

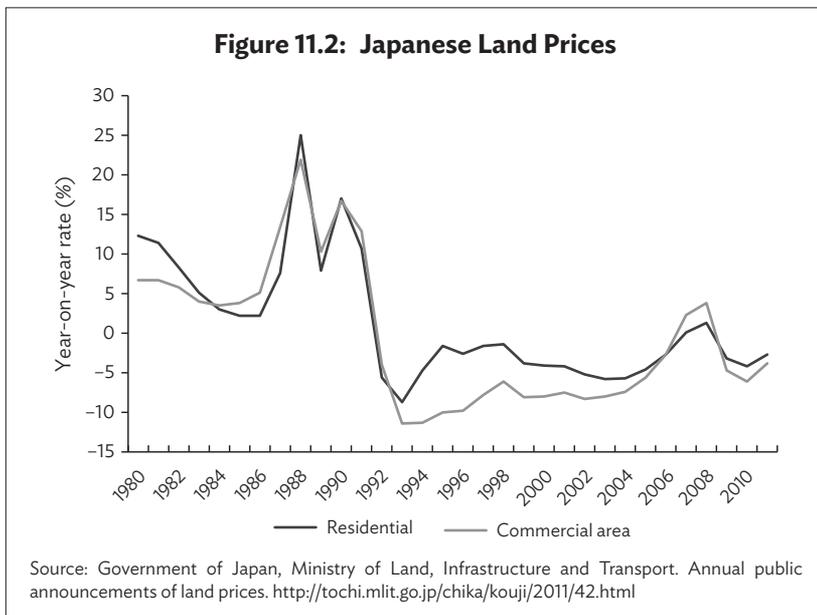
Next we explain the background of the CRD Association's establishment. The collection of information is intrinsic to the financial sector. However, there is a problem of asymmetric information between suppliers and demanders of funds. Information infrastructures are necessary to remedy this problem.

Many large enterprises list their shares on stock markets and issue securities in bond markets. Therefore, institutional information sharing schemes of capital markets can facilitate access to a wide range of information necessary to gauge the creditworthiness of large enterprises. However, most SMEs have no connection with capital markets. While financial institutions can closely and continuously observe borrowers, it is costly to do so for small loans. The lack of information infrastructure for SMEs increases the information asymmetry problem.

### 11.3.2 Collapse of the Japanese Bubble Economy and Changes in SME Finance

From 1986 to 1991, Japanese financial institutions rapidly increased lending and the financial system became excessively reliant on land collateral rather than carrying out direct and prudent appraisal and monitoring of borrowers. After the collapse of the bubble economy, loan schemes that relied heavily on collateral turned out to be unsustainable due to the decline of land prices (Figure 11.2).

Concurrently with the collapse of the Japanese bubble, the revision of Basel I banking regulations started in 1998 and the final documents of Basel II were published in 2004. The Japanese government expanded policy-based finance for SMEs to mitigate the constraints on SME finance as an urgent countermeasure against Basel II. In this situation,



efficient and low-cost credit risk evaluation tools were needed for SME financing, especially for transaction-based lending.

To address the serious credit constraints on SMEs after the collapse of the bubble and to conform to Basel II requirements on risk management, the SME Agency and the Bank of Japan offered support by introducing a new credit risk evaluation tool. The SME Agency organized meetings with the leading users of credit evaluation tools. Leading users, consisting of five credit guarantee corporations, three government-affiliated financial institutions, and three private financial institutions, held meetings regularly to discuss the basic concepts and ideas for the CRD.

The CRD Management Council was founded as a nonprofit membership organization in March 2001 with 58 members, including 52 CGCs. At that time, the scoring model CRD Model 1 version 1 was released. In April 2005, the CRD Management Council obtained corporate status and renamed itself the CRD Association.

### **11.3.3 The Mission of the Credit Risk Database**

The primary objectives of the CRD are to “soundly facilitate funding provision to SMEs” and “improve the quality of risk management in finance,” as specified in the memorandum of association (CRD Association 2005). Compared with other countries’ credit information centers, the Japanese CRD is unique in that its primary objectives include facilitating the provision of funds to SMEs.

In many countries, financial crises triggered the establishment of credit information centers. The Asian financial crisis in Southeast Asia as well as the tequila crisis in Central America triggered the establishment of credit information centers and the introduction of the necessary legal frameworks. In almost all cases, bank supervisors played leading roles in establishing the centers, and the primary objective was the provision of support for bank supervision, namely reducing nonperforming loans.

The difference in primary objectives probably influenced the differences in database architecture.

## **11.4 Characteristics of the Credit Risk Database**

### **11.4.1 Two Types of Credit Information Centers**

There are two types of credit information centers. One handles individual information and the other anonymous information. We define credit bureaus and credit registries as public or private credit information

centers collecting personally identifiable credit information and having an individual information reference function. On the other hand, a credit database is defined as a public or private credit information center collecting anonymous financial information and having no individual information reference function.<sup>3</sup>

Credit bureaus and credit registries share information on the creditworthiness of individual borrowers. They place emphasis on borrowers' past loan performance rather than their ongoing business performance. The simplest design is a blacklist sharing scheme. Such a scheme contributes to the reduction of delinquency and nonperforming loans through discipline of borrowers.

Credit databases share information on the creditworthiness of the average borrower in groups having the same attributes. They place emphasis on data regarding borrowers' current and ongoing business performance rather than their past loan performance. This approach predicts borrowers' future behavior based on their ongoing business performance measured by statistical probability and is closely related to portfolio risk management over pooled loans and the reduction of overestimated risk premium caused by information asymmetry.

The relationship of these credit information centers is not competitive but rather complementary. Credit databases give general information and credit bureaus and credit registries give specific information regarding borrowers. For example, financial institutions give a borrower an internal rating categorized by a scoring model which was developed from the credit database. In addition to that, the financial institution adjusts its rating by utilizing special information on that borrower from a credit bureau or credit registry. Credit bureaus in Japan are Teikoku Data Bank and Tokyo Shoko Research. The CRD doesn't directly work together with those. However, the CRD members effectively utilize both types of information centers.

### 11.4.2 Information Center Characteristics

Table 11.4 shows a brief comparison of credit databases and credit bureaus and registries. These two types of credit information center have different characteristics in their databases and different effects for the financial market regarding SMEs.

The essential function of credit bureaus and registries is their reference function, and almost all are designed with the objective of

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<sup>3</sup> This definition is not very common. Credit bureaus and credit registries usually collect and share personally identifiable credit information, but a credit database is not necessarily supposed to collect anonymous information.

**Table 11.4: Credit Bureaus and Registries versus Credit Databases**

	Credit Bureaus (or Registries)	Credit Databases
Information	Personally identifiable information Information of individual borrowers	Anonymous information – An average borrower in the group with the same attributes (statistical information)
Discipline of borrowers	Direct To acquire a good financial record (“reputation collateral”) To avoid being blacklisted	Indirect To belong to a higher credit rating group To improve financial conditions
Promoting competition in the financial market	Direct To reduce information monopoly	Indirect To reduce overestimated risk premium by improving predictability
Constraints from privacy problems	Tight constraints – Content (depth of information) – Tight constraints affect the depth and length of the database – Preservation period – Accuracy of data – Need for appropriate process to correcting wrong data	No constraints – Comparatively easy to develop deep and rich database enabling more value-added services

Note: Figures represent the number of borrowers. Some borrowers who changed region or business type are counted twice. Data as of 31 March 2016.

Source: Credit Risk Database. [www.crd-office.net/CRD/en/index.html](http://www.crd-office.net/CRD/en/index.html)

reducing delinquency and nonperforming loans. Therefore, the core data of credit bureaus and registries concern borrowers’ loan performance, namely the current amount of outstanding loans and the record of past delinquencies and defaults. In contrast, the essential function of credit databases is to enable the building of statistical models. Therefore, the core data of credit databases are accounting data for the construction of the models. It is possible to establish credit bureaus and registries that have the same functions as credit databases in addition to their intrinsic functions. Some global private credit bureaus in the United States have extended their business to the field of credit databases, but they remain

exceptional cases among the large number of credit bureaus in the world. Many credit bureau databases are insufficient in variety and quantity for the construction of reliable statistical models. The narrow range of data accumulated by other information centers may be due in part to the necessity of reducing privacy risks, the manageability of databases, and the difficulty of collecting precise account data for SMEs. This results in a very small number of databases that satisfy the requirements of both types of credit information center. In many cases, each type of credit information center has a different characteristic database responding to its essential functions.

For the discipline of borrowers, credit bureaus and registries have more direct effects than credit databases. Being blacklisted is highly detrimental for borrowers so the possibility of being blacklisted acts as a strong deterrent. Credit databases, conversely, have indirect effects, and it is advantageous for borrowers to show better financial data compared with that of the average borrower with the same attributes to achieve better loan conditions. Thus, borrowers are motivated to improve their business situation.

For promoting competition in the financial market, credit bureaus also have direct but limited effects. Sharing information prevents information monopolies, so borrowers can benefit from more opportunities for better loan conditions. However, this is effective only for the loan formation of registered borrowers. Borrowers whose data are not registered receive no benefit.

Credit databases have indirect effects but influence a wide range of SME financing. They reduce overestimated risk premiums by making clear the financial data distribution of groups with the same attributes. This enables more precise predictions of the default risk and expands credit opportunities for SMEs. It is also beneficial for borrowers whose data are not collected.

Regarding privacy problems, credit bureaus and registries have to introduce appropriate security safeguards for the protection of borrowers. Considering that information inaccuracy can pose fatal problems, borrowers should have the right to access their own information and dispute inaccurate information.

Credit databases are almost free from these kinds of constraints. It is comparatively easy to develop comprehensive information databases that can enable more advanced value-added services.

We expect it will gradually become difficult to maintain and collect comprehensive data because of increasing concerns about privacy. But the more advanced services require deeper and longer-range databases. Therefore, we suppose that both types of credit information center are necessary and have complementary functions.

### 11.4.3 Benefits from Collecting Anonymous Information

The CRD provides efficient evaluation tools that are useful for setting an appropriate lending interest rate in line with credit risk. Due to the information asymmetry and the lack of financial information infrastructure for SMEs, the risk premium on SME finance is prone to be overestimated. The CRD contributes to rectifying the overestimation of the risk premium.

The CRD also provides indispensable tools for promoting the securitization of various SME-related assets and helps to connect SMEs with capital markets. It also contributes to improving risk management of pooled SME loans in financial institutions.

Finally, the CRD provides low-cost and prompt evaluation tools that are suitable for transaction-based lending. This is particularly useful when costly evaluation tools are not viable for small loan amounts.

In this way, the CRD contributes more to the facilitation of fund provision to SMEs than to the reduction of nonperforming loans. The most essential function of credit risk databases is the precise prediction of default risk over collective SME loans in segmented groups and the reduction of overestimated risk premium for fund provision.

## 11.5 How Is the Credit Risk Database Used in Practice?

### 11.5.1 Variety of Services

The CRD Association offers various services to members. The basic services are (i) a scoring service, (ii) sample data provision, and (iii) statistical information provision.

#### Scoring Service

Members can use the CRD's scoring models and evaluate the credit risk of borrowers and potential borrowers in the following ways:

- by installing the model program directly onto members' internal rating systems or by installing the model application to computers in members' offices, or
- by accessing the CRD member website via the internet or by requesting data with scoring results.

### **Sample Data Provision**

The CRD provides random sampling data, such as financial data and scoring data, to members. Members can utilize the sampling data for various purposes:

- to complete insufficient data for creating internal scoring models,
- to validate the member's internal scoring model, and
- to develop financial products in new areas.

Members can extract the sampling data for standard segments by indicating the attributes of the segment, such as the type of industry, business scale, and region.

### **Statistical Information Provision**

A wide range of statistical information by region and industry is available from the CRD. Members can utilize the provided data in several ways, such as

- to compare financial statistics based on the member's customers with those of the CRD database for improving credit risk management, and
- to develop customer-oriented marketing strategies and new financing services.

The CRD also provides members with other valued-added services, such as the Management Consulting Support System and consulting services.

### **Other Services**

The CRD provides its members with a consulting tool, the Management Consulting Support System. The system indicates the comparative position of each borrower in various aspects and is useful for members to give advice to borrowers for improvements in management and their financial situation.

In addition, the CRD Association provides consulting services, such as the validation and reconstruction of internal rating systems, credit risk measurement, a housing loan database, an apartment loan database, and educational services. Some services are provided to members for additional fees.

## **11.5.2 Using Same Scoring Models**

Since April 2006, the CRD models have been used to decide credit guarantee fee rate classifications in the Credit Insurance System (Table 11.5). This allows the CGCs and member financial institutions across Japan to evaluate SME borrowers using the same scoring models.

**Table 11.5: Credit Guarantee Fee Rate Classification**  
(annual rate, %)

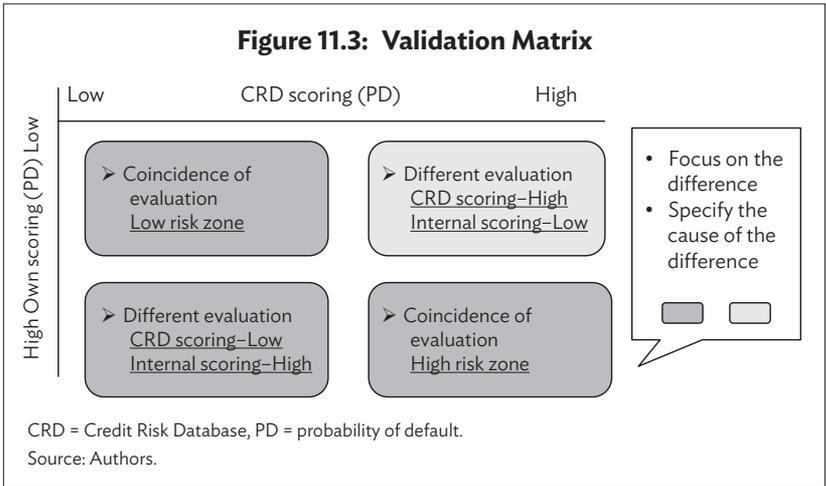
Classification	1	2	3	4	5	6	7	8	9
Credit guarantee fee rate	2.20	2.00	1.80	1.60	1.35	1.10	0.90	0.70	0.50

Source: Japan Federation of Credit Guarantee Corporations. <http://www.zenshinhoren.or.jp/english/index.html>

### 11.5.3 Validating Own Scoring Models

Members can employ the CRD scoring for the validation of their own internal credit rating systems. Financial institutions can choose to build their own credit scoring models and internal credit rating systems based on their internal databases; however, the size of a single financial institution’s database is far smaller than the CRD. Furthermore, its data may be skewed for attributes like region, industry, and scale of companies are often biased. These factors make scoring models unstable and vulnerable to changes in the economic environment. Though such models may be highly accurate in the early stages of practice, they are often prone to becoming unstable over time. Therefore, it is important to validate internal rating systems through comparison with those of a third party.

Figure 11.3 shows a validation matrix. This validates the accuracy of the internal credit rating system in a simple way. The vertical scale indicates the rating assignment of the internal credit rating system, and the horizontal scale indicates that of the CRD.



In the green areas of the matrix sheet, the results of both systems have similar rating assignments. However, in the blue and orange areas the results are conflicting. The discrepancy of evaluations does not immediately mean either side is inaccurate. Financial institutions' rating systems usually involve qualitative items or data outside of account figures that the CRD models do not consider. The financial institution must scrutinize the factors generating the difference in evaluations and decide whether to maintain its current system, modify it, or construct a new system.

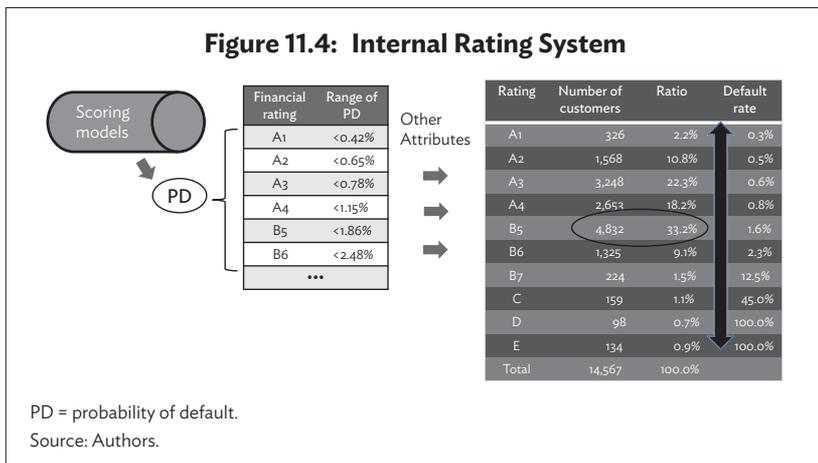
### 11.5.4 Scoring Models for Members' Internal Rating Systems

Another option is for members to employ the CRD scoring for developing their own internal credit rating systems. For more information on other credit rating models for SMEs, see Yoshino and Taghizadeh-Hesary (2014d, 2015) and Yoshino et al. (2015).

For small-scale financial institutions with a small number of loans, it is difficult to build scoring models based on their own databases. Some have internal rating systems that are highly dependent on the qualitative aspects of borrowers and use simple scoring methods. As such, they face the necessity of improving the quality of their risk management.

The CRD scoring models enable members to develop internal credit rating systems based on a large-scale database, reflecting qualitative items they have employed for their loan decisions (Figure 11.4).

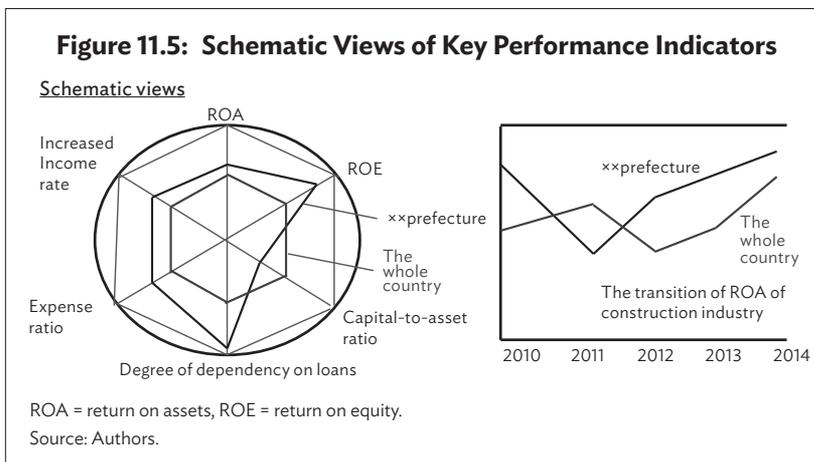
First, the member must calculate the scores of its customers by employing the CRD scoring models and setting up categories reflecting the distribution of scores. Then, it can modify the category structure



reflecting qualitative items. And finally, it can reassign a category to each customer.

### 11.5.5 Using the CRD Financial Indexes in a Regional Comprehensive Strategy

The government of Prime Minister Shinzo Abe established the Office for Vitalizing Local Economy and asked local governments to establish the regional comprehensive strategy. Local governments aim to prevent depopulation and revitalize local areas according to the regional strategy. Local governments are asked to set 5-year targets as part of the strategy. They are required to choose key performance indicators that allow the targets to be verified. The CRD provides statistical indexes concerning SME management as key performance indicator candidates (Figure 11.5). Local governments will monitor the improvement of key performance



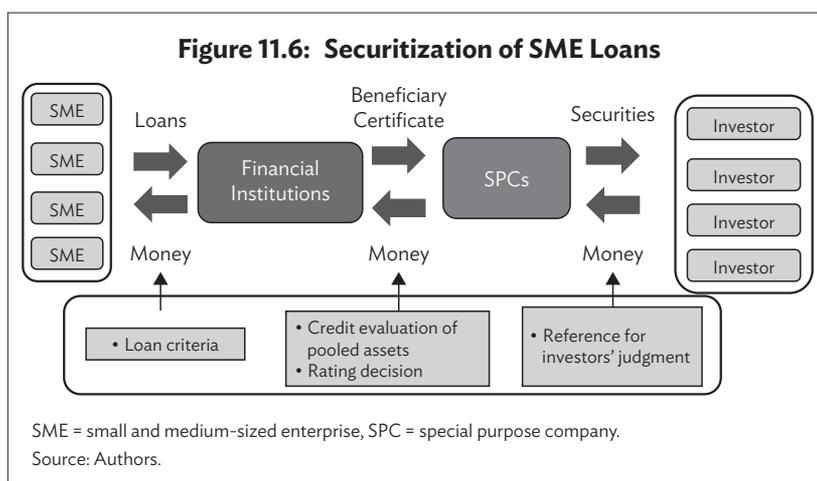
indicators in a specific area in order to assess the effectiveness of their regional comprehensive strategy.

### 11.5.6 Securitization

The collateralized loan obligation (CLO) framework is an example of the practical use of a scoring model. The CLO framework gathers loans held by financial institutions, issues securities against the background of those loans, sells securities to investor and acquires funds. In Japan, Japan Finance Corporation has been playing the main part in the CLO

framework. Japan Finance Corporation composed CLOs 20 times together with 161 other financial institutions. In total, they offered ¥218.9 billion in lending to 7,439 SMEs.<sup>4</sup>

Figure 11.6 is a graphic representation of the CLO system. The scoring model was used to select the loans, evaluate pooled assets, and assign ratings. It was also used as a reference for judgments on investors. However, the securitization environment deteriorated after the Lehman shock and CLOs have not been issued in recent years. However, Japan Finance Corporation will issue a CLO in March 2016 for the first time in 5 years.



Securitization using scoring models makes it easier to raise funds. If the environment improves, new CLOs may be issued more often and the CRD may be used to support them.

### 11.5.7 Other Uses of Credit Risk Database Services

The SME Agency also uses the CRD and the results of the CRD scoring model. The CRD covers all data on SMEs that use credit guarantees. The SME Agency uses the CRD and scoring results when it makes new policies and to validate the effects of policies and programs in the Credit Supplementation System.

<sup>4</sup> For further details, see Japan Finance Corporation 2015.

The Bank of Japan also uses the database to analyze and examine the situation of SMEs. It checks the distribution of credit risk and the financing situation of SMEs, and performs other activities.

The Financial Service Agency compares the results of the CRD scoring models against the borrowers with the results of the financial institutions' own models. Then it evaluates the fitness of financial institutions' own models against the borrowers. It uses the CRD scoring models because they are stable and impartial models. The Financial Service Agency also uses CRD data to better understand the situation of SMEs in Japan.

## 11.6 Maintaining Quality

### 11.6.1 Quality Assurance System for Credit Risk Database Models

To maintain the quality of the CRD models, a system has been created to objectively evaluate them.

In 2007, the CRD established the "model quality management guidelines," relating to model development, model operation, and validation. In accordance with the guidelines, the CRD organized the Third-Party Evaluation Committee for scoring models. The committee comprises prominent scholars, bankers, and others.

The CRD Association validates the CRD models annually in line with the regulations under the Small and Medium-sized Enterprise Credit Insurance Act and the Financial Service Agency notifications.

To ensure accurate scoring models, the CRD guidelines address the following points:

- compares the current data with the data from which models were made,
- checks the accuracy ratios of the models,
- compares the probability of default with the actual default rate,
- checks the stability of the models, and
- checks the ability of the variables to detect defaults.

