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Bank efficiency, competition and the Southeast Asian financial crisis

Mohd Khan, Shazida Jan

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Bank Efficiency, Competition and the Southeast Asian Financial Crisis

BY
SHAZIDA JAN MOHD KHAN

SUPERVISED BY
DR. BARBARA CASU
PROF. PHILIP MOLYNEUX

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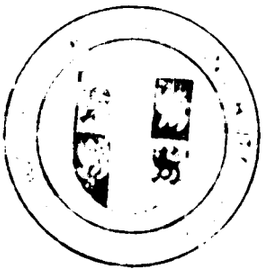

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ABSTRACT

The financial crisis which hit Southeast Asian countries in July 1997 had a significant impact on the countries' economies and forced governments in the region to undertake programmes of financial restructuring in order to reduce weaknesses in banks' balance sheets, stabilise currencies and, most importantly, to improve the soundness of the banking and financial sectors. The main aim of such policies was to restore confidence and help meet the ongoing challenges associated with financial innovation and globalisation. The causes and consequences of the Asian crisis have been studied extensively in the past decade. However, the literature on the impact of the post-crisis crisis restructuring programmes on bank efficiency, performance and competition, and their evolving relationships, remain rather limited and inconclusive. This study aims to shed some light on these interrelated aspects, with particular reference to the experience of six of the countries mostly affected by the crisis - Indonesia, Korea, Malaysia, Philippines and Thailand - during their recovery period (1999 to 2005).

Results from the efficiency analysis, carried out by means of Data Envelopment Analysis (DEA), show evidence of efficiency improvements in the region thereby indicating a positive impact of the restructuring programmes on the banking sector. Between 1999 to 2005 most of the countries in our sample actively followed policies of either closing failing institutions or fostering mergers. As a consequence, bank concentration in the region increased, raising the issue of the impact of the restructuring programmes on the competitive structure of banking markets. We found that, despite increased concentration, competition (assessed by the Panzar-Rosse *H*-statistic) also increased leading us to conclude that the structural changes in South East Asia improved the region's banking industry performance without resulting in banks enjoying excessive market power. These lessons from the Asian crisis may prove valuable in the light of current re-structuring of global banking systems in the light of the 2008 credit crisis.

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LIST OF ABBREVIATIONS

ADB	=	Asian Development Bank
AE	=	Allocative Efficiency
AFTA	=	Asian Free Trade Area
APEC	=	Asian Pacific Economic Cooperation
ATM	=	Automated Teller Machine
BCC	=	Banker, Charnes and Cooper
BIBF	=	Bangkok International Banking Facilities
BNM	=	Bank Negara Malaysia
BOK	=	Bank of Korea
BOP	=	Balance of Payment
CCI	=	Comprehensive Concentration Index
CCR	=	Charnes, Cooper and Rhoades
CD	=	Certificates of Deposits
CDRC	=	Corporate Debt Restructuring Committee
CES	=	Constant Elasticity of Substitutions
CMA	=	Cash Management Account
CONC	=	Concentration
CP	=	Commercial Papers
CR_K	=	*k*-bank Concentration Ratios
CRS	=	Constant Returns to Scale
DEA	=	Data Envelopment Analysis
DFA	=	Distribution Free Analysis
DMU	=	Decision Making Unit
E	=	Entropy Measure
EE	=	Economic Efficiency
EFF	=	Efficiency
EMS	=	European Monetary System
ES	=	Efficiency Structure
ESS	=	Scale Efficiency
ESX	=	X-Efficiency
ETA	=	Equity over Total Assets
EU	=	European Union
FDH	=	Free Disposal Hypothesis
FDI	=	Foreign Direct Investment
FOREX	=	Foreign Exchange
GCC	=	Gulf Cooperation Council
GDP	=	Gross Domestic Product
GLS	=	Generalised Least Square
GNP	=	Gross National Product
H_a	=	Additive Hause Index
HHI	=	Herfindahl Hirschman Index
HKI	=	Hannah and Kay Index
HM	=	Multiplikative Hause Index
HTI	=	Hall-Tideman Index
IBRA	=	Indonesia Bank Restructuring Agency
IDR	=	Indonesia Rupiah
IMF	=	International Monetary Fund
IO	=	Industrial Organisation

IT	=	Information Technology
KB	=	Commercial Banks
KRW	=	Korean Won
LLPL	=	Loan Loss Provisions over Total Loan
LTD	=	Loan over Total Deposits
M&As	=	Mergers and Acquisitions
MO	=	Monopoly Competition
MS	=	Market Share
MYR	=	*Malaysian Ringgit*
NBFI	=	Non-Bank Financial Institutions
NBQBs	=	Non-Bank Financial Institutions with Quasi Banking
NCD	=	Negotiable Certificate of Deposits
NDP	=	National Developing Policy
NEIO	=	New Empirical Industrial Organisation
NEP	=	New Economic Policy
NIC	=	Newly Industrialised Country
NIEs	=	New Industrial Economy Countries
NIM	=	Net Interest Margin
NOP	=	Net Open Positions
NPL	=	Non-Performing Loan
NVP	=	National Vision Policy
OE	=	Overall Efficiency
OLS	=	Ordinary Least Square
OPP	=	Outline Perspective Plan
PC	=	Perfect Competition
PHP	=	Philippines Peso
P-R	=	Panzar and Rosse
RI	=	Rosenbluth Index
RMP	=	Relative Market Power
ROA	=	Return on Assets
RP	=	Repurchase Agreement
SCP	=	Structure-Conduct-Performance
SDR	=	Special Drawings Right
SE	=	Scale Efficiency
SEA	=	Southeast Asian
SET	=	Stock Exchange of Thailand
SFA	=	Stochastic Frontier Analysis
SPVSs	=	Special Purpose Vehicles Acts
TE	=	Technical Efficiency
TFA	=	Thick Frontier Approach
TFP	=	Total Factor Productivity
THB	=	Thai Baht
UB	=	Universal Banks
UK	=	United Kingdom
US	=	United States of America
USD	=	United States Dollar
VAT	=	Value Added Tax
VIF	=	Variance Inflation Test
VRS	=	Variable Returns to Scale
WTO	=	World Trade Organisation

CHAPTER 1

Introduction

1.1 Background of the study

The importance of banks' role in supporting economic development is crucial, especially in developing economies. Over the past few decades, the need to improve bank resilience towards global economic uncertainty has increased. Developments in banking sectors around the globe have put financial sectors on alert, especially in areas relating to improved efficiency, productivity and profitability of the banking sector. Financial sectors have altered their purpose and have emerged as a host that spurs incentives and controls constraints faced in the economy. Ultimately the financial sector seeks to enhance resource allocation and should also aim to improve diversification measures that should ultimately enhance risk management and improve profitability, at lower cost (Demirgüc-Kunt and Levine, 2008).

However, developments in the financial sector may suffer distortions through experiencing a financial crisis. An economy could suffer from deep recessions and a sharp fall in economic growth as a result of financial collapse and this may be infectious across a region. This is what happened to the Asian economy in mid 1997. The region was struck by a financial crisis that started in Thailand and spread further causing financial distress that spurred major reform programmes aimed at emphasising financial sector stability. Crises, therefore, encouraged the South East Asian countries' agents to implement prudent action towards recovery and to attempt to shield the financial sector against any disruption in the future. During the past few decades, the region has adopted financial restructuring in order to keep their economies stabilised and to create a more favourable operating environment. More than ten years have passed since the crisis and Asia now demonstrates notable changes, although it is currently facing new challenges, as the recent global crisis continues to disrupt the region's stability and is slowing down the restructuring process.

In order to avoid a repeat of the failures that occurred in the 1997 financial crisis, policy induced reforms as well as changing banking sector strategies were implemented to improve financial sector efficiency further, via consolidation and other activities. The structural transformation that took place during and after the crisis brought broader changes in supervisory and policy regulations. Increasing efficiency, productivity and improving competitiveness in the sector, while building a stronger economy, were the goals of these changes.

1.2 Aims of the Study

There is a significant body of empirical literature on the assessment of bank efficiency, measured using either parametric or non-parametric methods. As a whole, the literature has focused more on developed economies (especially the US and EU) and study of Asian banking systems is relatively scarce. Although there is a vast literature that evaluates the Asian financial crises, especially its causes and consequences, cross country studies on the impact of the Asian crisis (and on bank competition and efficiency issues) are somewhat limited.