The Third-Party Evaluation Committee for the CRD scoring models assesses the results of the validation. The CRD then makes decisions on the scoring models based on suggestions from the committee. For example, many SMEs were affected by the Lehman shock and the accuracy of scoring models deteriorated as a result. However, the CRD used the experience to expand its knowledge through valuable suggestions from the Third-Party Evaluation Committee.

Additionally, an annual report by the Third-Party Evaluation Committee is delivered to the members and the summary of the assessments is disclosed to the public on the CRD website.

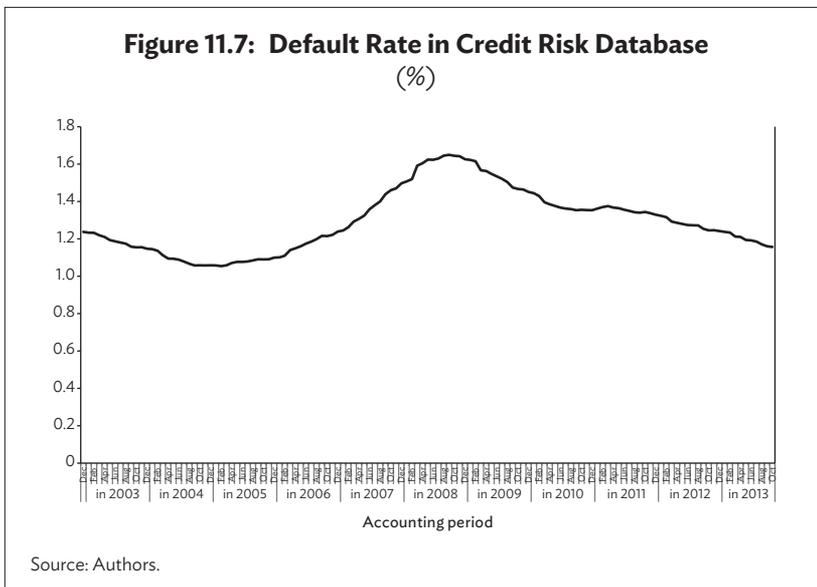
### 11.6.2 The Importance of Validation

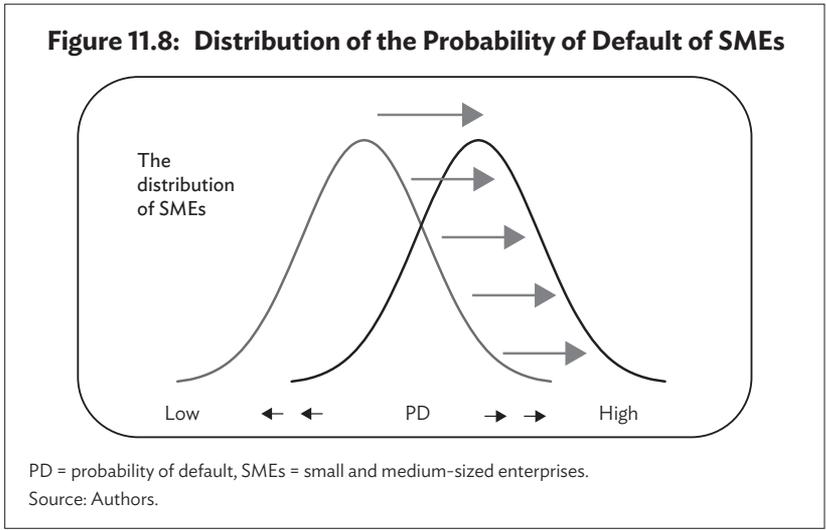
The accuracy of the scoring models tends to deteriorate with time. The scoring models must be validated in order to maintain their quality. Next, we discuss three cases of validation.

#### Case 1: After the Lehman Shock

The effects of the Lehman shock were felt worldwide. The scoring model was modified to correspond with the situation after the shock. Figure 11.7 shows the default rate in the CRD. Many SMEs' bankruptcies were triggered by the Lehman shock, so the default rate (i.e., bankruptcy ratio for SMEs) in the CRD increased rapidly. The actual default rate was higher than the probability of default of the scoring model. The probability of SME bankruptcy heightened after the Lehman shock.

Figure 11.8 shows the distribution of SMEs' probability of default after the Lehman shock. The shape of the distribution curve was not drastically changed. The accuracy ratio remained high just by changing parameter values ( $\alpha$ ,  $\beta$ , and  $\gamma$  as below) of the scoring model.





As a result of the scoring model, the probability of default can be calculated from this equation:

$$PD = \frac{1}{1 + \exp(-Z)} \quad Z = \alpha + \beta \times X^\gamma$$

$\alpha, \beta, \gamma$ : parameters  
 $X$ : general assessment of financial indexes  
 Adjusting  $\alpha$ , mainly

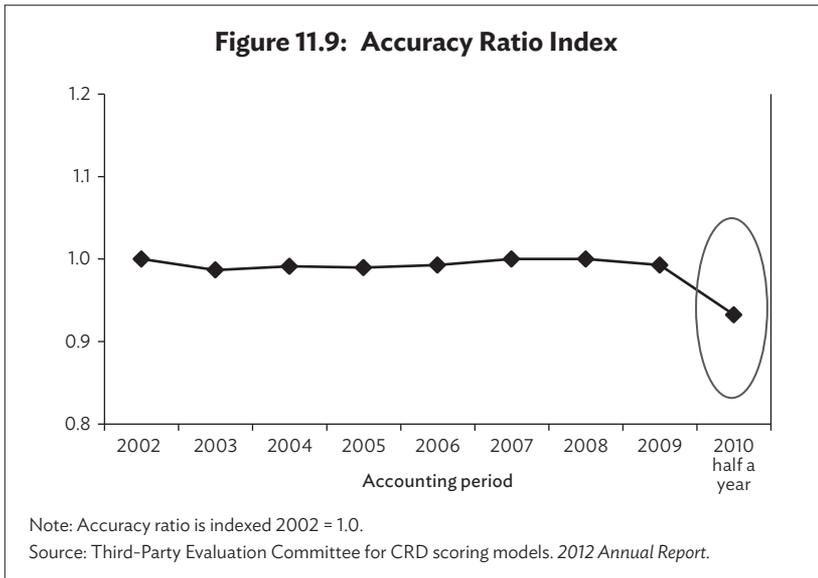
$\alpha, \beta$ , and  $\gamma$  are parameters and  $X$  is a general assessment of financial indexes.  $\alpha$  is constant and depends on the level of probability of default. CRD adjusts  $\alpha$  mainly against the rise in the actual default rate after the Lehman shock.

**Case 2: Great East Japan Earthquake**

The accuracy ratio of the scoring model, which was stable until 2009, suddenly declined in the first half of 2010 (Figure 11.9).

The data on the first half of 2010 includes the default data affected by the Great East Japan Earthquake. We considered that the sudden decline in the accuracy ratio may have been due to the Great East Japan Earthquake, and so explored the background of the sudden decline through validation as follows:

- (i) We excluded data from the heavily affected areas (the prefectures of Fukushima, Miyagi, and Iwate), then calculated the accuracy ratio.



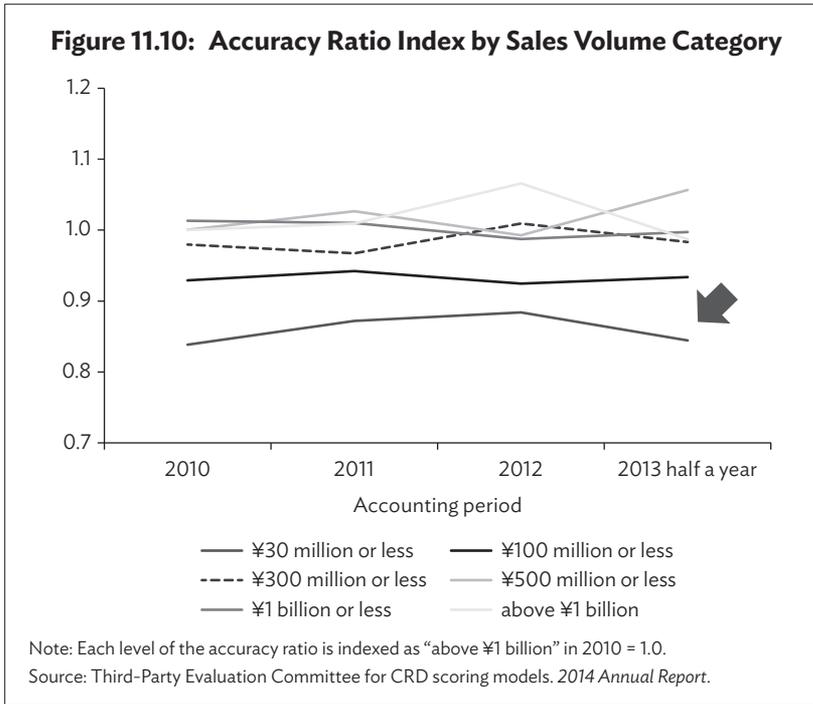
- (ii) We identified the badly damaged industries.
- (iii) We calculated the accuracy ratio from the dataset, shifting by increments of 1 month in order to identify when the ratio declined.

We determined that the decline of the accuracy ratio occurred at the same time as the earthquake, particularly in the areas devastated by the disaster and in the manufacturing industry. The manufacturing industry was damaged terribly from the earthquake through the supply chain of materials and the shortage of electric power supply. We notified the CRD members that the sudden decline was brought about by specific areas and specific industries.

### Case 3: Recent Validation

We next use validation to explore the factors that cause deterioration in the accuracy ratios. We identified categories with particularly low accuracy ratios. One was sales volume and the other was the age of the SME.

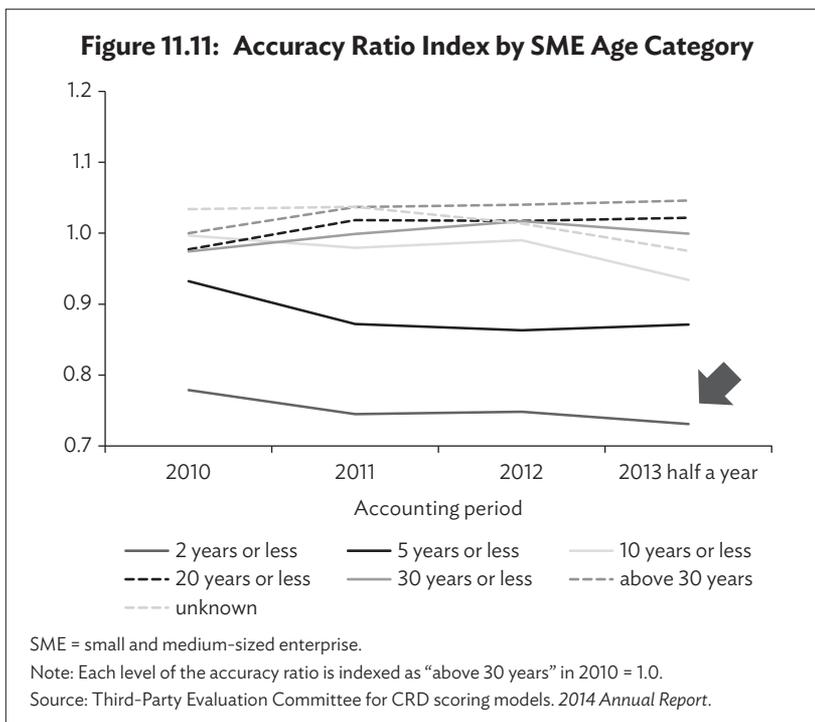
We calculated the level of the accuracy ratio at each category of sales volume (Figure 11.10). For sales volumes less than ¥100 million, the level of the accuracy ratio is continuously low. The level of the accuracy ratio in the lowest category, ¥30 million or less, is particularly low.



We calculated the level of the accuracy ratio at each age category of SMEs (Figure 11.11). The accuracy ratio was continuously low for SMEs younger than 5 years. The ratio was especially low for the lowest category, 2 years or less.

The categories with lower sales volumes and shorter periods show sustained low values of the accuracy ratio. However, it is often true that younger SMEs have lower sales volumes. We expect that the sales volume and the period of doing business are dependent on each other to some extent.

We conclude through the investigation of segmented group data that the length of the period of business practice is a fundamental factor. Members can find this information useful for designing new scoring models.



## 11.7 Concluding Remarks

Anonymous databases such as the CRD are uncommon in other countries. Initially, CGCs throughout Japan formed CRD’s core members, and were then joined by a large number of financial institutions. Accordingly, the CRD grew to become an extensive database.

The CRD collects anonymous data. Because of this, it is free from the constraints imposed by privacy issues and it is comparatively easy to develop a deep and rich database that enables more value-added services. Anonymous data collection also ensures that users cannot be identified or discriminated against by others, so it is easy to encourage members to send data to the CRD. This data collection system has made the CRD an incomparably large database, and the CRD endeavors to maintain the high quality of data. These characteristics in turn allow the creation of reliable scoring models from the database. In addition, the CRD strives to maintain the quality of scoring models and continues to provide members with other and new valued-added services. Thus, the CRD can provide a model to support the establishment and improvement of similar databases and services in other Asian countries.

Considering the importance of SMEs in employment, their share of gross domestic product, and the number of SMEs in Asian economies, further efforts need to be made to offer them access to finance. Although banks are the main source of financing for SMEs, these firms are difficult to evaluate since they often do not have solid accounting systems. As a result, many SMEs in Asia borrow at high interest rates or need to offer collateral. If banks can obtain better information on SMEs and mitigate the problem of asymmetric information, SMEs can raise money more easily at lower cost. Creating databases like the CRD may be one of the solutions for this. Credit risk databases have many benefits, and by improving the efficiency of lending to SMEs, they can help to foster economic growth and development in individual countries and throughout Asia.

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# 12

## Credit Surety Fund: A Credit Innovation for MSMEs in the Philippines

*Gary V. Maningo*

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### 12.1 Introduction

The Credit Surety Fund (CSF) is a credit guarantee program in the Philippines initiated by the Bangko Sentral ng Pilipinas (BSP), the country's central monetary authority, to help micro, small, and medium-sized enterprises (MSMEs) gain access to credit. It improves the bankability and creditworthiness of capital-short enterprises, including cooperatives, which have difficulty in obtaining bank loans due to lack of collateral, credit information, and an established credit track record. The CSF is financed by the pooled contributions of various stakeholders, including cooperatives, local government units, and government financial institutions (Land Bank of the Philippines, Development Bank of the Philippines, and Industrial Guarantee and Loan Fund). The pool of funds serves as security for loans to enterprises from banks in lieu of conventional collateral.

The beneficiary of the program is the MSME sector, which is an important driver of the Philippine economy owing to its large contribution in terms of jobs generated and by the sheer number of enterprises, which make up more than 99% of all registered firms nationwide. However, studies indicate that one of the key factors inhibiting the development of MSMEs is the lack of access to finance, particularly loans.

Unlike conventional credit guarantee schemes, the CSF has a broader range of funding sources, with partnerships with local government units, government financial institutions, cooperatives, and private banks. The program is national in scope but implemented locally.

A fund may be organized in a specific city or province, or in partnership with a particular local government unit. Such a CSF is a separate entity with regard to other CSFs, and has its own set of officers.

Since 2007, the CSF has been growing rapidly with 37 individual CSFs in operation at the end of 2014. Funding contributions have reached \$10.5 million and total accumulated approved loans have reached \$33.8 million. Of total approvals, \$27.8 million has been released to 14,434 MSMEs.

There remain key challenges to be addressed including the institutionalization of the program, more rapid processing of loan applications, and increases in the quality of credit information. In any case, the CSF has proven to be successful and has plans and strategies to further improve its operations and expand coverage to establish more local CSFs, expand the portfolio of loans covered, and increase the number of MSME loan beneficiaries.

## 12.2 Micro, Small, and Medium-Sized Enterprises as Key Drivers of the Philippine Economy

Small businesses play a vital role in reducing poverty, creating jobs, and promoting inclusive economic growth. MSMEs are often dubbed as the drivers of the Philippine economy as they continue to dominate the business sector in terms of the number of establishments and jobs created.

As provided in the Republic Act 9501, MSMEs are defined as business entities, whether single proprietorship, cooperative, partnership, or corporation. Size is based on assets and ranges from up to \$66,667 for micro, up to \$333,333 for small, and up to \$2.2 million for medium-sized businesses (Table 12.1).

**Table 12.1: Definitions of Micro, Small, and Medium-Sized Enterprises according to Asset Base**

Type of Enterprise	Asset Base
Micro enterprise	\$0 to \$66,666
Small enterprise	\$66,667 to \$333,333
Medium-sized enterprise	\$333,334 to \$2.2 million
Large enterprise	Above \$2.2 million

Source: Philippine Government. 2008. Magna Carta for Micro, Small and Medium Enterprises (Republic Act 9501), Sec. 3.

About 99.6% (940,921) of registered firms nationwide are classified as MSMEs and the remainder is made up of large enterprises (Philippine Statistics Authority 2013). In itself, the figure appears staggering but when one considers the total population of the Philippines, which now stands at 100 million, this is only 1 enterprise for every 100 Filipinos and is lower than most other Asian countries.

The MSME sector is the biggest employer with about 62% of the workforce working for an MSME. Thus, they play a very important role in providing employment in both rural and urban areas and contribute to equitable income distribution. They account for 35.7% of gross domestic product (GDP) (Department of Trade and Industry 2013). The Philippine government and stakeholders hope to increase the GDP contribution to 40% by the end of the current MSME Development Plan (2011–2016) so that it is on par with neighboring countries (MSMED Council n.d.).

As inviolable as they may seem, the fact is that many MSMEs in the Philippines remain fragile, immature, and undeveloped. There is a need for them to realize their full potential and enhance their competitiveness. This can be achieved in part by providing sustainable and effective support mechanisms, such as access to credit, through the assistance of the government and the private sector.

## 12.3 Access to Finance: A Key Growth Factor

### 12.3.1 Current Scenario

Survey data from the Philippine National Strategy for Financial Inclusion indicate that 47% of adult Filipinos borrow money, but most loans come from informal sources like family and friends (62.0%) and informal lenders (10.0%). Formal institutions provided a much smaller share, including lending and financing companies (12.0%), cooperatives (10.5%), microfinance nongovernment organizations (9.9%), and banks (4.4%). More than 85% of the survey's respondents indicated that they wanted to access financial services from formal institutions.

Insufficient lending to the enterprise sector constrains economic development. Only 13% of Filipino SMEs have access to bank loans to finance investment and working capital, considerably lower than in other Asian countries. Only 6% of capital formation is financed by banks and another 6% is funded by other external sources. Increasing the level of externally funded capital in Filipino SMEs from 12% to 50% could create 7 million additional jobs (Bridge Financial Services 2010).

A recent report by the Asian Development Bank and Asian Development Bank Institute indicates that SME loans in the Philippines were equal to only 3.1% of GDP—the second lowest in Southeast Asia after Myanmar. It also lagged behind its neighbors in terms of the share of SME loans to total loans at 10.3% (ADB and ADBI 2015). These indicators suggest that more needs to be done to channel finance to enterprises in the Philippines.

### 12.3.2 Philippine MSME Development Plan

The Philippine MSME Development Plan (2011–2016) considers access to finance as a critical factor affecting global competitiveness. Access to finance is the sustained availability of reasonably priced, socially responsible, and environment-friendly financial products, services, and support programs that are designed for MSMEs and that MSMEs can conveniently and readily access. Some of the important stakeholder concerns regarding access to finance and indicated in the MSME Development Plan are synthesized in Table 12.2.

**Table 12.2: Synthesis of Access to Finance Concerns**

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1. Funds are available but micro, small, and medium-sized enterprises (MSMEs) find these difficult to access because of stringent and voluminous documentary requirements as well as the slow processing time of their loan applications.
  2. MSMEs find it difficult to borrow funds from banks because of the collateral requirements.
  3. MSMEs find the minimum loan amount requirement and the short repayment period restrictive.
  4. The financial packages for MSMEs in several regions are only available in urban areas.
  5. There is a mismatch of financing programs for MSMEs. MSMEs in several regions lack the capacity for financial management.
  6. MSMEs in several regions do not have the capacity to borrow from formal sources.
  7. MSMEs do not have access to venture capital funds.
  8. It is difficult to restructure loans.
  9. MSMEs have limited access to information regarding the sources of funds for MSMEs and on how to access these funds.
  10. Financial institutions do not consider the environment when they lend to MSMEs.
  11. The interest rate charged by financial institutions to MSMEs is very high.
  12. There is lack of government financial support to MSMEs.
  13. Banks in several regions are not keen on lending to MSMEs.
  14. Policies related to access to finance are not gender-responsive.
  15. There are no funds available for start-up MSMEs in several regions.
  16. Government-owned and -controlled corporations' funds for MSMEs are not well utilized.
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Source: Micro, Small, and Medium Enterprise Development (MSMED) Council. 2012. MSME Development Strategy, p. 22. MSMED Council MSME Development Plan 2011–2016.

The same plan also outlined eight result statements (Table 12.3) describing a level of access to financing to realize the MSME development goals (MSMED Council 2012).

**Table 12.3: Access to Finance Outcome Portfolio**

1. The financial products, services, and support programs that MSMEs need are sustainably available and accessible even for start-up MSMEs and those in the countryside.
2. The cost of obtaining MSME loans is reasonable and affordable.
3. The requirements that MSMEs need to comply with to obtain loans are reasonable and manageable.
4. The process that MSMEs need to follow and documents that must be submitted to obtain loans are simplified and streamlined.
5. MSMEs are trained in financial management and are able to understand and speak the language of financial institutions, while financial institutions are trained to understand and speak the language of MSMEs.
6. Financial products and services for MSME lending are gender-responsive and environment-friendly.
7. The information needed by MSMEs to access financial resources is available and easily accessible.
8. The assistance extended by stakeholders to MSMEs in accessing funds is coordinated, responsive, and effective.

MSMEs = micro, small and medium-sized enterprises.

Source: Micro, Small, and Medium Enterprise Development (MSMED) Council. 2012. MSME Development Strategy, p. 28. MSMED Council MSME Development Plan 2011–2016.

### 12.3.3 The Financial Gap

It is convenient to think that banks and other financial institutions should step in and solve this problem right away. Liberalize policies and rules if needed. But for banks, lending to MSMEs is a challenge due to the lack of qualified collateral, a good credit history, and quality credit information that enables them to determine creditworthiness (Table 12.4). Simply put, the credit risk involved is too high for most banks.

Thus the financing gap prompts MSMEs to rely on informal sources of financing—families and relatives. They also rely on moneylenders who provide the infamous “5–6 financing” with very high interest rates and other unfavorable terms. It is called “5–6 financing” because for every \$5 borrowed over a period of say 1 week, the borrower must repay \$6, thus an interest payment of \$1 or 20%. Collection of payment is also made daily, which makes the arrangement burdensome for the borrowers.

**Table 12.4: Factors Affecting the Financial Gap**

Banks	MSMEs
Fear of unsecured loans	Lack of acceptable collateral
Prefer big loans	Lack of knowledge on credit sources and processes
High transaction cost	Fear of dealing with banks
Lack of credit information	Onerous documentation requirements

Source: Author.

There are several factors that contribute to the MSME financial gap. Primarily, there is a mismatch between the needs of MSMEs and the supply of financial services. This explains why lending to MSMEs is low.

MSMEs' limited access to financing is a result of a mismatch between their needs and what banks are willing to provide. On the supply side, banks avoid providing financing to MSMEs due to lack of collateral and a repayment track record. The lack of credit information also deters banks from lending to MSMEs as it is more difficult to determine their creditworthiness; hence, the risk is high. Moreover, the cost of obtaining credit-related information is high due to inconsistent financial statements and audits, and the lack of reliable third-party sources of quality credit information.

On the demand side, MSMEs are unable to qualify for credit primarily due to lack of acceptable collateral such as real estate. MSMEs may also be unable to comply with strict loan documentation requirements. Instead, most MSMEs rely on internal sources of financing while some go to informal sources that charge high interest rates. This financial environment is unlikely to sustain the growth of the sector. MSMEs need to be creditworthy and bankable.

### 12.3.4 Compliance with the MSME Magna Carta Law

The Philippine government has not been indifferent to finding solutions to the problem of SME finance. In 2008, the Republic Act 9501, otherwise known as the Magna Carta for MSMEs, was passed and declared that the state shall promote, support, strengthen, and encourage the growth and development of MSMEs and shall ensure that MSMEs' continuing viability and growth are attained by (i) facilitating access to finance, (ii) complementing and supplementing financing programs and eliminating stringent and burdensome collateral requirements, and (iii) instituting safeguards for the protection and stability of the credit delivery system.

An important feature of the law is the mandatory allocation by all lending institutions of at least 8% of the total loan portfolio to micro and small enterprises and 2% to medium-sized enterprises. The objective of the law is to force banks to lend to MSMEs. If they do not meet the prescribed levels, the lenders must pay a penalty.

While the objective of the law is laudable, the results have been discouraging. At the end of 2014, banks lent on average only 4.9% of their portfolio to micro and small enterprises, much below the 8.0% threshold and lower than the previous year (5.6%). The difference between what was lent and the threshold amounted to \$2.76 million. A significant number of banks did not achieve the mandatory lending requirement and many simply opted to pay the penalty (\$11,111 per bank) rather than assume the risk of financing MSMEs. Regarding the 2.0% requirement for medium-sized enterprises, there was over compliance, with the average reaching 6.1% (BSP Supervisory and Examination Sector Supervisory Data Center 2015) (Table 12.5).

**Table 12.5: Compliance with MSME Loan Requirements, Philippine Banking System**  
(% as of year-end)

	2008	2009	2010	2011	2012	2013	2014
A. Micro and small enterprises	10.0	9.7	8.5	7.6	6.4	5.6	4.9
B. Medium enterprises	9.0	8.2	7.9	7.6	6.9	6.1	6.1

MSMEs = micro, small and medium-sized enterprises.

Source: Data obtained from the Supervisory Data Center, Supervisory and Examination Sector, Bangko Sentral ng Pilipinas.

## 12.4 Brief Overview of the Credit Surety Fund

### 12.4.1 Conceptualization

The BSP has a constitutional mandate to provide policy direction in the area of money, credit, and banking. Legislative endeavors to specifically encourage finance to MSMEs include the Magna Carta for MSMEs, the Barangay Micro Business Enterprises Act,<sup>1</sup> and others. The CSF is an additional initiative in this area and was launched in 2008 in the province of Cavite.

<sup>1</sup> Republic Act No. 9178, also known as the Barangay Micro Business Enterprises (BMBEs) Act of 2002, promotes the establishment of BMBEs and provides for related benefits such as tax incentives and financial support.

The CSF is of national relevance but it is implemented at the provincial and city levels for greater flexibility, more efficient administration, and easier access and reach to the end beneficiaries, which are cooperatives and MSMEs in the countryside. The Credit Innovation and Advancement Group of the BSP Department of Loans and Credit is in charge of promoting, organizing, monitoring, and supporting capability enhancement for CSFs. BSP provides the support necessary to expand the program and make it more sustainable by (i) providing capability building training programs to stakeholders and beneficiaries and (ii) providing liquidity support to the banking industry by making loans covered by the CSF re-discountable under its regular rediscounting facility.

### **12.4.2 The Credit Surety Fund at a Glance**

The CSF is a credit guarantee system for MSMEs experiencing difficulty in obtaining bank loans due to their lack of acceptable collateral, credit knowledge, and credit track record. The CSF provides security (i.e., a guarantee) on bank loans to MSMEs in lieu of collateral. The guarantee reduces the risk to the bank of lending to these enterprises. The CSF program also provides capacity building to address concerns regarding the borrower's lack of knowledge on credit sources and processes with regards to MSME or business loans.

### **12.4.3 Types of Credit Guarantee Systems**

There are different types of guarantee systems, distinguished not by terminologies but generally by purpose and the type of ownership. Five major types of guarantee systems can be identified: mutual guarantee associations, publicly operated national schemes, corporate schemes, bilateral or multilateral cooperation schemes, and nongovernment organization (NGO) schemes. Schemes can be divided according to the operational mechanism used (i.e., selective, portfolio, or intermediary approaches) (Green 2003).

In the Philippines, the existing guarantee systems are publicly operated national schemes that are owned by the government and operated by an agency or unit of government or by an entity with a separate juridical entity but organized by the government. The system requires periodic appropriations of public funds, such as continued subsidies or a fixed fund.

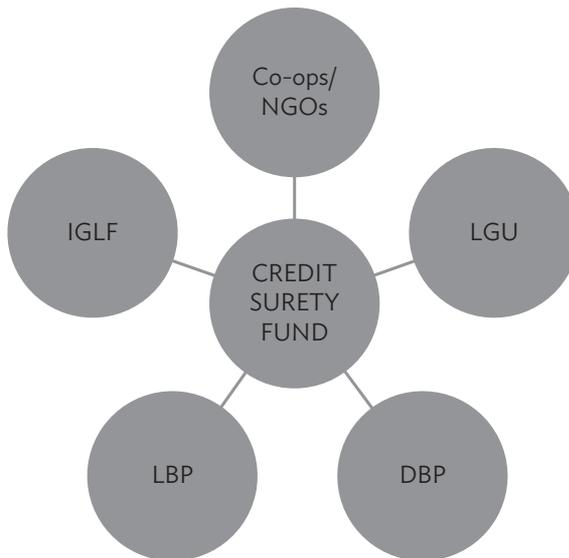
But the CSF is a unique hybrid type of guarantee, as it combines the features of other schemes (mutual guarantee associations, corporate guarantee schemes, and public guarantee schemes). The CSF is based on

partnership and cooperation among different stakeholders, both public and private, including cooperatives, NGOs, associations, and the MSMEs themselves. This broad membership makes the CSF more expansive and flexible in catering to the varying needs of MSMEs.

#### 12.4.4 Creation and Organization

The creation of the CSF stems from the *bayanihan*—a Filipino custom referring to the spirit of communal unity, work, and cooperation to achieve a particular goal. The fund is generated from contributions of the cooperatives and nongovernment organizations with counterpart funding from the local government units. Other government financial institutions are also part of the program: the Development Bank of the Philippines, the Land Bank of the Philippines, and the Industrial Guarantee and Loan Fund. The contributions are placed in a trust fund managed by a trustee bank and used as a guarantee for MSME loans (Figure 12.1).

**Figure 12.1: Composition of a Credit Surety Fund Organization**



DBP = Development Bank of the Philippines, IGLF = Industrial Guarantee and Loan Fund, LBP = Land Bank of the Philippines, LGU = local government unit, NGO = nongovernment organization, Co-ops = cooperatives.

Source: Author.

### 12.4.5 Participation in the CSF Program

Only well-capitalized and well-managed cooperatives that are organized under the provisions of Republic Act No. 9520 (otherwise known as the Philippine Cooperative Code), including cooperative banks and NGOs, may contribute or invest in the CSF. In order to be considered as well-capitalized, a cooperative must have an adjusted capital of at least \$22,222<sup>2</sup> and an adjusted capital-to-asset ratio of at least 15%.<sup>3</sup> The minimum contribution to the fund is set at \$2,222.

### 12.4.6 Oversight Committee

The CSF is governed by the Oversight Committee, of which a majority of the members are elected by member cooperatives and NGOs and ex-officio members representing the local government units and other institutions. Similar to a board of directors, the Oversight Committee is responsible for proper administration and overall management. It formulates rules and regulations governing CSF operations, provides criteria for admission of new members, issues surety cover, decides on the investment policies, and selects the trustee bank.

### 12.4.7 Trust Fund

The funds generated provided by the stakeholders are deposited in a trustee bank. The trustee bank administers the fund and invests it in safe investment securities such as government treasury bills and bonds. This fund will be used as security or collateral for MSME loans.

### 12.4.8 Qualified Borrowers and Beneficiaries

As provided in BSP guidelines, two types of borrowers are qualified to apply for surety cover under the CSF program:

- (i) contributor-cooperatives or NGOs engaged in any business activity, or
- (ii) MSMEs that are members in good standing of a contributor cooperative or NGO.

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<sup>2</sup> Adjusted capital computed as total equity minus all past due loans and loans under litigation (net of allowance for probable losses), plus dividends payable.

<sup>3</sup> Adjusted capital-to-asset ratio is computed as adjusted capital divided by adjusted total assets (computed as total assets less past due loans and loans under litigation net of allowance for probable losses).

Further, an MSME borrower must be endorsed by a cooperative that is a member of CSF in order to qualify for the program. In case the end-user borrower is a primary cooperative and the purpose of the loan is for its own business activity, including relending to its members, the endorsement is provided by a secondary cooperative or federation or other member cooperatives, or directly by the Oversight Committee.

The loan of the end-user borrower must be used for productive activities such as additional working capital, acquisition of equipment, purchase of goods, additional inputs for agricultural and commercial projects, and lending.

### 12.4.9 Loan Capacity and Other Limitations

The BSP guidelines and CSF internal rules and regulations require that in providing surety, CSF will implement the following to two risk management and prudential measures:

- (i) The aggregate amount of loans covered by the surety undertaking of the endorsing cooperative may not exceed 10 times the amount of the cooperative's contribution to the fund.
- (ii) The aggregate amount of outstanding loans granted by all participating banks shall not exceed 5 times the outstanding aggregate amount of contributions to the CSF by all cooperatives, (local government units), other government agencies, and nongovernment organizations or entities.

### 12.4.10 Mechanics in Access and Collection

**Obtaining CSF coverage.** To obtain CSF coverage, a three-tier evaluation process is used involving the cooperative, the CSF Oversight Committee, and the lending bank: (i) the cooperative evaluates the loan and endorses it to the Oversight Committee, (ii) the Oversight Committee evaluates the loan and if appropriate issues surety cover in favor of the borrower to the participating bank, and (iii) the lending bank receives the loan application supported by surety cover and releases the loan directly to the MSME borrower or through the cooperative.

**Collection Process in Case of Default.** The collection process in case of default reverses the three steps in loan assessment discussed above. First, the lending bank files a claim against the CSF after the loan has become past due following the guidelines prescribed by the BSP on the definition and treatment of past due loans. Second, after reviewing the validity of the bank's claim and completion of the submitted documents, the Oversight Committee pays the lending bank. Third, after paying the

claim of the lending bank, the CSF endorses to the original endorsing cooperative or NGO the claim, together with the loan and other documents received from the lending bank, for collection. Any payments made by the end-user borrower on the past due loan to the endorsing cooperative must be remitted to the CSF.

### **12.4.11 Other Important Features of the CSF**

There are three other interesting features of CSF. First, a cooperative may endorse loans or directly borrow from CSF up to a value that is 10 times its contribution to the fund. Second, the CSF covers 80% of the loan value at inception but coverage rises to 90% when 30% of the loan has been repaid. Coverage rises further to 100% once 60% of the principal has been repaid.

Third, although the fund is a nonprofit endeavor, the CSF and the endorsing cooperatives may charge an annual surety fee of up to 5% of the loan value. This fee is in addition to the interest charged by the bank. Some CSFs charge as low as 1% depending on the risk exposure and risk appetite. CSFs may charge 5% for riskier loans, which adds significantly to the cost of the loan for the borrower.

## **12.5 Other Credit Guarantee Schemes in the Philippines**

There are five other guarantee schemes in the Philippines. Two of these—the Industrial Guarantee Loan Fund (IGLF) and Small Business Corporation—serve a purpose similar to the CSF and are discussed below. The three other schemes are not focused on MSMEs. The Philippine Export-Import Credit Agency provides support for exporters, whereas the agriculture sector is served by the Agricultural Guarantee Fund Pool and the Quedan and Rural Credit Guarantee Corporation.

The IGLF is currently managed by the Development Bank of the Philippines (DBP) and was previously under the BSP. Its primary target is the MSME sector. It has not provided direct guarantees for quite some time. Instead, it provides wholesale loans through DBP to banks and other financial institutions for relending to MSMEs. It also provides retail loans facilitated by DBP directly to MSMEs. It has very few personnel and they are detailed from DBP. It maintains a single office in Manila and has no regional operations. However, IGLF is a pioneer stakeholder in the CSF with a total contribution of \$1.7 million. The IGLF received an award from the BSP as the CSF's most outstanding

partner because it provides additional funding for capacity building training activities and seminars for the benefit of program beneficiaries.

The Small Business Corporation's primary mandate is also to support and develop the MSME sector. Its public guarantee scheme is among the most active and is wider in scope because its services are directed toward the MSMEs themselves. It maintains satellite offices in the Visayas and Mindanao regions.

Before the CSF began, the Small Business Corporation was the most prevalent guarantee scheme in the Philippines. It is organized as a government corporation and is fully funded by the national government with seed capital of \$22.2 million and current capital of \$42.2 million. Its services go beyond providing credit guarantees and include direct and indirect lending, financial leasing, secondary mortgages, venture capital operations, and the issuance of debt instruments for compliance with the mandatory allocation provision.

Its credit guarantee portfolio was \$4.6 million in 2014, benefiting only 119 MSMEs, whereas its wholesale and retail lending portfolio was \$16.2 million. The number of its MSME borrowers was 1,253. Also, microfinance wholesale lending reached \$28 million in the same year. The Small Business Corporation is more focused on lending than on providing credit guarantees.

Its limited funding and capitalization also limits its capacity to grow its portfolio and help more MSMEs. Jesus Tambunting, chair of the Small Business Corporation, is aware that there is a problem with its credit guarantee facility. He recently stated, "We already have a guarantee program but we have not fully developed it. Not many banks can make use of it. I think we have to review it and see if we can make it even more attractive so that more banks can make use of that guarantee" (Mirafflor 2015).

The CSF and the Small Business Corporation could augment and complement each other in supporting credit to MSMEs. However, the two organizations work differently in some ways. For example, the CSF is not a wholly owned government corporation, but a public-private partnership, with funds coming from the government and private sector. Other notable differences are provided in Table 12.6.

In legal terms, there are significant differences between a guarantee and a surety, and such differences probably make the latter more attractive to banks. With a surety, the entity that issues surety cover binds itself solidarily with the principal debtor; however, in a guarantee, the guarantor is only subsidiarily liable to the creditor if the borrower does not pay. Also, in case of default, the creditor has to exhaust all remedies of collection before the creditor can collect from the guarantor.

**Table 12.6: Comparison of Credit Surety Fund and Small Business Corporation Credit Guarantees**

	Small Business Corporation	Credit Surety Fund
Originator	National government (Department of Trade and Industry)	BSP
Funders	Government and international NGOs	Local government units, GFIs, NGOs, cooperatives
Type of Coverage	Guarantee	Surety
Coverage Ratio	80%	80% but 100% of the remaining balance if 60% of principal is paid
Co-guarantor/Surety	None	Endorsing cooperative or NGO

BSP = Bangko Sentral ng Pilipinas, NGO = nongovernment organization, GFI = government financial institutions.

Source: Author.

## 12.6 Benefits of the Credit Surety Fund

### 12.6.1 MSMEs

Through the CSF program, a share of MSMEs now have easier access to formal financing. MSMEs are made bankable and enjoy significantly lower interest rates than those charged by informal sources. This allows MSMEs to compete with large firms on a more level playing field. MSMEs can also benefit from the Capability Enhancement Program through training and seminars in the areas of management, marketing, and finance (discussed in section 12.14).

### 12.6.2 Cooperatives and NGOs

Cooperatives and NGOs play a vital role in the operation of CSFs. These groups address the gap separating MSMEs and the banking community. Cooperatives are ideally suited as key partners in the program design because they are owned and run by MSMEs. Apart from that, the statistics are enormously favorable, given that there are more than 23,000 cooperatives in the Philippines with total membership of 12 million people. However, cooperatives have limited funds to serve the credit needs of their members. Instead of denying their members the much-needed credit, the cooperatives can endorse the loans to the CSF. In this way, the CSF benefits the participating cooperatives by providing their members of good standing with access to bank credit.

By participating in the program, cooperatives may expand due to an increase in membership. Cooperatives can also benefit from training under the Capability Enhancement Program.

### 12.6.3 Banks

The CSF helps banks comply with the credit allocation requirements micro and small enterprises. It significantly reduces credit risk as the CSF substitutes for hard collateral. Further, banks can avail themselves of the BSP's rediscounting facility for loans covered by the CSF.

### 12.6.4 Local Government Units

Local government units will now have a mechanism to address the need of small entrepreneurs in their area. The CSF encourages more business activity, which may create more jobs, raise tax revenue, and improve the local economy.

## 12.7 The CSF Complements Existing Microfinance Programs

Microfinance is the provision of financial services to the poor and low-income people. From an earlier loan ceiling of \$3,333, the BSP has raised it to \$6,666 on microfinance loans under the new rules contained in BSP Circular 744 allowing some authorized banks to offer bigger loans to clients seeking to expand their businesses. These loans are generally unsecured and provided to households and microenterprises.

Despite relaxed regulations, noncollateralized microfinance loans offered by banks are expensive, with interest rates ranging from 2% to 4% per month (or 24% to 48% per annum). Some banks require collateral for microfinance loans. Philippine banks generally remain conservative despite liberalization of banking rules. In any case, the issue of collateral requirement can be addressed by the CSF program.

The CSF covers a wide spectrum of loans, from microfinance loans to wholesale loans to traditional lending by banks. By doing so, it can provide financing to the “missing middle”—enterprises whose needs are too large for microfinance and too small to obtain bank financing on their own.

Table 12.7 details how the CSF complements existing microfinance programs.

**Table 12.7: Microfinance and Credit Surety Fund**

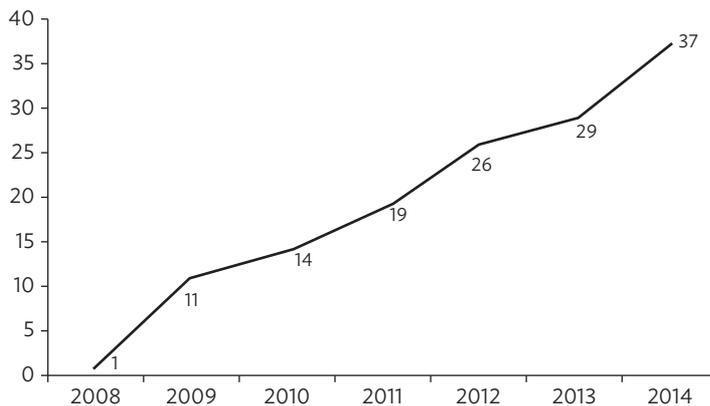
Microfinance	Credit Surety Fund
Loan limit up to P300,000 (\$6,666)	Amount of loan depends on the borrowers' capacity to pay and viability of the business.
Relatively higher market interest rates	Other banks (e.g., Development Bank of the Philippines) are putting a cap of 12% per annum on passed-on interest rates. Lending banks are encouraged to charge reasonable interest rates on surety-covered loans granted to micro, small, and medium-sized enterprises.
Higher costs (e.g., administrative, provisions for losses and funding)	Participating banks offer lower interest rates due to availability of Credit Surety Fund as collateral.
Limited to banks and financial institutions under Bangko Sentral ng Pilipinas	Cooperatives and nongovernment organizations are involved as conduits.

Source: Author.

## 12.8 The Growing CSF Community

Since its inception in 2008, the CSF program has expanded rapidly to 37 individual CSFs at the end of 2014 (Figure 12.2). They are spread throughout the country with 18 in the Luzon region, 7 in the Visayas, and 12 in Mindanao. More were expected to be launched in 2015.

**Figure 12.2: Number of Credit Surety Funds Established in the Philippines as of 31 December 2014**



Source: Author.

In terms of funding, the total trust fund pledges amounted to \$12.88 million, of which \$10.49 million had been fully paid by the partner organizations at the end of 2014 (Table 12.8).

**Table 12.8: Summary of Cumulative Paid Contributions**  
(\$ million)

Fund Contributors	2013	2014
Cooperatives and nongovernment organizations	2.89	3.77
Local government units	2.28	2.63
Land Bank of the Philippines	1.14	1.41
Development Bank of the Philippines	0.85	0.98
Industrial Guarantee and Loan Fund	1.47	1.70
<b>TOTAL</b>	<b>8.63</b>	<b>10.49</b>

Source: Bangko Sentral ng Pilipinas, Department of Loans and Credit. 2015. CSF Annual Status Report as of 31 December 2014. Manila.

## 12.9 MSMEs' Access to Loans through the CSF

From the inception of the program in 2008 to the end of 2014, total loans approved by banks under the CSF totaled \$33.83 million, of which \$27.78 million was released and supported access to finance by 14,434 borrowers. These borrowers constitute a small portion of the nearly 941,000 MSMEs in the Philippines and one may draw the conclusion that the CSF is underutilized and ineffective in reaching MSMEs. However, the CSF is demand driven and available to registered MSMEs that are unable to obtain formal credit. Unfortunately, there are no reliable statistics on how many of these enterprises there are. Hence, it is difficult to know whether the demand of unbankable MSMEs is being met by the CSF (Table 12.9).

**Table 12.9: Credit Surety Fund Loans Comparative Summary**  
(\$ million)

	Accumulated as of 2013	Accumulated as of 2014	Increase (Decrease)	
			Amount	%
Loans approved	23.74	33.83	10.09	42
Loans released	17.17	27.75	10.58	62

Source: Author.

Accumulated loans outstanding as of as 2014 was \$9.49 million, of which \$7.75 million was covered by the CSF. The difference, about 18%, is the risk exposure of the banks. Based on CSF guidelines, the maximum amount of total loans that can be covered by the CSF is about \$37.78 million. This is based on the lower amount calculated as either (i) 10 times the co-ops' paid-up contributions, which is currently \$3.77 million (i.e., \$37.78 million); or (ii) 5 times the CSF paid-up fund balance of \$10.49 million (i.e., \$52.44 million). Given that the outstanding loan balance now covered by surety is \$9.49 million, the CSF could still cover additional loans totaling \$28.22 million.

## 12.10 Diverse Profile of MSME Beneficiaries

The CSF program does not focus on a particular industry or purpose, as long as the borrower is an MSME or a cooperative. This liberal policy allows the program to reach a wide and diverse range of borrowers.

Loans for production of agricultural and industrial goods account for 29% of the CSP portfolio. Loans for retail and wholesale trading and services account for 27%. The remainder and the bulk of approved loans, 44%, went to other activities including loans to cooperatives for relending and/or rediscounting to various microentrepreneurs.

MSME lending under the CSF can also be classified by industry following the Philippine Standard Industrial Classification. Cooperatives and NGOs involved in financial activities, such as microfinance, account for the largest single share of lending (28%), followed by loans to MSMEs engaged in agriculture (25%) and in retail trade (22%).

## 12.11 Adherence to Quality Standards of Guarantee Schemes

To assess the sustainability of the CSF, the BSP conducted an evaluation of the program's adherence to quality standards and best practices of other successful guarantee schemes. For the evaluation it used a manual published in 2012 by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) titled *SMEs' Credit Guarantee Schemes in Developing and Emerging Markets* (Douette et al. 2012). The manual provides quality standards and guidance on how to set up and run a credit guarantee scheme for MSMEs. The manual was based on research of various guarantee schemes, in light of both positive and negative experiences.

### 12.11.1 Risk-Sharing Standard

Ideally, a guarantee scheme should provide for a risk sharing mechanism. A full guarantee can be an overly risky undertaking that puts extreme pressure on the trust fund. If the loan is unpaid, the lender (i.e., bank), under a full guarantee, does not bear any risk and would have no incentive to try to rescue the client or to initiate appropriate legal action. Further, the supervisory authority may find that the guarantor actually acts as a bank and is susceptible to creating a systemic risk, which would force the supervisory authority to apply more rigorous prudential rules, probably not different from those of financial institutions. The social goal of the instrument would vanish (Douette et al. 2012).

The CSF features a unique risk-sharing mechanism in which the lending bank and cooperatives share the risk. The CSF implements a basic risk-sharing ratio of 80% for CSF and 20% for the bank. For other schemes, the share guaranteed is generally above 50%, according to a World Bank study (Saadani et al. 2010). Therefore, the CSF cover rate of 80% is higher than some other guarantee schemes but the same as the standard indicated in the GIZ study.

Credit risk can also be transferred to the endorsing cooperative or NGO. Upon payment of a claim to the bank, the CSF may collect the same amount from the endorsing cooperative, thereby transferring credit risk. To mitigate the risk of noncollection, the CSF thoroughly screens the participating cooperatives, observing strict eligibility requirements as set out in the rules and regulations.

### 12.11.2 Adherence to Other Standards

The CSF program substantially complied with the other quality standards set out in the GIZ study. Examples are provided below.

Best practice requires that the guarantee should follow a stop-loss policy. CSF policy sets a borrowing limit of 10 times the cooperative's contribution to the CSF and total outstanding loans cannot exceed 5 times the total fund. Further, the CSF must stop issuing surety cover when the total outstanding past due loans ratio exceeds 10%.

The CSF also has a credible loan evaluation process that is observed diligently by trained loan officers and managers. The scheme provides additional credit protection by requiring borrowers to assign their share capital in the cooperative. The CSF also has readily available equity capital that is sufficient to meet current and possible financial obligations. The CSF undertakes conservative financial investments and sound liquidity management with the funds invested in safe and

income-yielding government securities. And finally, active participation of the private sector (i.e., cooperatives and NGOs) as contributors to the fund is important for the success of the CSF.

## **12.12 Risk Management**

The CSF adopts risk management practices that take into account all relevant risks that can threaten its sustainability:

### **12.12.1 Credit Risk**

The past due ratio at the end of 2014 increased slightly to 1.6% as compared with 0.6% the previous year. The past due ratio pertains to the past due loans claimed by the lending bank against the CSF over the total outstanding loan balance.

When all the claims are paid to the lending bank, there are no more past due loans and all the remaining outstanding loans are considered current. After payment, the CSF books a receivable from the endorsing or borrowing cooperatives, which are responsible for collecting defaulted loans from their member-borrowers. This counter guarantee mechanism and the relatively low past due ratio indicate low overall credit risk.

### **12.12.2 Risk Diversification**

The CSF has a diversified risk structure based on a large number of borrowers, geographic and industry spread, and varying maturities. Its portfolio is made up of 14,434 MSME borrowers, each with a bite-sized exposure, and the fortunes of these borrowers are not closely tied to one another. Geographically, the CSF program is established in different provinces and cities spread across the country. Loans are spread across different industries and economic activities, as noted previously.

### **12.12.3 Maturity Risk**

Longer-term loans are considered more risky than short-term loans. More generally, sound time diversification policy suggests that organizations should build portfolios not concentrated in particular maturities. For the CSF, 70% of the loans released are short-term with maturities of less than 1 year.

### **12.12.4 Liquidity Risk**

This is the risk that the entity will not have sufficient funds available to pay creditors and other debts. The current ratio of funds to liabilities is favorable at 139% while solvency risk is adequate with normal leverage ratio at 115% in 2014. The higher current ratio indicates that the CSF is liquid enough to pay creditors and other debts. Funds are invested in liquid short-term government securities.

### **12.12.5 Market Risk**

Losses may arise from changes in market conditions. Interest rates are a key market risk in which the value of a fixed income security will fall as a result of an increase in market interest rates. The primary purpose of the CSF is to enable MSMEs and cooperatives to access bank loans. It is not primarily an investment vehicle designed to general income; it is a nonprofit public-private undertaking. Although funds are invested in safe, secure, and at the same time income-earning investment securities such as government bills and bonds, generally, the primary concern of the CSF is the liquidity of the fund to meet potential obligations.

### **12.12.6 Operational Risk**

Operational risk is the risk of loss resulting from inadequate or failed processes, people and systems, or external events. Breakdowns in internal control and corporate governance are the major causes of operational risk. In general, the Oversight Committee is responsible for the proper administration and management of the CSF. CSF policies should ensure that members of the Oversight Committee act competently, objectively, and independently in making important decisions affecting CSF operations.

### **12.12.7 Strategic Risk**

Strategic risk is the level of certainty that an organization has adopted the right strategies to be successful and sustainable. The CSF risk management strategy is anchored on these four basic aspects: (i) avoid risk if necessary by choosing not to undertake some activities; (ii) transfer risk to other parties, such as cooperatives; (iii) mitigate risk through preventive and detective control measures; and (iv) accept risk, recognizing that undertaking certain risky activities can generate stakeholder value and achieve the purpose of the program.

## 12.13 Institutional Partners and Stakeholders

The CSF has benefited from the support of three key partners. The Land Bank of the Philippines is not only a donor but is also a lender to MSMEs and a trustee bank for local CSFs. It has been awarded with recognition as the Most Outstanding Program Partner and Outstanding Lending Bank for 2 years. A second partner is the Development Bank of the Philippines, which has been with the CSF program since it started in 2008. Apart from being a donor, it too has provided lending to MSMEs and trust fund services to local CSFs. Finally, the Industrial Guarantee and Loan Fund (IGLF) is another donor and has been very supportive in the implementation of capability enhancement training programs. Through the efforts and funding of the IGLF, many cooperatives and hundreds of MSMEs have benefited from the training programs.

## 12.14 Capability Enhancement Program

Aside from guaranteeing loans, CSF also delivers the Capability Enhancement Program, which consists of several training courses for cooperatives and MSMEs to improve their management. There are currently four main courses offered.

Credit Appraisal and Monitoring is a 6-day course aimed at enhancing the credit and risk management skills of cooperatives, particularly in evaluating loan proposals of their MSME members. The course is being implemented by the University of the Philippines Institute of Small-Scale Industries with funding by the IGLF.

Financial Management has 7 modules covering the basic competencies required from cooperative officers and MSMEs in managing their financial resources. It is also intended for the Oversight Committee members to develop their skills in risk management, internal controls, and audit. It replaced an earlier course, Appreciation of Financial Statements.

Entrepreneurship and Business Management is a short course intended to provide the target participants, particularly MSMEs and enterprising cooperatives, with the basic knowledge, skills, and competencies required of managers and business owners in engaging in entrepreneurial activities, developing business plans, and managing a business enterprise.

The Risk Management Seminar equips cooperatives and MSMEs with basic knowledge and skills in risk management. The Institute of Small-Scale Industries implements the seminar with funding from

the IGLF. Interesting topics in risk management include concepts, challenges and opportunities, tools, and strategies. The participants are also required to apply the knowledge gained from the lecture in a guided workshop to create and present a risk management plan.

## 12.15 Institutionalization of the CSF

For the past years, one of the most prevalent issues affecting the CSF has been the lack of legal personality, but this issue is now put to rest. On 6 February 2016, Republic Act 10744, otherwise known as the Credit Surety Fund Cooperative Act of 2015, earlier passed by the Philippine Congress took effect. With this new law, the CSF will not be just a mere program, but a duly recognized institution with separate juridical personality, fully supported by the Cooperative Development Authority, the BSP, Land Bank of the Philippines, Development Bank of the Philippines, Industrial Guarantee and Loan Fund, local government units, and other government agencies.

Under the new CSF law, the Cooperative Development Authority shall be in charge of registration, regulation, and supervision of all CSFs in the country. On the other hand, the BSP shall spearhead the promotion, encouragement, creation, and organizational development of CSF Cooperatives and facilitate the acquisition of technical assistance such as training and seminars in coordination with other public or private stakeholders.

Presently, a joint interagency CSF committee, composed of representatives from the Cooperative Development Authority, BSP, and the Department of Finance, has been formed to draft and promulgate the implementing rules and regulations of the CSF law.

## 12.16 Issues and Challenges

The CSF faces key challenges which, if addressed, would enhance its operations:

### 12.16.1 Delayed Processing of Loan Applications

The processing of loan applications by banks, whether covered by the CSF or under regular lending windows, is slow. Lack of staff (i.e., loan officers), voluminous documentary requirements, and stringent procedures are the common reasons. A World Bank study revealed that

the Philippines ranks third lowest worldwide, after Bangladesh and Pakistan, in terms of number of days to process SME loan applications. This highlights the inefficiencies of Philippine financial institutions, even with the presence of the CSF and other available guarantees (Beck et al. 2006).

### **12.16.2 Lack of Credit Information**

Another challenge is the lack of reliable, high-quality, and cost-efficient credit information to evaluate loan proposals. Credit information is a key factor in assessing and managing risk. A credit bureau would be very helpful in providing information on MSMEs and is essential to creating an enabling environment for the sector (Bennett et al. 2005).

### **12.16.3 Other Efforts**

The CSF can also be improved by strengthening certain key features. These include (i) expanding capability enhancement training and seminars to improve the capacity of banks and cooperatives in evaluating loan proposals; (ii) observing rigorous control measures through audit and monitoring activities to keep relevant risks to a minimum; (iii) improving loan processing procedures to decrease turnaround time without sacrificing prudent loan evaluation; (iv) conducting regular dialogues and meetings with program partners and stakeholders; and (v) undertaking promotional activities including business forums, symposiums, briefings, general assemblies, and press releases.

## **12.17 Conclusion**

The CSF has been performing well and according to expectations. Targets used as performance standards have been achieved. The CSF is financially sound with related financial risks maintained at minimum and tolerable levels. The program also adheres to quality standards on established credit guarantee schemes in areas such as risk management, credit policies, liquidity management, and private sector participation.

However, the CSF still faces several limitations and challenges, including its legal status and limited funding. Because of these factors, the CSF has not been able to extend its reach to the great majority of unbankable MSMEs. The share of total bank lending flowing to micro and small enterprises has decreased consistently in recent years to 4.9% and is much lower than the required 8.0%. To improve performance,

plans and strategies anchored in institutional change, aggressive promotional campaigns, and expanded capacity building activities for the stakeholders and borrowers are needed.

Nevertheless, the CSF program has provided support for MSMEs with a viable business plan to access formal credit without providing collateral. The much-needed credit provides them with an opportunity to grow, thus generating jobs and

contributing to inclusive economic growth. MSMEs need to be competitive in these challenging times, especially with the advent of the much-anticipated ASEAN Economic Community.

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PART III  
**Human Capital**

# 13

## Skills Training by SMEs: Innovative Cases and the Consortium Approach in the Republic of Korea

*Kye Woo Lee\**

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### 13.1 Small and Medium-Sized Enterprises and Development

In many developing countries, small and medium-sized enterprises (SMEs) play an important role in development. They contribute to a large part of output, employment, and growth. For example, in the Republic of Korea, SMEs currently account for about 99% of all enterprises, 88% of employment, and almost half of total outputs and exports. As such, SMEs are an important source of income and employment in the Republic of Korea, and this situation is similar in many developing countries, especially in Asia (ADB 2014).

Therefore, many governments have adopted targeted policy tools to promote SMEs as part of economic development strategies. The literature review suggests that targeted SME support policies have been justified by two arguments. First, SMEs make special contributions to developing economies in terms of growth, employment, productivity, and investment, and therefore merit special support. Second, SMEs face special challenges or jeopardies that do not apply to larger firms,

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so addressing these challenges or jeopardies “levels the playing field,” resulting in healthy competition, growth, and welfare improvement.

The literature and document reviews found inconclusive evidence for the first claim, but a wealth of support for the second (World Bank 2014). For example, small and young firms have higher job creation rates than large and mature firms. However, large and young firms have higher productivity growth than small firms. This finding suggests that while small firms employ a large share of workers and create the most jobs in developing economies, their contribution to productivity growth is not as high as that of large firms (Ayyagari et al. 2011).

## **13.2 Training as a Development Policy**

Ever since human capital theory was advanced in the early 1960s (Schultz 1961; Becker 1964) and the multilateral development banks launched their lending for human resources development, the governments of developing countries have increasingly emphasized human capital investment.

### **13.2.1 Financing of Training Programs**

General skills development has been promoted through education sector programs (such as vocational secondary schools and technical colleges), and firm-specific skills development has evolved into nonformal education or training programs. The training sector programs offer preemployment training for youths entering the labor market for the first time, retraining for unemployed adults or workers who intend to change occupations, and in-service training for employed workers. The preemployment and retraining programs have been undertaken by public sector agencies and often depend on ordinary budgets based on general revenues, which always have been constrained. In-service training programs have been the responsibility of enterprises, which aim to maximize short-term profits and are loath to invest in human resources on a long-term basis. Thus, financing has been recognized as a major impediment to skills development.

### **13.2.2 Training Levy System**

To mobilize more resources for various training programs, some developing countries launched innovative extra-budgetary programs, such as training levies, which imposed semi-taxes (0.5%–2.0%) on

the wage bills of enterprises, as in France in 1925 (Table 13.1). In the 1940s, Latin American countries, with the technical assistance of the International Labour Organization (ILO), established semiautonomous national training institutions, such as SENAI and SENAC in Brazil and SENA in Colombia. Training levies were collected by the social security authority and transferred to the national training institutions. With this independent source of finance, training programs prospered. Other developing countries in Latin America and other regions soon followed the model, and the training levy has become a popular method of financing national training programs in many developing countries.

The training levy system was successful in mobilizing independent and extra-budgetary resources for training. The extra resources have been channeled mostly to the national training institutions and the

**Table 13.1: Financing of In-Service Training**

Country	Levy System	Levy System with Exemptions/ Deductions	Levy Grant System	Levy Rate (%)
Argentina		Yes		1.0
Bahrain	Yes			1.0–3.0
Brazil	Yes			1.5
Cote d'Ivoire		Yes		0.4–1.6
France		Yes		1.5
Hungary			Yes	1.5
Kenya			Yes	1.0
Korea, Rep. of			Yes	0.1–0.7 <sup>a</sup>
Malaysia			Yes	1.0
Mauritius			Yes	n.a.
Morocco	Yes			1.6
Nigeria			Yes	1.25
Singapore			Yes	0.25 <sup>b</sup>
South Africa			Yes	0.5–2.0
Tanzania			Yes	2.0
Turkey	Yes			n.a.
United Kingdom			Yes	1.5–2.5 <sup>c</sup>

<sup>a</sup> 0.25%–0.85% since 2006.

<sup>b</sup> Minimum \$2.00, maximum \$11.25 monthly.

<sup>c</sup> Discontinued in the 1990s.

Source: Author.

expanded public training programs, covering even the training needs of disadvantaged groups, the unemployed, and small employers.

However, the training levy system often failed to stimulate employers' interest in worker training. Moreover, the expanded public training programs tended to crowd out nongovernment training entities and programs, as in Kenya and Tanzania (Adams and Fretwell 1997), and become more supplier-oriented and less relevant to the needs of employers, as in Brazil. As the independent resources accumulated, the national training entities tended to become complacent and authoritative in offering their training programs, and even spent the funds on non-training programs or training programs not related to the sectors (mostly industries) from which the revenues were levied, such as agriculture, construction, and the self-employed, as in Colombia (Glasskov 1994). The training levy system became bureaucratic and costly in collecting levies and operating training programs. It even became a source of corruption for public officials when the system allowed exemptions or deductions of the levies for those enterprises carrying out training programs for their workers.

### 13.2.3 Training Levy Grant System

To overcome the disadvantages of the training levy system and adjust to the changing needs of the macroeconomic environment, some developing countries transformed the levy system into a levy grant system (e.g., the Republic of Korea, Malaysia, and Singapore). Instead of channeling the payroll levy revenues into public training programs, the levy fund reimburses or rebates the training costs incurred by enterprises. The advantage of this system is that it encourages employers to voluntarily offer in-service training for their workers, either through in-house training programs or external training programs purchased from recognized training institutes, by rebating the enterprise's training expenses as a grant. In this way, the training levy fund can be used to benefit enterprises that pay training levies, and training programs can be more demand-driven to meet the needs of those enterprises.

Indeed, a greater number of enterprises have benefited from this levy grant system than from the levy system, and more workers have been trained on account of the levy grant system. For example, in Singapore, where the Skills Development Fund was established in 1979 to provide incentives for development of higher-level skills needed for economic restructuring, the number of trained workers tripled and the number of enterprises benefiting from the fund more than doubled by 1991 (Dar et al. 2003).

Also, mobilization of training levies has become more efficient under the levy grant system. Corruption and irregularities can be avoided since all enterprises are obligated to pay the training levy first, irrespective of the existence of their plan for training workers and training expenses incurred are reimbursed from the training levy fund. No special exemptions or discounts of training levies are needed.

Moreover, training programs have become more relevant since they are organized or purchased by the enterprises themselves in accordance with their needs. Both public and private training institutes and programs become more efficient since they compete in the training market for the selection by enterprises.

However, the levy grant system was not free from drawbacks. First of all, the system generated a regressive situation between large and small enterprises. The larger enterprises, which had already been carrying out in-plant training before the establishment of the system, received a windfall effect and produced no additional training, i.e., the training grants became a deadweight loss. The smaller enterprises did not regard the training grant as sufficient incentive to compensate for all implicit costs incurred by SMEs in training their workers. For example, SMEs usually do not have in-house staff members who specialize in identifying training needs, organizing or exploring training programs inside or outside the enterprise, evaluating training effects, and reimbursing training expenses. The training levy grant is usually not sufficient to hire an additional staff member responsible for the SME's training management. Therefore, SMEs do not train their workers as actively as large enterprises, and consequently, SMEs do not benefit from training levy rebates (or grants) as much as large enterprises, resulting in an inequitable situation between large and small enterprises. In Singapore, for example, while all enterprises with more than 200 workers applied for the training rebate, only 25% of the small enterprises with fewer than 50 workers claimed the training grants (Dar et al. 2003).

Moreover, the procedures for claiming training rebates or reimbursements were usually cumbersome and time-consuming, and therefore smaller enterprises often did not bother to carry out training or file claims, and regarded the training levy as a new tax (Dar et al. 2003; Edwards 1997).

Also, assurances for the quality of training are weak, especially for the smaller enterprises. Under the training levy grant system, enterprises tend to implement training programs that fulfill the minimum requirement, if there is one, and produce no additional training. To alleviate the bureaucracy and delays in reimbursement, some countries (e.g., the Republic of Korea) streamlined the procedures for rebate claims and advanced the rebate at the time of approving

training programs. This required monitoring and supervision of the programs' implementation and quality, which could prove problematic and costly (ILO 1998).

Furthermore, in some countries, enterprises never fully recover their training expenses since the national authority channels the training levy fund toward public training institutions for preemployment training or training of the unemployed, as in Mauritius, where 50% of the recurrent expenses of public training institutions were funded with resources collected through the levy grant scheme (Dar et al. 2003). The government had to search for a new solution to the training problems in enterprises, especially SMEs.

### 13.3 Special Challenges for SMEs in Training

Compared with large enterprises, SMEs face special challenges or jeopardies in developing their human resources. SME jeopardies in training can be highlighted in terms of their scale and institutional capacity, and the economic nature of training (Lee 2006).

First is the scale jeopardy. SMEs do not participate in training programs as much as large enterprises do because of their small number of employees. SMEs find it difficult to organize in-plant training programs or arrange suitable institutional training programs outside the enterprise. Therefore, SMEs in general incur a higher training cost per worker compared with large enterprises, and merit compensation for their extra training costs in order to secure level playing field for fair competition.

Moreover, due to SMEs' small staff size and the nature of the technology adopted in SMEs, an SME worker generally has to carry out multiple roles and possess a broader range of skills. This makes it difficult for an SME to organize a suitable training course or to find one suitable for its capacity and resources provided by an external training institute, which generally offer standardized training courses, suitable for their capacity and resources, i.e., supplier-oriented training courses (Lee 2009).

Second, SMEs have institutional limitations. They generally do not have anyone working exclusively on the planning, organization, and management of worker training. Even though SMEs could identify some priority training needs, they lack economies of scale and specialized staff members who could find suitable outside training institutions, negotiate with them, enter into a contract, monitor their training processes, evaluate training effectiveness, and/or handle the cumbersome administrative processes for reimbursement of their training expenses.

These factors contributed to the low level of SME participation in job skills development programs (Lee 2006).

SMEs are in general constrained by their capacity to adjust to changing market conditions (demand, technology, prices, etc.) due to their financial, human, and knowledge constraints, and therefore are disadvantaged in launching training programs for their workers in time (Booth and Snower 1996; Lepenies 2004). Even when subsidies were provided for SMEs (for example, training vouchers), information asymmetries inherent in training markets prevented SMEs from using the training vouchers effectively. Moreover, since competition among training providers was limited, they controlled the market demand for training. Therefore, there is a strong need for introducing institutionalized *ex ante* and *ex post* “voice” in a voucher project (Lepenies 2004).

Third, like general education, skills training is a public or semipublic good, specifically a merit good (Musgrave 1959; Freedman 1962), and has both positive and negative externalities. As such, entrepreneurs are reluctant to provide or finance training with their own funds. Therefore, the socially optimal quantity of skills training is larger than the market-determined equilibrium quantity of training, and the government is justified in increasing the quantity of skills training by subsidizing SMEs.

Moreover, such training is an investment in human capital over a relatively long gestation period, and the returns to the investment accrue over a long period. Therefore, SMEs’ limited financial and credit situation does not allow them to invest in their workers as much as larger enterprises and merits government assistance.

## 13.4 SME Training and Government Policies

The literature review offers surprisingly little guidance on the actual efficacy of the most common forms of targeted SME support, either for direct beneficiaries or, more broadly, for markets and economies, much less on the appropriate sequencing and complementarities of interventions (World Bank 2014). Therefore, it is necessary to review the trajectory of government policies for training by enterprises, especially by SMEs.

The government policies to promote SMEs’ development role evolved over time. In the last few decades, they appeared in the form of providing financial services for SMEs. These SME finance projects were often launched as a reaction to the highly inefficient “integrated” enterprise promotion measures of the 1960s and 1970s, which usually combined the provision of subsidized credit with obligatory training

courses. The integrated projects often lacked acceptance, as they failed to take into account the real preferences of the target group (Lepenies 2004).

However, recent evidence suggests that “finance alone does not automatically lead to the desired developmental effect of promoting entrepreneurs” (Gulli and Berger 1999; Mosely and Hulume 1998). “A clear obstacle to enterprise growth is not only lack of capital, but also lack of entrepreneurial and occupational skills. Therefore, projects that provide training courses for SMEs are experiencing a recent renaissance under the heading of ‘business development services’ (BDS) (Gibson 1997; Goldmark 1999) that explicitly try to compensate for the developmental shortcomings of SME-finance projects” (Dowson 1997). “This new approach to enterprise training projects differs from the earlier ‘integrated’ projects. Instead of distorting competitive markets, BDS projects attempt to lay the foundations that will make markets work by themselves” (Tanburn 2002). These projects are influenced by the new institutional economics and attempt to overcome the shortage of entrepreneurial and occupational skills through the design of favorable institutional arrangements (Table 13.2).

**Table 13.2: Innovative Training Programs to Support Training in SMEs**

Country/Region	SME Training Program	Government Support Measures
Latin America	Voucher	Financial support
Turkey	SME special support	Financial support for human development projects as part of BDS
Singapore	SPRING Singapore: Human Capability Improvement	Financial support for human capability improvement as part of BDS
Malaysia	SME training projects	Financial support for management and training projects as part of BDS
People’s Republic of China	Start and Improve Your Business Program	Financial support for management and occupational training projects as part of BDS
Chile	Fiscal incentive	Financial support for training costs
Mexico	CIMO	Financial support for information and advisory services
Republic of Korea	Training Consortiums Program	Organization/management/financial support

BDS = business development services, SME = small and medium-sized enterprise.

Source: Author.

In Asia, we can observe that occupational skills training in SMEs is emphasized as part of government's support for SME business creation and expansion. For example, SPRING, an agency in Singapore, is promoting SME human capability development as a way to help enterprises grow and to build trust in Singaporean products and services. SME Corporation Malaysia also operates skills upgrading and expert advisory programs for SMEs as part of the SME development programs ([www.smecorp.gov.my](http://www.smecorp.gov.my)). Also, the People's Republic of China introduced ILO's Start and Improve Your Business (SIYB) Programme in 2003, and as part of the program, SMEs have benefited not only for entrepreneurial advice and support services, but also for occupational skills training services.

"As part of this BDS approach, the use of vouchers is frequently advocated (Brook and Smith 2001) and practiced in a few developing countries, especially in Latin America as in Argentina, Bolivia, Ecuador, and Paraguay" (Lepenes 2004).

Other innovative projects to support skills training by SMEs in harmony with the operation of the market systems include the Integrated Human Resources Quality Improvement and Modernization (CIMO: Calidad Integral y Modernizacion) Program in Mexico, which was supported by the World Bank in 1987 and 1993 (World Bank 1998); the fiscal incentive program in Chile, which was also initiated with World Bank financial support in 2002 (World Bank 2002); and the SME support program of Turkey ([www.kosgeb.gov.tr](http://www.kosgeb.gov.tr)).

The CIMO Program in Mexico tries to overcome information and knowledge asymmetry and organizational weaknesses of SMEs by visiting interested SMEs periodically to provide information on training and advisory services available from public organizations and private enterprises. The information and counseling services are provided by specialists contracted by enterprise associations with government subsidies from the Ministry of Labor and Social Provision.

The fiscal incentive program in Chile offers an income tax exemption for training expenses incurred by SMEs. The SME Support Program of Turkey provides financial support to SMEs for projects developed to solve human resource development problems specific to the enterprise, as part of business development efforts, just like other BDS models in Asia.

One unique government program is the SME Training Consortiums Program initiated by the Republic of Korea in 2001. The government encourages an industry- and geographically determined group of SMEs to organize a training consortium and provides it with financial support to hire training managers. These training managers provide consortium member SMEs with technical and institutional assistance

to undertake voluntary occupational skills training. The results have been so encouraging that many entities, such as employers' associations, large enterprises, and training institutions—including higher education institutions—also have participated in the program. The system has become the main government-supported training program, and in 2012 was renamed the National Human Resources Development Consortiums Program.

All those innovative SME training programs are common in taking special measures to help SMEs overcome their special training challenges. However, the support measures taken by the government are somewhat different. While the voucher, fiscal incentive, and special support programs focus on providing financial support for training or human resource development projects, as part of the “integrated” SME support policy, the CIMO and Training Consortium programs emphasize provision of information and advisory and managerial services, rather than financial support for training activities. In this sense, all these training programs try to build SMEs' business capacity and belong to the BDS typology. However, their emphasis is different.

The voucher, fiscal incentive, and special support programs are narrower than the other two policies in the scope of intervention. The government only intervenes through financial support. Also, the incentive mechanism is weaker since the programs do not provide support for strengthening or supplementing the capacity of SMEs. Despite the financial support, SMEs have not actively availed themselves of the training vouchers since they have limited information about training needs and markets (Lepenies 2004). The success of the fiscal incentive and special support programs also depends on SMEs' taking initiative for their human resources development, an area in which SMEs inherently face greater challenges, as shown already. In this sense, the CIMO and Training Consortiums programs try to help SMEs overcome their challenges and seem superior as a development policy tool.

The results of empirical studies on the education and training effects of such government-financed enterprise training are mixed. Studies by Holzer et al. (1993), Van Horn and Fichtner (2003), Gorg and Strobl (2006), and Lee and Yoo (2011) show positive educational and training effects. However, Leuven and Oosterbeek (2000), Muhlemann et al. (2005), and Abramovsky et al. (2011) demonstrate negative or no increasing training effects of government's financial incentives, especially the tax deduction incentive.

Still, there are some differences between the CIMO and Training Consortiums programs. While the CIMO program focuses on filling information gaps and strengthening the capability to identify human resource development needs and sources for external technical

assistance, the Training Consortiums Program emphasizes the provision of both financial support and building up the organizational and managerial capability of SMEs for enterprise training. Moreover, the Training Consortiums program helps SMEs voluntarily organize a consortium and operate it autonomously with ownership. It is no wonder that the CIMO program ceased to function in 2012, while the SME Training Consortiums program has become the major government-supported training program in the Republic of Korea.

Therefore, it is worth reviewing the Republic of Korea's SME Training Consortium Program in detail. In the following section, the SME Training Consortiums Program is reviewed in terms of its objective, background, rationale, content, implementation, main results, and impacts.

## **13.5 SME Training Consortiums in the Republic of Korea**

### **13.5.1 Objectives and Content**

The SME Training Consortiums program aimed to combat unemployment and improve the productivity of SME workers by helping groups of SMEs organize themselves to launch and manage in-service training of their workers.

Each consortium formed an operating committee to manage its training tasks. The operating committee was composed of representatives of training consortium member enterprises, the local chamber of commerce, the Ministry of Labor field office, and training experts, and met periodically for the planning and management of the consortium member enterprises' training affairs. The project provided each consortium with two training specialists financed by a levy grant fund (one of three employment insurance funds) to relieve the organizational, informational, and financial constraints that SMEs face in developing their human resources. Individually, each SME could not afford to recruit its own training specialist (Lee 2006).

### **13.5.2 Background**

The pilot training consortium project was conceived in the wake of the Asian financial crisis of 1997–1998. The financial crisis quickly spread to the real sectors of the economy, which in turn devastated the labor market in 1998. The stable unemployment rate of 2.0% through 1996

rose to 2.6% in 1997, and then shot up to 6.8% in 1998 and 8.6% in 1999. The Government of the Republic of Korea was desperate to lower the high unemployment rate in the short run and encouraged enterprises to raise their international competitiveness in the long run. “It was against this background that the Korea Chamber of Commerce and Industry (KCCI) prepared a pilot project for SME training consortiums in 1999 and applied, through the government, to the World Bank/Asia and Europe Economic Meeting (ASEM), for a grant to launch it. The project was initially planned to be implemented only in Busan City, which was hit hardest by the economic crisis, from June 2001 through December 2002. With promising prospects, however, the Ministry of Labor provided additional funds to the KCCI for implementation of the project in two other cities (Incheon and Kwangjoo) in September 2001” (Lee et al. 2014).

### 13.5.3 Rationale

The main justification for launching the pilot training consortium project was the role of SMEs in Korean economic development, the regressive situation generated by the training levy grant system, and the government’s realization that SMEs have special challenges or jeopardizes in human resources development due to their size and special characteristics.

The pilot project focused on SMEs (enterprises employing fewer than 300 workers) because they were more adversely affected by the Asian financial crisis of 1997–1998, held greater capacity for employment, and had lower productivity than larger enterprises. As in many other developing countries, SMEs in the Republic of Korea accounted for about half the national income and exports, and 86% of total employment at that time. However, their labor productivity was much lower than that of large enterprises (about 41%) (Kim 2012). Therefore, in the aftermath of the financial crisis, the government wanted to develop the skilled workers of SMEs and improve their productivity and welfare.

Since 1995, all firms, large and small, have been obligated by law to pay training levies and are entitled to get rebates of the training levies to recover the costs of training their workers. Although the levy grant system did serve as an effective incentive for enterprises to carry out job-related skills training, it has worked regressively against SMEs. SMEs did not avail themselves of the training levy grant system as actively as large enterprises did.

The regressive result occurred even though the system paid special attention to the SMEs’ jeopardies in training their workers and offered SMEs greater financial incentives. For example, the rate of training levies

as a percentage of workers' wages (which ranges from 0.1% to 0.7%) was lower for SMEs than for large enterprises. Moreover, the level of rebates for large firms was 80% of training costs, up to a total of 100% of training levies paid, while for SMEs it was at 100% of the training costs and up to a total of 200% of training levies paid. As a result, for each worker trained, the financial benefit (i.e., the difference between training levies paid by enterprises and the rebates received by enterprises) was greater for SMEs than for large enterprises. The financial benefit or net training grant was 0.08%–0.14% of the average wage of workers for large enterprises; however, it was 0.10%–0.24% for SMEs (Lee and Yoo 2011).

Despite these special financial incentives, SMEs did not avail themselves of the financial incentive system as much as large enterprises did. Consequently, an inequitable situation developed in the training levy rebates. Both large firms and SMEs pay training levies, yet a disproportionate share of the total reimbursements went to large firms (Table 13.3).

**Table 13.3: Results of the Training Levy Rebate Policy, by Enterprise Size, 2002**

Assessment Criteria	Large Enterprises	Small and Medium-Sized Enterprises
Enterprises participating in training levy rebates	78%	21%
Workers participating in training levy rebates	38%	4%
Training levy amount recovered by enterprises	30%	15%

Source: K. W. Lee. 2004. A Pilot Project for the Training Consortiums in Korea: An Ex-Post Evaluation. Presented at the APEC Symposium on the Human Resources Development, 10–11 May, Jeju, Republic of Korea.

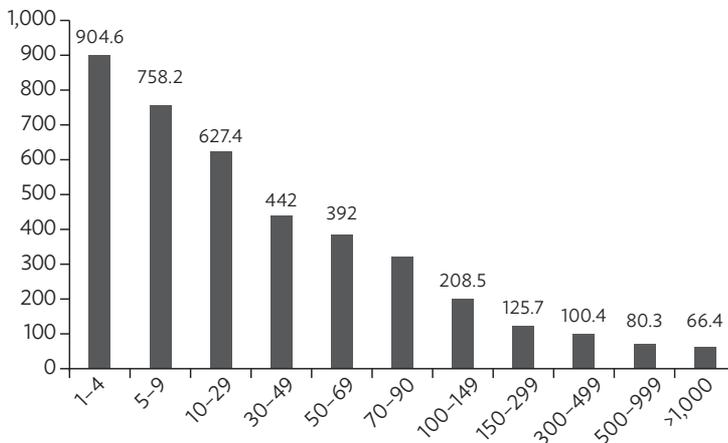
Of the total 6.9 million employees who paid the training levy (actually paid by employers as part of employment insurance fees), SME workers accounted for 65% (or 4.5 million workers). However, only 4.2% (192,000) of them participated in training programs and got the training levy rebated, and this number accounted for only 18% of the total workers who paid training levies and received training levies rebated (reimbursed) in 2002. In contrast, while workers of large enterprises accounted for only 35% (or 2.4 million) of total workers who paid the training levy, about 38% (904,000) of them participated in training programs and got their training levy rebated, and this number accounted for as many as many as 82% of total workers who paid training

levies and got training levies rebated (reimbursed) in 2002 (Lee and Kim 2004). Thus, large enterprises were able to recover their training levies at a much higher rate than SMEs. While large enterprises as a whole got about 30% of their training levies reimbursed in 2002, SMEs recovered only 15% of their training levies.

The recovery rate between rebates received per trained worker and the training levy paid per worker—the financial return—was higher among SMEs than large enterprises. While the recovery rate was between 66% and 100% for large enterprises in 2002, it was between 126% and 905% for different groups of SMEs by staff size (Figure 13.1). In other words, for each worker participating in training, the recovery rate was greater for SMEs than for large enterprises due to the more favorable financial incentive given to SMEs. Despite such a favorable system arranged for SMEs, it is striking that a regressive situation developed against SMEs compared with large enterprises.

This situation implies that financial incentives (financial rates of return) were insufficient for SMEs to train their workers, and/or SMEs needed more than financial incentives alone. For SMEs, the costs or

**Figure 13.1: Average Training Levy Recovery Rate per Worker Trained (%)**



Note: The average recovery rate is a ratio between the average training levy paid and the average levy rebated per trained worker for each enterprise size.

Source: B. H. Lee, and D. B. Kim. 2004. *A Study of the Characteristics and Effects of the Support System for Enterprise Training*. Seoul: Korea Labor Institute (in Korean).

disincentives (e.g., training costs, poaching risks, asymmetry of available information on training markets, and administrative burdens to arrange training and recover levies) must have been greater than the financial incentives. Besides the rebate incentive, additional factors should have been considered, and the government should have taken greater action to redress the inequitable situation of the training levy rebate incentive system. Also, SMEs have historically had institutional and informational difficulties in making training arrangements with public training institutes, which focus mainly on preservice training and do not offer in-service training programs for enterprises, especially for SMEs. Asymmetries of information between large enterprises (which have personnel and human resources development officers and the ability to organize and often offer training programs for their own workers in the workplace) and the SMEs (without such capacities and amenities) compounded the imbalance between large enterprises and SMEs in providing in-service training of their workers (Lee et al. 2014).

In sum, SMEs participated in training less enthusiastically than larger enterprises, and it was proven that a training levy rebate incentive system alone was inadequate to promote skills training by SMEs. Additional or different types of incentives should have been devised to compensate SMEs for their jeopardies in the training of their workers.

### **13.5.4 System and Strategy for Implementation**

The Ministry of Labor opted to launch the pilot SME in-service training consortium project. However, the project implementation was entrusted to the Korea Chamber of Commerce and Industry (KCCI). The pilot project was launched in June 2001 and completed in December 2002. The Ministry of Labor and the KCCI selected three industrial cities for the project—Busan, Incheon, and Kwangjoo—and the ministry's field office and the local chamber of the KCCI in these cities were instrumental in the implementation of the project.

Each local KCCI chamber helped a group of 30–50 SMEs in the same area and industry to organize themselves into a training consortium, and also financed two training managers for each consortium. The two training managers played a key role: they were to act as the training specialists for the member SMEs. “They were to establish an information network among consortium members (e.g., home page, email systems, and periodic meetings); conduct a training-needs survey of each member SME through interviews with managers and workers, and through job analysis; plan and program training activities of member SMEs; contract outside training institutions to train workers collectively as much as possible; collaborate with training institutions to develop

training programs and materials; monitor their training activities; and conduct an evaluation study upon completion of major training courses on behalf of the member SMEs” (Lee 2006).

In 1999, the Government of the Republic of Korea applied, through the Ministry of Labor, for a World Bank grant to launch the project. The World Bank was administering a technical assistance trust fund entrusted by the Asia–Europe Economic Meeting (ASEM) for Asian economies affected by the Asian financial crisis in 1997–1998. The grant amount sought by the Republic of Korea was \$730,000; however, the final approved amount was \$250,000, so this was allocated for the implementation of the pilot project in the Busan City area alone. In September 2001, the Ministry of Labor allocated its own fund of \$2.5 million for refurbishing the KCCI’s training equipment and facilities, and the KCCI decided to allocate \$103,000 for the recurrent expenditures of the training consortiums in the cities of Incheon and Kwangju. Therefore, altogether about \$353,000 was spent for the training consortium project during the 1.5-year pilot project period.

### **13.5.5 Achievements and Impacts**

#### **Overview**

This evaluation of the achievements and impacts of the pilot project focuses on (i) the organization and operation of the training consortium; (ii) participation in in-service training; (iii) training levy rebates to SMEs; and (iv) other outcomes (such as promotion of SME productivity, prevention of unemployment, shift to a demand-driven training system, enhanced competition and cooperation in training markets, and strengthened partnership between public and private entities in training affairs) (Lee et al. 2014) (Table 13.4).

#### **Assessment Methodology and Data**

Before discussing the achievements and impacts, methodology and data of our evaluation study are discussed.

The objective of our evaluation of the pilot training consortiums project is not to compare the costs and benefits of the training programs themselves. Many studies in the literature have already vouched for the efficiency and economic viability of enterprise-provided training programs in different parts of the world, including the Republic of Korea (Bartel 2000; Barret and O’Connell 2001; Groot 1995; Kim et al. 2003; Lee and Kim 2004). On the basis of this accumulated knowledge of the high returns to investment in employer-provided training programs, this study rather attempts to assess whether the government SME training consortium policy through the pilot project has been effective. In other

**Table 13.4: Overview of Achievements and Impacts**

Assessment Criteria	SMEs without Pilot TCs in 3 Cities (pre-project: June 2001)	SMEs with Pilot TCs in 3 Cities (post-project: June 2002)	For All SMEs in the Republic of Korea (change from June 2001 to June 2002)
No. of TCs	0	3	–
No. of SMEs in TCs in 3 cities	0	732	–
No. of training managers in a TC	0	2	–
% of enterprises participating in training	11%	50%	21% → 57%
Workers participating in training (persons)	3,087 (planned)	6,573 (actual)	12% → 4%
% of training levies rebated	24%	48%	25% → 15%

— = not applicable, SME = small and medium-sized enterprise, TC = training consortium.

Source: K. W. Lee. 2004. A Pilot Project for the Training Consortiums in Korea: An Ex-Post Evaluation. Presented at the APEC Symposium on the Human Resources Development, 10–11 May 2004, Jeju, Republic of Korea.

words, did the government policy stimulate and encourage SMEs to undertake training of their workers voluntarily, and redress inequities caused by the training levy rebate system? The reason for this focus is that even though the training levy rebates provided higher financial and economic returns for individual workers trained in SMEs than in large enterprises, few SMEs used it actively. The main objective of the SME training consortiums project was to encourage SMEs to train their workers, and we need to verify whether this objective was attained.

To evaluate the achievement and impact of this pilot project, a quasi-experimental method had to be adopted by selecting control groups after the pilot project was launched and adjusting for differences in observable and unobservable attributes of the control and experimental groups. As experimental groups, this study takes the SMEs that were members of the training consortiums in Busan, Incheon, and Kwangjoo, depending on the data available. As control groups, this study has adopted “all SMEs nationwide” and “all enterprises nationwide.” Ideally, the differences in the observable and nonobservable attributes of the experimental and control groups have to be adjusted or corrected. However, this was not possible and it was assumed that the experimental groups were randomly selected from the control groups.

For the experimental groups, the data were collected from surveys of the SME training consortium member, which were conducted through questionnaires with the help of the KCCI at the beginning (June 2001)

and at the end of the pilot project (June 2002). These survey data were complemented by intensive interviews with managers and workers of selected SMEs in each of the three cities at the same time as the surveys (Lee 2004, 2006).

Data for the control groups were obtained from the *Quarterly Employment Trends* of the Employment Information Center of the Human Resources Development Service of Korea, the *Current Situation of the Occupational Skills Development Program*, and the Ministry of Labor's annual report.

### **Organization and Operation of Training Consortiums**

“Originally, the project aimed to organize 90-member SMEs into three training consortiums. However, the project actually started with 163-member SMEs in three TCs [training consortiums], one in each of the three chamber areas. By the end of 2002, TC members increased to 732 SMEs—an increase of four and a half times the original number of SMEs. The 557 member SMEs in June 2002 had a total of 14,043 workers, with 65% of them being production workers. About 70% of the member SMEs were those with fewer than 50 workers and were located in the industrial zones developed by the government” (Lee et al. 2014).

“Despite the sharp increases in the number of member SMEs, only one TC was maintained in each of three areas throughout the project implementation period. This enabled each TC to enjoy economies of scale. However, each TC's operational effectiveness was gradually lowered to less than optimum, having too many and diverse member SMEs belonging to different industrial associations. As a result, the [training managers] could not provide tailor-made advice and attention to each member SME. Also, the TC lost homogeneity and solidarity among member SMEs” (Lee et al. 2014). It became difficult to organize training courses to accommodate the diverse but small number of workers of each member SME belonging to different industrial sectors. Each course had too small a number of trainees to offer courses economically. This prodded training managers to increase the number of member SMEs irrespective of their industrial sector. This in turn aggravated the problem of organizing economical courses. “In retrospect, it would have been better to organize each TC by SMEs belonging to the same trade association, as originally planned, and the ratio between two [training managers] and about 30 SMEs of each TC should have been maintained” (Lee et al. 2014).

Upon mainstreaming of the program in 2003, the number of SME training consortiums multiplied every year. Today, together with training programs for unemployed workers, the Training Consortium Program for workers employed by SMEs is the bellwether program of

the Ministry of Labor in the Republic of Korea. In 2011, the Training Consortium Program trained 229,000 workers from 112,750 SMEs with the training levy rebates of 98.7 billion won (Table 13.5).

**Table 13.5: Mainstreaming of the SME Training Consortiums**

	2001	2002	2003	2004	2005	2006	2007	2011
Number of training consortiums assisted (cumulative)	6	8	19	30	47	57	69	134
Workers trained ('000) <sup>a</sup>	4	10	20	38	71	143	295	229
Number of SMEs ('000) <sup>a</sup>	1	3	8	15	33	63	134	113
Levies rebated (billion won)	3.2	6.1	14.1	16.8	39.9	45.0	74.4	98.7

<sup>a</sup> Multiple counted whenever training plan is approved.

Source: Government of the Republic of Korea, Ministry of Labor (2008 and 2013).

### Participation in In-Service Training

“The output of the project was impressive. In the in-service training courses for workers already employed in SMEs, a total of 6,573 persons were trained. This number far exceeds the number of workers identified initially by employers in the training needs survey as requiring in-service training (3,087) (Table 13.6) and accounts for almost half the total number of workers in all member SMEs of the three pilot TCs” (Lee 2009). (The fact that the number of workers trained was higher than the number identified in the survey may be due to the fact that the initial training needs survey was conservative, taking into account the implementation capacity.) Another notable fact is that about 50% of all trainees had more than 10 years of service with the member SMEs (Lee 2009). As a result, the share of enterprises training their workers

**Table 13.6: Output of In-Service Training for Employees (2002)**  
(persons)

Plan v. Actual	Total	Busan	Incheon	Kwangjoo
Actual trainees*	6,573	2,353	1,837	2,383
Planned trainees	3,087	871	1,573	643
Actual/Target	213%	270%	117%	371%

<sup>a</sup> Multiple counted each time a worker was trained.

Source: Korea Chamber of Commerce and Industry.

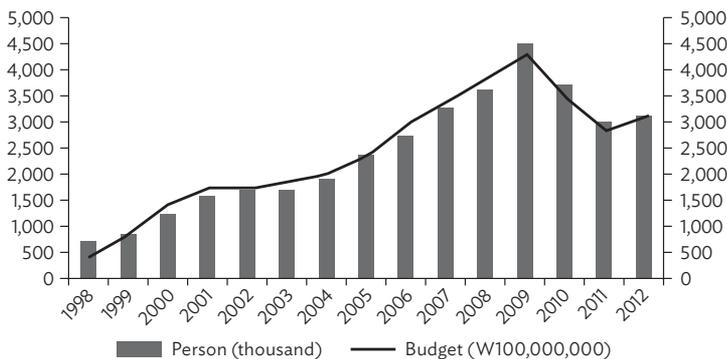
increased from 11% of total SMEs before the Training Consortium Program to 50% of total SMEs after the program (Table 13.4).

“Most courses lasted from 1 to 30 days, and about 60% of the total workers who participated in the training programs went through only one training course per worker; the balance of the workers took two or three training courses each. The training course subjects were not confined to technical skills, but also included management, accounting, tax administration, and motivation skills of middle and high-level managers” (Lee 2004). In the past, such courses were not offered by public training institutes, and therefore it was a welcome change. Studies abroad indicate that economic and administrative training yields much higher wage gains than technical training (Groot 1995).

“Training programs and materials were developed by contracted training institutions and the training managers. Altogether, 65 training programs were developed on the basis of the analyses of 140 job categories, and 147 modular training syllabi and texts were developed for 14 job categories. Also, 13 programmed learning materials were prepared for trainees to study using computers” (Lee 2004).

The initial success of this pilot project helped the government to mainstream it in 2003, and the number of workers trained has increased steadily (Figure 13.2). Accordingly, the project instigated academic debate on the effectiveness of the incentive mechanism of the training levy rebate system in general and the SME training consortium system in particular. In other words, the question was asked: Is the increase

**Figure 13.2: Training by Enterprises: Number of Trainees and Expenditures**



Source: Republic of Korea, Ministry of Employment and Labor. *The Current Status of the Vocational Skills Development Project. Yearly.*

in in-service training caused by the training levy rebates? Successive empirical studies show positive answers. Lee (2006) shows that the historical number of workers receiving training from employers increased sharply after the pilot training consortium project. Using data taken from the Korean Labor and Income Panel, and after controlling for the difference in training expenses among enterprises of different sizes, Lee and Yoo (2011) econometrically showed that workers employed in enterprises with a higher rate of net government support (difference between the levy rebated and the levy paid as a percentage of the wage per worker) had a greater chance of receiving training, and as a result a greater chance of wage increases. Using data from the 2010 Survey on Vocational Training in Enterprises by the Ministry of Employment and Labor, Ban (2013) found that government support for SMEs resulted in a statistically significant increase in their spending on education and training. This was not the case with large companies, probably because of a deadweight loss.

### Training Levy Rebates to SMEs

“The project accorded substantial financial benefits to member SMEs by helping them organize worker training and get reimbursed from the training levy funds (a part of the unemployment insurance). With the advent of the pilot project, training managers facilitated training opportunities for SMEs’ workers, which resulted in SMEs’ active participation in the reimbursement process. Consequently, the proportion of TC-member enterprises offering training to their workers increased from 11% to 50%, an increase of 345.5%. This compares favorably with an increase from 21% to 57% or an increase of 171.4% for all sizes of enterprises nationwide. The number of TC member SMEs participating in training levy rebates increased at a rate between 56% and 310% among TCs” (Lee 2004) (Table 13.7).

**Table 13.7: Number of Training Consortium Member SMEs Participating in Training Levy Rebates**

Area	Pre-Project (January–May 2001)	Post-Project (January–June 2002)	Percentage Increase (%)
Busan TC	31	127	309.6
Incheon TC	56	118	110.7
Kwangjoo TC	110	172	56.0

SMEs = small and medium-sized enterprises, TC = training consortium.

Source: Korea Chamber of Commerce and Industry and Employment Information Center.

The training levy recovery rate (the ratio between the training levy paid by member SMEs and the reimbursement amount received for training workers) of the Busan Training Consortium members increased from 24% of total paid training levies to 48%, which contrasts with the decrease from 25.5% to 14.6% for all SMEs nationwide. The inequitable outcome of the training levy rebate system was being effectively redressed. The rate of increase in the recovery rate for training consortium member SMEs was much higher (100%) than that of SMEs nationwide (-43%) and all enterprises nationwide (-25%). The fall in the recovery rate among all SMEs and enterprises nationwide may be because (i) the percentage of workers being trained declined although the percentage of enterprises participating in workers' training increased (Table 13.8); and (ii) the standard procedures for recovering the training levies are cumbersome and costly, while the procedures were made drastically easier for training consortium member enterprises.

**Table 13.8: Training Levy Recovery in Training Consortium Members vs. Nonmembers**  
(W)

	2001 (Jan–Dec)	2002 (Jan–Dec)	Increase/ Decrease
• Busan Training Consortium Members			
→ Total training levy paid	116,138,630	95,990,480	-20,148,150
→ Total rebates	28,129,250	46,489,050	18,359,800
→ Recovery rate	24.2%	48.4%	100.0%
• All Enterprises Nationwide			
→ Recovery rate	33.0%	24.8%	-25%
• All SMEs Nationwide			
→ Recovery rate	25.5%	14.6%	-43%

SMEs = small and medium-sized enterprises, W = won.

Source: Korea Chamber of Commerce and Industry (Busan Chamber) and Employment Information Center.

### Other Impacts of the Training Consortium Project

Although this study does not attempt to make a cost-benefit analysis of the project, it is appropriate to mention some positive outcomes. The project promoted SME worker productivity, solving the most critical SME problem of skilled worker shortage and helping prevent unemployment. “In addition, the project also motivated the government and training institutions to shift their training policy toward a demand-

driven system; developed new working relationships between SMEs and training institutions; and promoted a partnership between private sector associations and public/non-governmental organizations” (Lee 2006).

### ***Promotion of SME Productivity***

This project enhanced the capability of SME workers and as a result most likely led to an increase in SME productivity. “For example, in the welding course, trainees scored only an average of 65 points on a skills test before the course; however, they scored 93 points on average after the course (Busan Chamber area)” (Lee 2004).

“At an ex-post evaluation through interviews with member SMEs, employers revealed that workers’ job performance and productivity improved sharply after training (81% of total responses); savings in maintenance and repair expenses resulted (67% of responses); factory machinery utilization factor increased (88% of responses); and waste or defective products declined (72% of responses) (Incheon Chamber area). Also, many employers indicated that workers’ attitudes towards their jobs changed most noticeably (88% of responses) (Kwangjoo Chamber area)” (Lee 2004).

Ban (2013) also econometrically shows that government support for training in SMEs had positive effects on the growth of productivity, but this was not the case with large enterprises.

“Interestingly, the practice of poaching or scouting workers by other SMEs declined substantially since all SMEs of the same trade and area joined the training consortium. Industry-wide collective action reduced the risks of training and poaching. Thus, workers stayed longer with the same SME and consequently, SME productivity was enhanced” (Lee 2004).

### ***Prevention of Unemployment***

This pilot project helped prevent SME workers from becoming unemployed. This effect of the project was important in the aftermath of the Asian financial crisis, when the level of unemployment was unusually high (from the usual 2% to more than 8%). According to the training consortium survey conducted in June 2001, those member SMEs that participated actively in consortium training programs were reluctant to lay off their workers and, in fact, slightly increased the overall employment level by 1.7% (81 persons). In contrast, those member SMEs that did not participate in consortium training programs suffered a reduction in the total employment level by 8.8% (436 persons), aggravating the unemployment level of their workers (Lee 2005) (Table 13.9). Although these statistics may be criticized on the basis of possible selection bias, there is no strong reason to suspect that

**Table 13.9: Employment Level of Training versus Non-Training SMEs**  
(persons)

		Pre-Project (June 2001) Employment	Post-Project (June 2002) Employment	Change in Employment	Number of Enterprises Sampled
Training SMEs	Total	4,850	4,931	81 (1.7%)	63
	Busan	1,069	1,057	-12 (-1.1%)	17
	Incheon	1,691	1,637	-54 (-3.2%)	17
	Kwangjoo	2,090	2,237	147 (7.0%)	29
Non-Training SMEs	Total	4,960	4,524	-436 (-8.8%)	97
	Busan	786	755	-31 (-3.9%)	19
	Incheon	2,888	2,870	-18 (-0.6%)	47
	Kwangjoo	1,286	899	-387 (-30.1%)	31

SMEs = small and medium-sized enterprises.

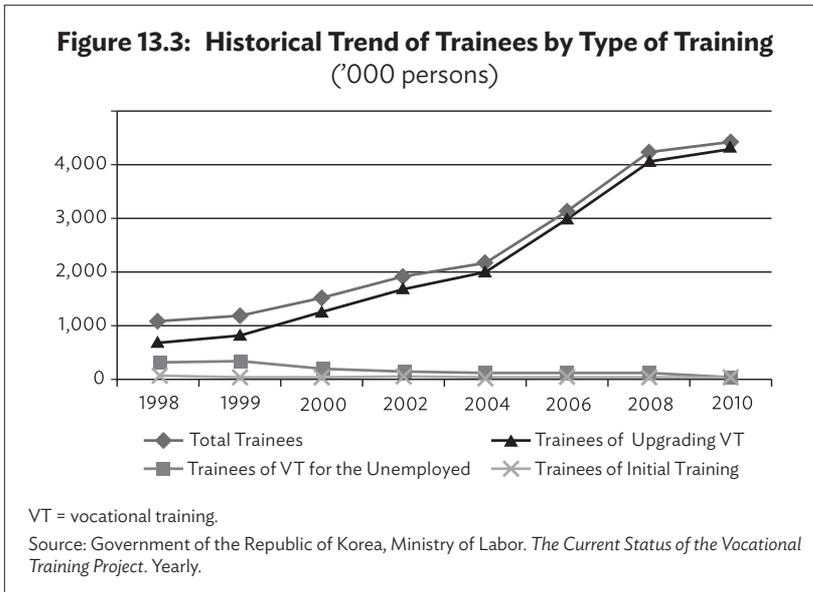
Source: Korea Chamber of Commerce and Industry.

training consortium members had sharply different business prospects since they all joined the same consortium voluntarily at the same time for a similar purpose.

### ***Demand-Driven Training Systems***

“The pilot training consortiums project enabled TC-member SMEs to meet their training needs, especially in-service training needs. The project demonstrated the need for, and feasibility of, shifting the emphasis of training from almost exclusively pre-service training toward in-service training of SME workers on the job. As the demographic and economic growth rates have stabilized, reducing the supply of and demand for young trainees, the need for training has increased for already-employed workers to adapt their job skills to restructured industry, changing technology, and shortening product life-cycles” (Lee 2004). Since 1974, large enterprises in key industries had been obligated to undertake a minimum level of training for their workers, and this training requirement had also been applied to an increasing number of SMEs by the changes in law in 1986 and 1991. Most enterprises, large and small, met this obligation mainly with the preservice training programs until around 1997. Since this project initiation, however, in-service training overwhelmed other types such as preservice training, initial training, or retraining (Figure 13.3).

“Before this project, large enterprises could conduct in-service training in their own training facilities, while SMEs lacked the financial



or managerial capacity and staff to establish and operate their own or joint-training facilities. Until the training consortium was organized in 2001, training in SMEs had depended entirely on public training institutions that concentrated on pre-service training of youth for possible hiring by SMEs and did not offer in-service training much” (Lee 2004).

“With the advent of the TC project, training by enterprises took place mostly under contracts with outside training institutes; yet, a substantial number of training courses were conducted in-plant at member SMEs, using their own machines, tools, equipment, and materials. In these cases, the SMEs often closed down their production lines for several days to involve all workers in the training courses. The contracted training institutions brought their training instructors and equipment to the plant in a vehicle. This means that micro-enterprises or SMEs often prefer to train all their workers at the same time and in-plant, rather than sending their workers one by one to outside training institutions at different times. This mode of training met the special needs of SMEs, since they prefer to protect their unique technical know-how and promote teamwork and solidarity among their small number of workers” (Lee 2009).

“This project also motivated the Ministry of Labor to change its training policy toward a demand-oriented training system and aided

its decision to provide financial support to replicate the project scheme with two more local chambers in September 2001, then later with three more employers' associations in January 2002" (Lee 2009).

In addition, the ministry replicated the training consortium concept into two more modalities. One involved a large enterprise that helped its cooperative SMEs organize a training consortium and train their workers in its own in-plant training institute or outside training institutes. The other was a training consortium organized by a training institute. Training institutes organized local SMEs and provided in-service training to their workers. Upon mainstreaming of the pilot SME training consortium project, the government approved another mode in which training institutes collaborate with large enterprises to organize their cooperative SMEs into a training consortium and provide training services for SME workers. The most successful case (the Bridge Project) has been developed by the Korea University of Technology and Education; the model is currently practiced by some 27 higher education institutions (Box 13).

#### ***Enhanced Competition and Cooperation in Training Markets***

"The project promoted market-oriented selection of training institutions. In theory, TCs had the freedom to choose the most suitable training institution available in the competitive training market. In practice, TCs hired vocational training institutes (VTIs) of the KCCI for most training courses; TCs preferred KCCI-sponsored VTIs on account of their merits and the training managers who were seconded from the VTIs/KCCI through government grants. Likewise, other training institutes were also contracted on the basis of their merits (e.g., auto repair and maintenance training institutes, accounting, and motivation training institutes). Since the selection of training institutions was based on their merits, more training institutions were expected to join training markets, and competition in training markets was expected to be keener in the future, resulting in improved quality of training" (Lee 2009). However, no evaluation has been made to determine whether this has actually occurred. In fact, from 2006, colleges and universities had been allowed to offer training courses for training consortium member SMEs organized by large enterprises, employers' associations, or other training institutes. Since in-service training was recognized by the government as satisfying individual enterprises' legal training obligations in 1986, the number of training institutes had been on the rise (Lee 2006). This trend has continued even after the legal training obligation was dropped in 1998.

"The training managers (TMs) of each TC recommended to each member SME the training priorities to be addressed and the training

### Box 13: The Bridge Model for SME Training Consortia

Korea University of Technology and Education (KUT) pioneered a new mode of SME training consortiums and has spread it throughout the country. The SME training consortiums used to be organized by one of three models: (i) an employers' association organized its member SMEs belonging to the same industry and area into a training consortium; (ii) a large enterprise organized those SMEs supplying goods and services to it into a consortium; and (iii) a training institute organized SMEs in its vicinity into a consortium. However, when a training institute organized SMEs, it lacked intimate knowledge of business and production processes and practical skills used by enterprises. When a large enterprise organized SMEs, it had also weaknesses in such areas as finding instructors who can teach theoretical aspects of skills training and facilities to accommodate a large number of SME workers. The KUT tried to overcome the weaknesses of both training consortium models by acting as a bridge between large enterprises and SMEs in carrying out worker training. This Bridge Model means that KUT partners with some large enterprises in training workers of their collaborating SMEs, whose productivity improvement would critically influence their own productivity. Since 2005 KUT has entered into partnership agreements with leading large enterprises like Samsung Electronics, Samsung SDI, and Hyundai Mobis Corporations to carry out in-service training programs for their own and their collaborating SMEs workers.

To carry out the partnership agreement, KUT established the Advanced Technology Education Center. While KUT offered mainly training facilities, theory instructors, training materials, and administration, the large enterprises provided practice instructors, training equipment and technology, and interested SME workers. The training programs have been developed on the basis of field investigations into training demands, carried out jointly by KUT and partnering large enterprises (Lee et al. 2011).

This Bridge Model proved a success and has been replicated by 27 higher education institutions involving as many as 6,900 SMEs and 41,440 trained workers in 2011.

W. Y. Lee, J. S. Seol, and J. W. Kim. 2011. A Bridge Model of University-Industry Cooperation to Develop Skills of Practical Engineers for Small-Medium Size Companies. *Innovations: World Innovations in Engineering Education and Research*. Chapter 3. pp. 27–34.

institutions to be contracted, administered the training-levy rebate processes, monitored and supervised training services, and evaluated the training results on behalf of member SMEs. TMs filled the organizational, managerial, as well as informational gaps prevalent in an average SME" (Lee 2004).

The training manager system not only promoted competition in training markets, but also induced cooperation between SMEs and training institutions. "While most SME members of the Busan TC were

located in the newly established industrial zone on the outskirts of the city, most training institutions were located on the opposite side of the city. This long distance discouraged both employers and workers from participating in the training programs offered at the training institutes. With the progress of this project, an industrial association of the member SMEs (the machinery manufacturers association) offered a building and other spaces for the establishment of a new training facility in the center of the industrial zone. This geographical proximity enabled the member SMEs to participate in the training programs actively and enthusiastically. This also encouraged training institutions to consult with their client SMEs closely and more often for the development of training programs, thus making them more relevant and demand-responsive” (Lee 2004).

### ***Strengthened Partnerships between Public and Private Entities***

“This project strengthened the partnership among central and local government agencies, local and national Chambers of Commerce and Industry, training institutions, training experts, academics, and SMEs for training and human resources development. Representatives of the government (Ministries of Labor and Industry, Small Business Administration, provincial and municipal governments) developed a new relationship with the private sector by becoming members of the TC Operating Committee and advising the TC regarding training and human resources development” (Lee 2006). The training consortiums also periodically held consultative meetings and seminars to monitor and evaluate the progress in the project, and sought improved and/or simplified government procedures and processes related to SME training courses and levy rebates. “Such close consultations and collaborations between the private and public sectors concerning training and human development had no precedent in Korea. As a result of such practices, for example, the training rebate ceilings for SMEs were lifted from 200% to 270% of the training levy paid, or 1.5 million won to 2.5 million won per year; training expenses were reimbursed at the time of the government’s approval of training courses, in contrast to the past practice of ex-post reimbursement upon completion of the training courses; and the lead time required for submission of a training plan for a government’s approval was shortened substantially” (Lee 2006).

## **13.6 Conclusion**

It has been clear that SMEs have a potentially important role in expanding employment and output and promoting equity and welfare.

However, from empirical records, it has also become clear that SMEs are in general less active than large enterprises in training their workers and more broadly developing their human resources. The market system by itself cannot correct this imbalance between SMEs and large enterprises in developing human resources. To realize SMEs' potentially important contributions to the economy and society as a whole and to redress the imbalance between large and small enterprises, the government will have to intervene in the skills training market in favor of SMEs.

We have discussed some innovative government policies and interventions in favor of SMEs: vouchers, fiscal incentives, special project financing, information dissemination, and training consortiums. Financial assistance alone or redressing information asymmetry alone did not adequately achieve the objectives of redressing imbalance between large and small enterprises or taking advantage of SMEs' potential contributions to the economy. On the basis of the comparative review of the experiences with the innovative government interventions in favor of SMEs, it has become clear that a government should combine financial support with organizational, institutional, and technical support for SMEs. In this sense, the experience with the SME Training Consortium in the Republic of Korea can serve as a role model.

However, in the international context, one size does not fit all. A good experience in one country does not guarantee success in others with different social, historical, economic, and political environments. The success model in one country will have to be adjusted to suit different contexts. For an SME training system to be successful, a government must establish a sound institutional framework for training by enterprises in general. The framework would include competent public and private training institutions competing in the training market with sound and flexible training programs to meet the demands of enterprises, especially SMEs. The quality of training should be verified and certified by competency or qualification tests. The trainees should be supported by guidance, counseling, and employment services for career development before and after the training programs. Since training is a public good, like basic education, a government should operate a sound training financing system, either with a sufficient government budget or a levy, a levy rebate system, or an unemployment insurance system to support training by enterprises in a sustained manner.

In addition, more conditions favorable for the application of SME training consortiums are desired (Lee et al. 2014), such as the following:

- The government should ensure that a training consortium is organized and operated by SMEs themselves through their associations or large enterprises to which they provide goods and supplies. When it is organized by an outside organization,

especially by a training institute, the government should pay special attention to ensure the ownership of the training consortium by SMEs and autonomy of the consortium.

- It is advisable to start not on a national scale, but with a small-scale pilot project in a selected suitable area to accumulate experience and knowledge through independent outsiders' evaluations. In mainstreaming the program, it is advisable to begin with relatively larger-scale SMEs, rather than focusing on micro or small-scale enterprises. These micro and small-scale enterprises have the hard-core problems of organizing a consortium and undertaking in-service training, and therefore are more difficult to address. It is advisable to start with relatively easy clients to deal with and build up good track records, rather than starting with tackling the hard-core problem clients, running a high risk.
- Government financial support for the SME training consortium may focus not on the capital expenditures to expand or improve training equipment and facilities, but on the recurrent expenditures for the operation of the training consortium and training management specialists. It is important to ensure that an adequate number of training management specialists are assigned to each consortium and that adequate budgets are allocated for the operations of the training management specialists, so that they can function as staff responsible for personnel and training management in each member SME.
- Governments should not discriminate against in-plant training by SMEs vis-à-vis outside institutional training in rebating training levies. For most SMEs, in-plant training is more effective and preferred to the formal institutional training offered by an outsider (ILO 2008; KOSBI 2009).
- The government should minimize the bureaucratic red tape for the operation of the SME training consortium. The approval of training plans and the reimbursement of training levies should be carried out in a simple manner and in a short period of time. The training consortium project is not meant to regulate SME activities, but to support SMEs' training activities. Therefore, SMEs should find the processes and procedures involved in the training consortium's operation simple and helpful.

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\* ADBI recognizes “Korea” as the Republic of Korea.

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# 14

## Small Firms, Human Capital, and Productivity in Asia

*Paul Vandenberg and Long Q. Trinh*

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### 14.1 Introduction

The overwhelming majority of businesses in any economy are small and medium-sized enterprises (SMEs). While the definition of what constitutes an SME varies greatly, in nearly all countries they account for over 95% of enterprises. Furthermore, they produce a substantial share of economic output and normally employ the majority of the workforce. With the expansion and deepening of regional and global value chains, SMEs have become important as local parts and component suppliers, as providers of logistics and other services and, for some, as exporters and overseas investors. SMEs account for over 40% of India's exports, for example.<sup>1</sup>

SMEs are often viewed as being dynamic and innovative, and while many are, as a group they are a highly variable lot. Along with the highly productive and competitive enterprises, there are many that remain small and rely on conventional technology to deliver standard products and services. This type of enterprise may be more in evidence in developing countries, where running an enterprise is often a family survival or get-ahead strategy in the context of limited employment opportunities or a need to diversify from farm income.

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<sup>1</sup> National statistics compiled by the Asian Development Bank (2015) and covering 2012 and 2013 indicate the economic importance of SMEs. For example, they produce 37% of the gross domestic product of Thailand and 60% of Indonesia. They employ 58% of the workforce in Malaysia and 65% in the People's Republic of China.

Enterprise survival and growth require high levels of efficiency and productivity. These factors determine whether the enterprise can be competitive against other firms—be they small or large, domestic or foreign. The factors that support enterprise productivity and competitiveness are many, including the knowledge and experience of the owner, decisions about what markets to enter, the organization of production and distribution, investment in plant and equipment, financial management, supplier networks, marketing strategy, and others. Along with these various factors, human capital is a key factor that enhances enterprise competitiveness.

In this chapter, we have assembled a rich dataset of enterprises in five Asian countries (the People's Republic of China (PRC), Indonesia, Malaysia, Thailand, and Viet Nam). We estimate the correlation between enterprise-level productivity and human capital. The latter is expressed in two variables: one that captures preemployment educational attainment (i.e., years of schooling) and another that indicates whether enterprises offer in-service training to their workers. We consider differences between small, medium-sized, and large enterprises and between the five countries. Furthermore, we assess whether preemployment and in-service human capital efforts can operate simultaneously and in parallel to raise productivity. The policy implications of the results are provided briefly at the end.

## 14.2 Human Capital at the Enterprise Level: A Short Survey

A link between workforce skills and education and the productivity of the enterprise is to be expected. A worker with more education is expected to contribute more to enterprise productivity than uneducated or unskilled workers. This would tend to hold if the education system does in fact impart knowledge and develop intellectual capacity. At the very least, it may act as a screening mechanism for more capable individuals—those who are more capable to begin with may complete more years of education, even if they don't gain much from the experience. For in-service training, the intuition is only slightly different. An enterprise invests in training because it seeks to make its workers more capable of performing their tasks, either more quickly or at a higher standard of quality. Training programs that do not induce greater productivity are likely to be phased out over time due to a negative cost-benefit calculus for the enterprise.

Research conducted over the past 3 decades has sought to confirm this basic and plausible intuition, and most of the evidence does confirm that a higher-skilled workforce is correlated with higher productivity. Some of the more revealing results relate to what type of education or training contributes most to productivity and whether there are important sector differences. Studies can be divided between those that use in-service training as the human capital variable and those that use educational attainment. The choice of which variable to focus on is often determined by what is available in enterprise datasets. There are also questions of the estimation techniques used and whether they are capturing a legitimate correlation. The literature includes studies of firms of all sizes and others that focus specifically on SMEs.

Generally, micro-level analysis of the relationship between education and training and enterprise performance is fairly recent. Only 2 decades ago, Black and Lynch (1996, p. 263) would assert that there have been “few studies” in the United States (US) testing the impact of “education and employer-provided training on productivity.” A decade later, Dearden et al. (2005) would still argue that despite the interest by policy makers in the United Kingdom (UK), there “are hardly any papers that examine the impact of work-related training on direct measures of productivity.” In the same vein, Zwick (2006, p. 27) noted that the evidence on the link between training and productivity effects is “thin and partly contradictory.” These researchers, and others, have since deepened the research in this area through their work. Much of the research has focused on single-country studies of the US and countries in Europe.

Black and Lynch (1996) found a significant and positive impact of education on enterprise productivity for both the manufacturing and nonmanufacturing sectors, using data from the US. Furthermore, the total number of workers receiving enterprise training did not affect productivity, although more detailed analysis showed that in-service but off-the-job training for manufacturing workers and computer-based training of nonmanufacturing workers were correlated with higher productivity. The study also found that off-the-job training was less disruptive of the production process and could generate better outcomes. Haltiwanger et al. (1999) found clear evidence that enterprises with more educated workers are more productive. The results, based on data from the US state of Maryland, suggested that “high-productivity workplaces are also high-skill workplaces” (p. 97).

Dearden et al. (2006) found a statistically significant impact of training on productivity in the UK. However, the researchers used a vague training variable from a survey that asked respondents if they had been engaged in any type of work-related education or training over the

previous 4 weeks. Nonetheless, an increase in training of 1 percentage point increased production output by about 0.7%—a rather large impact. In a similar study, Zwick (2006) found that German firms that trained a large share of their workers in the first half of 1997 had higher productivity in subsequent years.

Several studies have focused on Asian economies. Batra and Hong (2003) found that formal training is an important determinant of technical efficiency—a measure closely related to productivity. They employ data on a cross-section of SMEs in Indonesia, Malaysia, Taipei, China, and three countries in Latin America. The study also found that the most efficient firms combine formal and informal training but that informal training by itself is negatively correlated with firm efficiency, except in the case of Mexico. The general results confirm the findings of an earlier study (Tan and Batra 1995).

Vu (2003) found that a larger share of skilled workers in the enterprise workforce was correlated with higher technical efficiency of state-owned enterprises in Viet Nam. The two other key factors were engagement in export activities and location in Ho Chi Minh City. Hara (2011) studied the impact of training on the productivity of non-regular workers in Japan. Those who received training, both on and off the job, demonstrated higher productivity. Productivity was measured imprecisely as the increase in work assignments, work levels, and work responsibilities.

Charoenrat and Harvie (2014) found that the share of skilled workers in small Thai manufacturing firms is positively correlated with technical efficiency. However, the relationship does not hold for medium-sized firms—a puzzling result. Combining small and medium-sized firms, the study does find a significant correlation between skills and technical efficiency across eight industry subsectors.

## 14.3 A Model of Labor Productivity and Human Capital

We use a standard model of labor productivity to test the correlation (and possible impact) of human capital on firm performance. Productivity is defined as the value added of the enterprise divided by the number of regular, full-time workers. Productivity is determined by the capital input, represented by the capital/labor ratio, and human capital input. We use two measures of human capital: educational attainment of the enterprise workforce and whether the enterprise provides formal

training to its workers. Control variables are included as provided below. The equation is as follows:

$$L_p = c + \beta_1 k + \beta_2 H + \beta_3 S + \beta_4 A + \beta_5 T + \beta_6 L + \beta_7 C + \varepsilon$$

in which:

$L_p$  = labor productivity

$k$  = capital/labor ratio

$H$  = human capital (preemployment education or in-service training)

and we include control variables:

$S$  = size of the enterprise

$A$  = age of the enterprise

$T$  = sector

$L$  = location

$C$  = country.

The constant term is  $c$ , the error term is  $\varepsilon$ , and the coefficients are represented by  $\beta_s$ , following standard notation. We run ordinary least squares regressions on three versions of the model. Model 1 includes the education variable, model 2 includes the training variable, and model 3 includes both.

### 14.3.1 Countries and Data

We use data from five middle-income countries in Asia: the PRC, Indonesia, Malaysia, Thailand, and Viet Nam. The data are drawn from the World Bank's Enterprise Surveys, which use a standard methodology for surveying businesses in developing countries.<sup>2</sup> This provides confidence that the country data can be pooled without concern for differences in the definitions of variables. Our sample comprises a total of 4,045 enterprises, thus providing a fairly large sample and avoiding bias based on small sample size (Table 14.1). For the PRC and Thailand, the sample includes over 1,000 firms each, and for the three other countries the sample is between 500 and 800 firms.

The countries use different definitions for firm size, which we could not use because we make estimates on a sample that pools the five countries. The World Bank uses a standardized classification with a threshold differentiating medium-sized and large firms set at 100

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<sup>2</sup> The data were obtained from the World Bank Group through the Enterprise Survey website: [www.enterprisesurveys.org](http://www.enterprisesurveys.org).

workers. However, we find this threshold too low. As a result, we use a classification in which small firms are defined as having fewer than 100 workers and medium-sized firms having fewer than 250 workers. We feel that this is more in line with classifications used in Asia and other regions.

Using this classification, just under 60% of the firms in our sample are small, with the share of small firms in each country ranging from 52% to 60%, except for Indonesia where it is higher at 75% (Table 14.1). The remaining firms are fairly evenly distributed between medium-sized (22%) and large (19%) firms. The average firm has 200–300 workers, again with the exception of Indonesia, which has an average size of 166 workers.

Value added is calculated from the survey data on output value and costs. The two human capital variables are dummies. The education variable takes the value 1 if the average education of the enterprise workforce is 10 years or more and takes the value 0 otherwise. The training variable takes the value 1 if the enterprise provides formal in-service training and takes the value 0 if it does not. The age of the enterprise is expressed in years and the other control variables (sector, location, and country) are dummies. Location signifies the province where the enterprise is located, or subnational state in the case of Malaysia.

**Table 14.1: Enterprise Sample, by Size**

	Small (Share of enterprises with < 100 workers) (%)	Medium (Share of enterprises with ≥ 100 and < 250 workers) (%)	Large (Share of enterprises with ≥ 250 workers) (%)	Total number of enterprises	Average number of workers per enterprise
PRC	58	25	17	1,214	275
Indonesia	75	11	13	504	166
Viet Nam	56	20	24	565	251
Thailand	52	25	23	1,024	252
Malaysia	60	22	19	738	209
<b>Total</b>	<b>59</b>	<b>22</b>	<b>19</b>	<b>4,045</b>	<b>236</b>

PRC = People's Republic of China.

Note: Workers refers to full-time, regular workers.

Source: Authors.

### 14.3.2 Results

The estimation results of the three models are provided in Table 14.2. All variables are significant and have the expected signs. Model 1 indicates that enterprises that provide formal training programs to their workers have significantly higher labor productivity than enterprises that do not provide training. The results for model 2 indicate that enterprises with an average educational level of the workforce of 10 years or more have higher productivity than enterprises where the average education is less than 10 years. This difference is also statistically significant. These results confirm our intuition that higher-quality human capital through education and training contributes to higher enterprise productivity.

Model 3 includes both human capital variables in the regression. Both variables remain significant with only a small reduction in the size of the coefficient—for training the coefficient falls from 0.129 to 0.109 and for education it falls from 0.190 to 0.182. The result suggests that prior education and in-service training are not substitutes for the enterprise to

**Table 14.2: Determinants of Labor Productivity**

	Model 1	Model 2	Model 3
Capital intensity (K/L)	0.270*** [0.014]	0.266*** [0.014]	0.264*** [0.014]
Training	0.129*** [0.044]		0.109** [0.044]
Education		0.190*** [0.037]	0.182*** [0.037]
Medium-sized firms	0.157*** [0.046]	0.168*** [0.044]	0.142*** [0.046]
Large firms	0.165*** [0.050]	0.185*** [0.049]	0.151*** [0.050]
Firm age	0.081*** [0.028]	0.088*** [0.028]	0.084*** [0.028]
Industry dummies	Yes	Yes	Yes
Location dummies	Yes	Yes	Yes
Country dummies	Yes	Yes	Yes
Number of observations	4,045	4,045	4,045

Notes: Dependent variable is labor productivity. Standard errors in parentheses. Significance levels: \*\*\* = 1%, \*\* = 5%, \* = 10%.

Source: Authors.

choose from but that both can, at the same time, contribute to productivity increase.<sup>3</sup> Enterprises can hire workers that are more educated, and can raise productivity further by providing training after hiring.

The results for the enterprise size variables are also interesting and expected. Small firms (the base case) have the lowest productivity whereas large firms have the highest. This is consistent with many other studies that indicate that while SMEs are often touted as being dynamic, flexible, and innovative, they in fact exhibit a lower productivity than larger firms.<sup>4</sup> Our estimations do account for differences in skills, education, capital intensity, and sector and thus the differences in labor productivity by firm size are likely derived from economies of scale, management capacity, and/or other factors.

We expand the estimates to explore country differences and to see whether certain countries are driving the general results. To do so, we drop the country dummies and replace them with variables that interact the country variable with the training variable in model 1 and the country variable with the education variable in model 2. Both interaction terms are included in model 3. The results are presented in Table 14.3 which shows only the new variables used, as the coefficients for the other variables remain similar to those in the initial estimations. The results are revealing.

In Table 14.3, all but 2 of the 20 coefficients exhibit the expected sign (positive). The two cases with a negative sign have very small coefficients that are not significant and thus are not a concern. Of the remaining 18 coefficients, 11 are significant. For the PRC, none of the interaction terms for education and training are significant. For training, the lack of significance may be due to the high share of the PRC enterprises that train, which stands at 85% of firms in our sample and is much higher than the sample average of 61% and the share for the next highest country, which is Thailand at 71% (figures not shown). With such a high share of training (i.e., little variation) it may be difficult to establish a correlation with differences in productivity among the

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<sup>3</sup> We are not arguing that preservice education and in-service training are complements. The economic sense of “complement” would imply that an increase in one of the human capital variables raises the use or impact of the other variable. It could be argued that the benefits of in-service training to the enterprise might be higher if the workforce is already more educated. More educated workers might pick up new skills faster or more readily. However, the coefficients on the human capital variables both fall slightly when both are included in model 3 and this suggests they are not complements but parallel factors having a similar impact.

<sup>4</sup> Vandenberg (2004) provides a review of the evidence on productivity and firm size which indicates generally that smaller firms have lower productivity than larger firms.

**Table 14.3: Heterogeneity by Country**

	Model	PRC	Thailand	Viet Nam	Malaysia	Indonesia
Training	1a	0.032 [0.078]	0.423*** [0.144]	0.024 [0.096]	0.120* [0.065]	0.208** [0.103]
Education	2a	0.088 [0.065]	0.618*** [0.129]	0.222** [0.093]	0.190*** [0.054]	0.031 [0.102]
Training	3a	0.035 [0.078]	0.283* [0.148]	-0.002 [0.096]	0.090 [0.065]	0.226** [0.105]
Education	3a	0.093 [0.065]	0.587*** [0.135]	0.227** [0.093]	0.183*** [0.054]	-0.002 [0.103]

PRC = People's Republic of China.

Notes: Standard errors in brackets. Significance level: \*\*\* = 1%, \*\* = 5%, and \* = 10%. Training and education are included in a single estimation of Model 3a; the results are provided in separate rows for presentational purposes.

Source: Authors.

PRC firms. However, the same argument cannot be made for the lack of significance on the education variable. Some 47% of firms in the PRC have a workforce with 10 years or more of schooling but this is only slightly above the average for the whole sample (41%) and is not the highest among the five countries.

In Malaysia and Thailand, both training and education are strongly correlated with productivity as 7 of the 8 variables are found to be significant. Viet Nam and Indonesia offer interesting contrasts. Education is important in the case of Viet Nam but training does not seem to impact productivity. The opposite is the case with Indonesia, where training is the key human capital variable.

We also investigate differences by firm size. We wish to determine whether training and education are likely to have a greater impact on firms of a particular size—and indeed whether human capital has a statistically significant impact on all sizes of firms. Our supposition is that human capital is important for enhancing the productivity of enterprises of all sizes. The size variables are dropped and replaced with variables that interact size with training in model 1b and size with education in model 2b. In model 3b, both sets of interacted terms are included. The results are provided in Table 14.4. They show a significant correlation between all the interaction terms and productivity, with one exception. In model 3b, the interacted term of training and medium-sized enterprises is the right sign but not significant. The overall results suggest that education and training raise productivity for enterprises of all sizes and that hiring educated workers and training the workforce

**Table 14.4: Heterogeneity by Enterprise Size**

	Model 1b	Model 2b	Model 3b	Model 3b
	Training	High school	Training	High school
Small	0.110** [0.049]	0.107** [0.044]	0.143*** [0.050]	0.097** [0.047]
Medium	0.174*** [0.051]	0.322*** [0.058]	0.070 [0.065]	0.341*** [0.076]
Large	0.224*** [0.058]	0.339*** [0.062]	0.161** [0.064]	0.277*** [0.071]
		[0.065]	[0.135]	[0.093]

Notes: Standard errors in parentheses. Significance level: \*\*\* = 1%, \*\* = 5%, and \* = 10%. Training and education are included in a single estimation of model 3b; the results are provided in separate columns for presentational purposes only.

Source: Authors.

is important for small enterprises as it is for larger firms. However, in the first two models we see that the strength of the correlation rises with firm size (i.e., larger coefficients) and that the pattern is consistent through the three size classifications for both human capital variables. This suggests that education and training may have more of an impact on raising the productivity of larger firms than smaller ones. Model 3b provides no pattern in this regard.

### 14.3.3 Endogeneity

It may be argued that the foregoing estimations suffer from the problem of endogeneity.<sup>5</sup> Two sources of endogeneity might arise: one stemming from reverse causality and the other from a missing variable that might affect both human capital and productivity independently. Both concerns should be considered.

Regarding reverse or dual causality, there is a possibility that not only might human capital raise productivity but that firms with higher productivity may be more likely to engage in training and to hire educated workers. While this concern is very real, we need to consider the underlying economics and business decision making that is taking place. More productive firms may invest more in hiring and training but

<sup>5</sup> The issue was raised by participants at a presentation of the initial results during the workshop “SMEs in Developing Asia: New Approaches to Overcoming Market Failures” 19–20 November 2015, held at the Asian Development Bank Institute, Tokyo, Japan.

they are not doing so simply because they are more productive firms. They do it because they know that better-skilled workers are more productive and contribute to the overall productivity of the enterprise. So while it is possible that there may be some degree of reverse causality, it is based on the singular understanding by firms that greater human capital contributes to productivity. If their experience, over time, showed otherwise, they would reduce the resources allocated to training and not pay higher wages to new recruits.

The other endogeneity problem—a missing or unobserved variable that affects both productivity and human capital—is a possibility, but it is difficult to imagine what variable or type of variable this might be. Given that productivity is a performance variable and human capital is an input, the mostly likely arrangement is of an input affecting performance. There are no obvious candidates for a factor that might influence both independently. It may be that the owner or entrepreneur is driven to reach high productivity and also has faith in human capital so that it is promoted along with other efforts to raise productivity. This endeavor may occur simultaneously before the increase in human capital has an opportunity to affect productivity. In addition, there may be factors at play of which we are just not aware.

To account for the possibility of endogeneity, we re-run the main estimations with the use of instrumental variables. In doing so, we use the generalized method of moments (GMM) technique. We focus our efforts on the training variable. We estimate a probit equation with training as the dependent variable and the identification variable as the enterprise's perception of whether the lack of availability of skilled workers affects its growth. This variable is available in our dataset. (We experimented with another indicator—the perception of labor regulation as a constraint for the enterprise—but the results were weak.) As there may be an endogeneity problem in this estimation as well, we created two instruments: one in which that identification variable is crossed by province or state and the other by industry. All tests for instrumental variables were passed, including the Hansen test, the weak instrument test, and the under-identification test. We generated the fitted values of training and used them as the instrument.

The results are presented in Table 14.5. Models 1c and 2c include the instrumental training variable; the former with the identification variable crossed with province or state and the latter with industry. We exclude the education variable from these two estimations. In models 3c and 4c we again use the two instruments but now also include education. The results for our key variables of interest are similar to the earlier estimations. The instrumented training variable is significant and with the expected sign in all four estimates, although with a reduced

level of significance. Education is significant as in previous estimates. These results provide us with greater confidence that training, at least, is causing higher productivity at the enterprise level.

However, we do find that firm size is no longer significant (and the coefficients are negative) across all four estimates. This stands in rather bold contrast to the earlier results, which were positive and significant and suggested the size of the enterprise had a significant bearing on differences in labor productivity even when taking into account human capital, industry, and other factors. The negative signs here, if they had been significant, would have suggested that small firms have higher productivity than medium-sized or large ones.

We check the robustness of the results by trimming. This technique is used to determine whether the results are driven by the top performers (who would always provide training for their workers) and the weakest performers (who may never provide training). We drop 5% of the enterprises with the highest level of labor productivity and 5% of those with the lowest level. The sample size is reduced to 3,613 firms. The results, not shown, are very similar to the results in Table 14.5, suggesting that the latter are robust. The signs are the same on all variables. The level of significance (1%, 5%, or 10%) remains unchanged, except that age is no longer significant at the 10% level. The size of the coefficients falls in all cases but only slightly.<sup>6</sup> We have similar minor changes when conducting trimming for model 3 of Table 14.2 (the model without instruments). Therefore, we can continue to conclude that training and education have a significant effect on firm productivity.

## 14.4 Policy Implications

The policy implications that can be drawn from the foregoing analysis are clear and direct. Efforts to increase human capital in the private sector workforce can be an important strategy for raising the productivity and competitiveness of enterprises of all sizes. The link between education and training on the one hand and enterprise productivity on the other is important for SMEs and is not a factor that they should ignore in their quest to develop competitive, productive, and sustainable enterprises. Furthermore, skills and education policy can be—and based on our results probably should be—an important part of the SME strategy of

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<sup>6</sup> For example, the coefficient on training falls from 0.719 in model 3c of Table 14.5 to 0.586 after trimming. Other coefficients decrease less. The trimming results are not presented to avoid presenting too many results.

**Table 14.5: Determinants of Labor Productivity, Instrumented**

Dependent Variable: Labor Productivity	Model 1c	Model 2c	Model 3c	Model 4c
Training (instrumented)	0.958*** [0.367]	0.820** [0.396]	0.719* [0.410]	0.693* [0.421]
Education			0.141*** [0.051]	0.143*** [0.052]
Capital intensity	0.252*** [0.013]	0.254*** [0.013]	0.251*** [0.013]	0.252*** [0.013]
Medium-sized firms	-0.054 [0.101]	-0.020 [0.107]	-0.054 [0.101]	-0.020 [0.107]
Large firms	-0.102 [0.127]	-0.058 [0.135]	-0.102 [0.127]	-0.058 [0.135]
Firm age	0.043 [0.031]	0.048 [0.032]	0.053* [0.032]	0.054* [0.032]
Industry dummy	Yes	Yes	Yes	Yes
Province dummy	Yes	Yes	Yes	Yes
Country dummy	Yes	Yes	Yes	Yes
Intercept	6.412*** [0.480]	5.892*** [0.540]	5.912*** [0.535]	5.922*** [0.535]
Number of observations (enterprises)	3,998	3,998	3,998	3,998

Notes: Standard errors in brackets. Significance level: \*\*\* = 1%, \*\* = 5%, and \* = 10%. Training and education are included in a single estimation of model 3b; the results are provided in separate columns for presentational purposes only.

Source: Authors.

governments in Asia. Efforts to focus SME support narrowly on access to finance may miss the wider factors that are important to small firms.

The empirical analysis tested two human capital variables—the education of workers and the training programs that firms offer their workers. We found that both are strongly correlated with labor productivity and that both, together, can have an impact. In other words, preservice education and in-service training are not alternatives from which an enterprise owner should choose. Rather they are parallel supporting factors: firms can both hire more educated workers and provide them with additional training and both efforts, undertaken simultaneously, will contribute to improved productivity.

The results do not allow us to provide more detailed policy measures, which require deeper and more specific analysis. For example,

our education variable differentiated between firms with an average workforce education level of 10 years or more and those with less than 10 years. This is a fairly vague yardstick. It equates in many countries with the end or the near-end of secondary school. More detailed analysis might indicate the value of postsecondary and vocational education. Our training variable was similarly broad, indicating only whether enterprises provided formal training to their workers and not exploring the extent of training (what share of the enterprise workforce had access to the training), the frequency of training offered, or the quality and nature of the training. More detailed analysis of these issues, which would require a richer dataset, would help to determine what specific types of training programs are most beneficial. Finally, the analysis did not provide a cost-benefit analysis from the perspective of the employer. More educated workers are attracted by higher wages while in-service training is costly to the enterprise not only in terms of paying in-house or external trainers but also the production that is foregone while employees are in the training room instead of on the shop floor or at the service counter.

What the results do indicate, however, is that governments need to both build a good education system and ensure that young people are completing high school. Furthermore, governments can consider whether to support (through subsidies) enterprise-based training, knowing it has a positive effect on developing the competitiveness of SMEs and large enterprises and increasing productivity in the economy.

## 14.5 Conclusion

SMEs play an important role in the development of economies in Asia, as they do in other regions of the developing world. Their contributions to job creation, investment, innovation, and exports make them an important policy area for governments. Understanding the key factors that support enterprise productivity and competitiveness is critical to knowing where governments—and enterprises themselves—can focus their energies.

This chapter has examined the connection between productivity and human capital based on data on 4,000 enterprises in five countries. The results indicate a strong positive correlation and probably a causal effect of two measures of human capital—preemployment education and in-service training—on labor productivity. SMEs can increase productivity by hiring a workforce that has been educated to at least the secondary school level and by providing training to their workers through in-service programs. The relationship between human capital

and productivity is valid for different sizes of enterprises. SMEs benefit from progressive hiring and training practices just as large firms do. It is an area of enterprise management that they avoid at their own peril.

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# Is There a Size-Induced Market Failure in Skills Training?

*Paul Vandenberg and Long Q. Trinh*

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## 15.1 Introduction

Small and medium-sized enterprises (SMEs) face a range of constraints in seeking to establish, sustain, and grow their operations. Access to credit is perceived to be a key constraint, but others are also important. Among the nonfinancial constraints is the difficulty of developing a skilled and educated workforce. Skilled workers increase the quality of goods and services produced and raise the productivity and competitiveness of the enterprise.

Developing a skilled workforce can contribute to the performance of enterprises of all sizes. However, there may be barriers to hiring and training good workers that are related to enterprise size. These barriers we call “size-induced market failures” in skills and education, and like other market failures they can constrain SMEs from reaching their full potential. Understanding the nature of these market failures is important for designing effective public policy interventions.

Finding ways to improve the survival and performance of SMEs is not a trivial matter. These firms, including microenterprises, are important for the economies of Asia. Although individually small in size, they are massive in number and make a large aggregate contribution to economic value creation and welfare. At least 97% of all Asian enterprises are SMEs and they account for more employment on aggregate than large enterprises. Their contribution to output ranges widely between countries but generally accounts for 30%–50% of gross domestic product (GDP). Large SMEs are engaged in exporting and/or supplying factories that do export.<sup>1</sup>

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<sup>1</sup> The data are from Vandenberg et al. (Chapter 1), which provides an overview of the SME contribution in Asia focusing on 14 major economies. See also ADB (2015) for detailed country overviews and financing issues, and Ayyagari et al. (2014) for employment share and job creation.

The analysis in the succeeding sections is based on firm-level data from five Asian countries. We divide the enterprises into four size categories and look for trends and possible patterns of association regarding training and education. We also use a linear probability model to test whether firms find that the lack of skilled workers as an enterprise constraint seek to overcome that constraint by providing their own training.

## 15.2 Enterprise Size as a Constraint

There is considerable evidence that a more skilled and educated workforce raises enterprise productivity and performance (Vandenberg and Trinh, Chapter 14). Furthermore, the impact holds for smaller firms as it does for larger ones. The results suggest that firms should be eager to raise human capital. The reality is that larger firms are much more likely to hire and train skilled workers than smaller firms. This difference may constitute a size-induced market failure.

An enterprise can raise human capital in two ways: hiring and training. Hiring allows an enterprise to secure workers with good skills, either fresh graduates from technical schools, training institutes, colleges, and universities, or experienced workers who are already part of the labor force. Small firms find it difficult to hire both types of workers because skilled workers will opt for jobs with better pay, benefits, and job stability, which tend to be offered by large firms and the public sector. The high “churning” rate among SMEs (high birth but also high death rate) means that SMEs are perceived to offer less long-term job security. Highly skilled workers, knowing the market for their skills, will self-select to secure employment with large firms; small firms will lose out unless they are dedicated to hiring skilled labor and willing to offer a competitive package. Furthermore, small firms have weaker links with training and education institutions, because new hiring is less frequent and at lower numbers than for large firms.

In addition, micro and small firms are often controlled by a single founder/owner/manager. This entrepreneur manages many aspects of the firm and has less time to dedicate to the recruitment of workers. There is commonly no established human resources department or even a single human resources staff person and there is little time to develop links with colleges and training institutes to recruit good young workers, either as graduates or through internships and apprenticeships.

In developing economies—and also some developed ones—the education system may not be turning out adequately skilled graduates. They may receive training in a specific field, but the skills they obtain

are not of adequate quality or relevant to the needs of employers. The problems of inadequate quality and employer relevance result in a “skills mismatch,” which is a public policy failure that leaves employers searching for solutions (Martinez-Fernandez and Powell, n.d.).<sup>1</sup> The main solution is for the enterprise itself to train its workers. This allows the enterprise to build on the general education and skills of fresh recruits, or provide firm-specific training to more experienced workers.

Training can be provided either informally through on-the-job mentoring or through formal training programs. Formal programs are offered either on-site (i.e., at the enterprise but away from the production process) or off-site (at a training institution to which the enterprise sends workers).

Many SMEs, especially microenterprises, will resort only to on-the-job training. Ashton et al. (2008) have challenged what they see as the “myths” that micro and small enterprises (MSEs) are not interested and generally do not engage in training. They argue that while these firms may exhibit low levels of formal training, they are involved in considerable nonformal training in which skills are passed from experienced and technically adroit workers to newer and less experienced ones at the firm.<sup>2</sup> Hill (2004, p. 9) also suggests training by SMEs is “more likely to be reactive and informal [and]...also it tends to be short term.” Capturing the impact of this type of training on firm performance is difficult. Batra and Tan (2003), who did have data on formal and informal training in their multicountry study, found that the most efficient firms combine both types of training but that informal training by itself was negatively correlated with firm efficiency.

Offering formal training to workers is difficult for small firms. The cost per worker is high in organizing on-site training using a contracted trainer because the number of workers is small. As well, not only is it costly to send workers off-site for training, small firms are more dependent on each worker to keep production going and meet demand. Training is best provided in off-peak times of the day, week, month, or year but external training providers may not want to accommodate these preferences. SMEs are also less likely to use training subsidies from public training funds that they have contributed to through a mandatory training levy (Lee, Chapter 13). Lack of awareness of how to access the

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<sup>1</sup> For definitions of skills mismatch and how it affects Europe, see Cedefop (2015) and ILO (2014).

<sup>2</sup> Ashton et al. (2008) challenge four prevalent myths about training by micro, small, and medium-sized enterprises: (i) they do not value training, (ii) they systematically underinvest in training, (iii) they consider informal training less important than formal training, and (iv) skills deficits can best be addressed through government training schemes that support firms to engage in formal training.

subsidy, lack of time to make the application, or disinterest in organizing training may be factors resulting in the low uptake by small enterprises.<sup>3</sup>

There is also the possibility that small firms are not interested in providing training, meaning that they offer less training not because they find it difficult or costly, but because they do not see the benefits for the firm. Because there is less available evidence linking training to outcomes in small firms than there is for large firms, owners may think there will be no impact (Hill 2004). The owner, who is also normally the manager and in micro firms may also be a member of the production staff, may have more pressing issues to address. As well, the enterprise may be engaged in nontechnical service activities (e.g., retailing) in which training is less important than it is for manufacturing or technical services. Even owners who appreciate the value of skilled workers may be reluctant to train because they fear that trained workers, especially those with certified skills, will be poached by other firms and the training investment would be lost.<sup>4</sup> If this is the case, then low levels of training among SMEs may not be the result of a market failure, and any efforts to make training cheaper or more available may have little impact on raising training levels.

### 15.3 Empirical Analysis of the Provision of Skills and Education in Asia

We analyze the phenomenon of size-induced market failures in skills training and education through an empirical investigation using data from Asia. Statistics, differentiated by enterprise size, are assessed to establish basic patterns and a plausible storyline. We then conduct a linear probability analysis to confirm these trends and explore additional possibilities.

Our empirical analysis is based on data from five Asian countries: the People's Republic of China, Indonesia, Malaysia, Thailand, and Viet Nam. These countries are lower- and upper-middle-income countries. We use data from the Enterprise Surveys of the International Finance Corporation, an agency of the World Bank Group. The surveys use a standard methodology and questionnaire for surveying firms in

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<sup>3</sup> Lee (Chapter 13 of this volume and 2006) explains how the Republic of Korea has responded to the low SME use of training subsidies by developing localized training consortia that better meet the needs of smaller firms.

<sup>4</sup> This itself is a market failure but of a different sort than is being discussed. The failure arises from an externality in which the investor (in training) cannot capture the full benefit.

developing countries and thus data from different countries can be combined without difficulty.

The sample comprises 5,586 enterprises (Table 15.1). It includes over 1,000 firms each for the PRC and Thailand and somewhat fewer for the other three countries. We impose a uniform size classification on the five countries based on the number of permanent, full-time workers.<sup>5</sup> Microenterprises are defined as having 5–9 workers, small firms have 10–49 workers, medium-sized firms have 50–249 workers, and large firms have 250 or more. The survey includes only formal sector enterprises and excludes enterprises with fewer than 5 workers. This classification is very close to that of the European Union (EU), with the exception that in the EU micro firms are defined as having 0–9 workers. It is also broadly consistent with classifications in Asia, although the range of country definitions is broad.<sup>6</sup>

Using this classification, about 11% of the firms are micro, with a very high proportion of 41% for Indonesia (Table 15.1). Small and medium-sized firms make up most of the sample at 32% and 39%, respectively. About 19% of firms are large. Thus, there is a fairly good distribution across the four size classes.

Table 15.2 provides firm characteristics related to the share of production workers and skilled workers and the owner's or manager's perception of skills. The share of production workers in the enterprises is fairly consistent across the four size classifications. It ranges from 76% for small firms to 83% for large firms. The share is not the smallest

**Table 15.1: Sample of Enterprises, by Size and Country**

	Size (no. of workers)	No. of Enterprises	Share of Enterprises (%)					
			All	PRC	Malaysia	Thailand	Viet Nam	Indonesia
Micro	5–9	589	10.5	2.9	3.1	0.2	6.3	40.9
Small	10–49	1,772	31.7	27.4	41.2	34.4	32.5	26.1
Medium	50–249	2,191	39.2	51.9	37.5	42.7	38.1	20.1
Large	250+	1,034	18.5	17.8	18.2	22.7	23.1	13.0
Total		5,586	99.9	100.0	100.0	100.0	100.0	100.1

PRC = People's Republic of China.

Source: Calculated by authors with data from World Bank Group Enterprise Surveys, [www.enterprisesurveys.org](http://www.enterprisesurveys.org)

<sup>5</sup> We do not use each country's own size definitions.

<sup>6</sup> Many countries have more than one definition depending on the sector. See Vandenberg et al. (Chapter 1).

**Table 15.2: Skills and Worker Characteristics, by Enterprise Size**

	% of Enterprises			
	Micro	Small	Medium	Large
Production workers as a share of all workers	80	76	78	83
Skilled production workers as a share of all production workers	79	48	43	44
Inadequately skilled workforce as major/ very severe constraint	27	54	62	69

Source: Calculated by authors with data from World Bank Group Enterprise Surveys, [www.enterprisesurveys.org](http://www.enterprisesurveys.org)

for microenterprises. It may be that nonproduction activities (e.g., service and support functions) are handled by the owner-manager in microenterprises. In contrast, small firms hire workers for the support functions, and because full-time workers are discrete units, they represent a disproportionately larger share of the workforce compared with medium-sized and large enterprises, for which the share of nonproduction workers is smaller.<sup>7</sup>

The most striking aspect of the data presented in Table 15.2 relates to the share of production workers who are skilled. The highest share is among microenterprises (79%) and is nearly twice as high as in the three other size categories (43% to 48%). This suggests that non-micro firms employ a core of skilled workers as well as other workers who are part of the production process but play a nonskilled supporting role. These workers would move supplies and goods into and out of the production line, store goods, and fulfill other production support functions. Micro firms are less likely to employ such workers and instead skilled workers carry out these tasks in the normal course of their work and in conjunction with their skilled activities. Non-micro firms may also employ more standardized machinery that can be operated by unskilled workers. It should also be noted that what constitutes a “skilled worker” is not defined in the questionnaire and therefore is based on the perception of the owner or manager completing the survey, and that perception may differ between micro and non-micro firms.

<sup>7</sup> A small enterprise and a medium-sized enterprise may each only need one finance person but that worker will represent a larger share of the total enterprise workforce for a small enterprise.

Micro and small firms are less likely than medium-sized and large firms to consider an inadequately skilled workforce as a key business constraint. Only about a quarter (27%) of microenterprises felt it was a major or severe constraint compared with a majority of small firms and 69% of large firms. There are two ways in which to interpret these figures. One is to take them at face value and interpret with the other data. As such, micro firms—and also, but to a lesser extent, small firms—have a higher share of skilled production workers and see skills as less of a constraint than do medium-sized and large firms. The lower share of skilled workers among the larger firms reflects an inability to secure the skilled workers needed and hence the perception that inadequate skills is a constraint. The second interpretation is derived from the idea that the results are based on perception. Larger firms might see it as a major or severe constraint because they have fewer other main constraints. Smaller firms may have other major concerns that reduce the sense that skills are a key constraint. These interpretations will become clearer as we investigate the data further.

## 15.4 Training and Education Characteristics

We next investigate the training activities of enterprises and the education level of their workers (Table 15.3). It is clear that larger enterprises are more likely to offer formal training to their workers. Formal training includes both that which is organized at the firm but taking place away from the normal work of the enterprise and that

**Table 15.3: Training and Education, by Enterprise Size**

	Share of Enterprises (%)			
	Micro	Small	Medium	Large
Share of enterprises that offer formal training to workers	7	39	71	79
Share of workers who receive formal training	7	39	57	64
Share of enterprises with average education of				
10–12 years or more	18	35	47	47
Share of enterprises with average education of more than 12 years	4	9	9	14

Source: Calculated by authors with data from World Bank Group Enterprise Surveys, [www.enterprisesurveys.org](http://www.enterprisesurveys.org)

which is conducted away from the enterprise at the training provider. It excludes on-the-job training by experienced colleagues. Only 7% of microenterprises offer formal training to their workers. The figure rises significantly to 39% for small firms and then to 71% and 79% for medium-sized and large firms, respectively. For these latter groups the effort to provide training is impressive. Furthermore, differences by firm size are also apparent when we consider the share of workers trained in each enterprise. The share rises with firm size: only 7% of the microenterprise workforce receives training, but this figure rises to 39% at small firms and up to 64% at large firms. That is, large firms that do offer training train on average about two-thirds of their workers, and micro firms train less than a tenth.

These basic statistics provide the following story: smaller firms have a higher share of skilled workers and do not see a lack of skilled workers as a major constraint for the enterprise. As a result, they are less likely to offer training to their workers, and when they do offer training they offer it to a fairly small share of their workers. We now turn to the education level of the workforce in these enterprises to add to or modify our story.

In the survey, enterprises are asked to provide the average years of schooling of the workforce. There are several discrete choices; we focus on the ranges of 10–12 years of education and more than 12 years. Workers with 10–12 years of schooling would have completed some or all of secondary school. Workers with more than 12 years of schooling would have completed some postsecondary education, which may be in skills and other technical training or in other areas (e.g., business administration, sciences). More precise measures would be better but are not available from the survey. We also note that the indicator is based on the view of the owner or manager who completes the questionnaire.

The results are presented in Table 15.4 and are similar to those for training. The average worker education level is lower in smaller enterprises than in larger firms. Only 18% of micro firms have a workforce with an average of at least 10–12 years of education, compared with 47% of both medium and large firms. The pattern carries for education beyond 12 years. Only 4% of micro firms employ a workforce with more than 12 years of education compared with 14% of large firms.

Where does that leave our line of analysis? Smaller firms have a higher share of skilled workers, train less, and have a lower tendency to see skills as a constraint. However, their workers have much fewer years of education. Four-fifths of microenterprises employ a workforce in which the average worker has less than a high school diploma. The share is three-quarters of small firms. But nearly half of medium-sized and large firms boast a workforce with a high school education, on average.

The majority of non-micro enterprises see an inadequately trained workforce as a major or severe constraint. We also know that the tendency to provide formal training rises with enterprise size. These are basic tendencies that appear from viewing data from four discrete categories of enterprise size. But are these two trends related? That is, are enterprises that see skills as a constraint likely to try to overcome that constraint by training their workers? The idea is that if skilled workers are not available in the labor market, the enterprise might take on that responsibility itself. For this we estimate the relationship by running a linear probability regression. The dependent variable—what we want to explain—is the tendency for an enterprise to offer formal training. The key explanatory variable is the perception that an inadequately skilled workforce is a major or very severe constraint. We also add other variables, including a size variable to see whether there is a significant size-induced element as well, and we include other control variables.

Thus, our model for estimation is the following:

$$T = c + \beta_1 P + \beta_2 H + \beta_3 S + \beta_4 A + \beta_5 T + \beta_6 L + \beta_7 C + \varepsilon$$

in which:

T = whether the enterprise offers formal training or not

P = perception that an inadequately skilled workforce is a major or very severe constraint

H = human capital; whether the average education of the workforce is 10 years or more

and we include control variables:

S = size class of the enterprise (micro, small, or medium-sized; with large as the base case)

A = age of the enterprise, in years

T = sector

L = location (subnational province or state)

C = country

The constant term is  $c$ , the error term is  $\varepsilon$ , and the coefficients are represented by  $\beta$ s, following standard notation. We estimate a linear probability model, first using the ordinary least squares (OLS) estimator and the second one using the generalized method of moments (GMM) estimator. In the latter case, we instrument our main variable of interest, which is whether the enterprise perceives an inadequately skilled workforce as a major or very severe constraint. We instrument this variable due to the possibility that it may be endogenous. Whereas it is most likely that enterprises train because they feel they do not have

access to adequately trained workers, it may be that the causality works in the other direction or that there are unobserved or unobservable characteristics that affect both training and the perception regarding the skills of the workforce. As a result, we instrument the variable using location (i.e., subnational state or province) and subject the instrument to the Hansen test, the weak instrument test, and the under-identification test, all of which it passes. The generated fitted values are then used in the estimation of model 2.

The results confirm our intuition and the trends shown in the analysis of the basic statistics of the two previous tables. Enterprises that feel that the workforce is inadequately skilled seek to overcome this constraint by training themselves. This result is statistically significant and with the expected sign (Table 15.4). The coefficient for education (10 years or more) is also significant and positive. It is interesting that

**Table 15.4: Estimation: Whether Enterprise Provides Training (Dependent Variable)**

	(1)	(2)
	OLS	GMM with IV
Inadequately skilled workforce as constraint	0.085*** (0.012)	0.525*** (0.038)
Micro	-0.385*** (0.024)	-0.442*** (0.027)
Small	-0.345*** (0.016)	-0.306*** (0.020)
Medium-sized	-0.105*** (0.015)	-0.052*** (0.017)
Average education at least 10–12 years	0.059*** (0.011)	0.049*** (0.013)
Firm age	0.022*** (0.008)	-0.000 (0.010)
Intercept	0.842*** (0.182)	0.727*** (0.155)
Includes country, sector, and location dummies	Yes	Yes
<b>Total observations</b>	<b>5,586</b>	<b>5,586</b>

OLS = ordinary least squares, IV = instrumental variable, GMM = generalized method of moments.

Notes: Standard errors in parentheses. Significance level: \* $p < 0.1$ , \*\* $p < 0.05$ , \*\*\* $< 0.01$ . Reference category for micro, small, and medium-sized enterprises is large enterprises.

Source: Authors.

enterprises with a more educated workforce have a greater tendency to offer training than enterprises with a lower level of education. This may indicate that firms feel that secondary education does not provide the skills needed in the workplace. In addition, firms may feel the need to build on basic education with training in specific, enterprise- or sector-relevant skills.

The coefficients on the enterprise size variables are also interesting. The base case is large enterprises and the results (based on both the coefficients and the negative signs) indicate that micro firms train the least, followed by small firms and then medium-sized firms. Large enterprises train the most. What is particularly important here is that these variables are significant even with the inclusion of the variable on the perception of inadequate skills. In other words, the tendency for smaller enterprises not to train is only partially explained by their perception that they do not need to train (because the workforce skills are not inadequate). This result offers the possibility that micro and small enterprises do face a market failure. That is, they train less partly because they don't feel the need to train and partly because it may be difficult to organize training. More detailed data, which is not available in our dataset, is needed to confirm whether smaller firms do in fact face a market failure of this nature. The significance of the size variables may also be explained by missing explanatory variables.

The model works equally well whether instruments are used or not. The only noticeable difference is that firm age goes from being positive significant in the first estimate to negative insignificant in the second. As the coefficients are small and the variable is not a key variable of interest, this change is of little importance.

## 15.5 Conclusions and Policy Implications

SMEs face several distinct market failures based on enterprise size. We have sought to investigate the “size-induced market failures” in skills and education. Using a firm-level dataset that covers five Asian countries, we have broken the sample into micro, small, medium-sized, and large enterprises and investigated differences. The results are interesting, if not conclusive.

The results clearly indicate that the propensity for enterprises to train their workers increases with size. Micro firms train the least and large firms train the most. The share of the workforce at each enterprise that has access to this training also increases with size. On average, only 7% of workers in a micro firm have access to training, with the figure

rising to 64% for large firms. A similar trend is evident for education. A medium-sized or large enterprise is 2.5 times more likely than a microenterprise to employ a workforce with an average schooling of 10 years or more.

Our data are not sufficiently detailed to determine whether these differences in hiring and training result from a market failure or instead whether they are the result of explicit decisions by the enterprise. That is, is it that enterprises *can't* do more training or hire more educated workers or is it that they *won't*? Our data tell us that micro and small firms are much less likely than medium-sized or large firms to see the lack of skilled workers as a major obstacle to the development of their enterprises. This may suggest that they are consciously deciding against increasing human capital because they do not feel the need. However, our linear probability analysis suggests that a lower level of training among smaller firms is not fully explained by a lack of interest, which leaves open the possibility that part of the explanation derives from market failures.

Our related research, using the same dataset, suggests that the provision of enterprise-based training and hiring better-educated workers results in higher productivity (Vandenberg and Trinh, Chapter 14). However, it is possible that smaller firms do not see the benefit of such investment, or that the costs are perceived to outweigh the benefits. Another explanation is that smaller firms may be content to operate in market segments where the skills requirement is not particularly high and workers with these skills are readily available. They may be content to operate in what has been called a “low-skills equilibrium” (Wilson and Hogarth 2003).

Our findings, although not conclusive, do have implications for policy. For medium-sized and large firms and some small firms that feel the skills level is a major constraint, the government can provide support through enterprise-based and other training options. For micro firms and some small firms, there may be a need to first convince entrepreneurs of the benefits of training and then offer support that reduces barriers to training and ensures that the benefits outweigh the costs.

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## **SMEs in Developing Asia**

### *New Approaches to Overcoming Market Failures*

A vibrant stratum of small and medium-sized enterprises (SMEs) is critical for the growth and development of Asian economies. These enterprises generate employment, contribute to investment, participate in value chains, and support innovation. SMEs that seek to sustain and grow their operations, however, face a variety of constraints, many of which are directly related to size. These “size-induced market failures” create a role for public policy intervention.

This book focuses on the market failures encountered by enterprises in the key areas of technology and innovation, credit and finance, education and skills, and market access. Obstacles to SME participation in the rapidly expanding regional and global value chains are also examined. The chapter authors examine national and multicountry experiences in South, East, and Southeast Asia.

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#### **ASIAN DEVELOPMENT BANK INSTITUTE**

3-2-5 Kasumigaseki, Chiyoda-ku

Tokyo, 100-6008 Japan

Tel +81 3 3593 5500

Fax +81 3 3593 5587

[www.adbi.org](http://www.adbi.org)