This study aims to fill this gap in the literature focusing on five crises affected countries during the period 1999-2005. Indonesia, Malaysia, Philippines and Thailand were chosen as they are among the worst affected countries with similar economic features, whereas South Korea (hereafter referred to as Korea), as the eleventh strongest economy in the world, was included to show how the crisis spread through the region and even countries that previously had relatively robust economies could be effected. We collected data from the Bankscope database, World Bank reports, International Monetary Fund's data (IMF) and several bank annual reports as well as developing our methodology from the previous literature for our empirical investigation on efficiency and competition in these banking markets.

The main research questions addressed in this thesis are as follows:

1) What was the impact of environmental variables[1] on the efficiency of Asian banking sectors after the 1997 financial crisis?
2) Did increased concentration in the sector bring about increased profitability but decreased efficiency of South East Asian banks?
3) What is the impact of post-crisis financial restructuring on competition in the banking sector of the selected Asian countries?

Countries in the Asian region have enjoyed steady growth and strong economic performance for several decades. Indonesia, Korea, Malaysia, Philippines and Thailand had a GDP growth of around 8-9 per cent per annum from the beginning of the 1990s. The Asian financial crisis began in Thailand and then spread to other countries including Malaysia, Indonesia, Korea and the Philippines. The foreign exchange market failure, during the period of financial turmoil, eroded investors' confidence and triggered a sharp drop in currency values. The situation worsened as further currency devaluations, stock market crashes, soaring inflation and severe economic recession increased capital outflows. Much has been said about the factors contributing to the financial crisis, including: over reliance on short term foreign capital, excessive investment in real estate, inadequate financial supervision and politically motivated credit allocations that resulted in growing non performing loans (Kim, 2007).

As soon as the crisis hit in mid 1997, these countries took immediate action towards recovery. The IMF played its part as a supportive agent in Indonesia, Korea, Thailand and Philippines, whereas Malaysia rejected IMF support. These actions included several drastic measures, especially focused on fostering stability in the financial sectors, such as: (i) reforming financial sectors through mergers and acquisitions (to avoid further bank collapses and helping to create stronger banks); (ii) improving transparency and regulation; (iii) strengthening corporate governance and allowing more competition (changing the entry policy, and allowing more foreign banks entry).

[1] These refer to external / environmental factors outside the control of banks' management.

These changes provide us with a framework to analyse their links to promoting bank efficiency and improving bank competition. Overall these actions appear to have had a positive effect, as all the countries concerned (to varying degrees) regained their growth development and created healthier financial systems.

1.3 Research Methodology

The following section provides a summary of the methodological approaches applied in this study. In order to address the aforementioned three main research questions, we concentrated on three main approaches. To tackle the first research question, that is to investigate changes in bank efficiency, we applied the non-parametric Data Envelopment Analysis (DEA) approach to examine bank efficiency pre and post-crisis. Our samples comprise commercial banks operating in Southeast Asia (SEA) over the period 1999-2005. Following the work of Fried et al. (1999), we employ empirical techniques to separate out external factors that influenced the performance of banks. By using Data Envelopment Analysis (DEA) and utilising the input slacks or output surpluses approach, we obtain a measure of technical efficiency adjusted for differences in the operating environment. Traditionally, DEA deals with the measurement of relative efficiency of Decisions Making Units (DMUs), neglecting external variables that influence the ability of management to transform inputs and outputs. In typical DEA studies, slacks and surpluses are relegated to the background at best and are neglected at worst. However, Fried et al. (1999) proposed that the inclusion of slacks, along with the measurement of technical efficiency (TE), could help deal with differences in the operating environment across production units. Our approach is based on the four-stage methodology proposed by Fried et al. (1999), whereby we account for the impact of environmental variables in a DEA-based model. Given the structural changes in the post-crisis environment described earlier, our aim is to incorporate the influences of external variables on SEA banking efficiency measurement. In so doing, we allow for slacks or surpluses due to the environment variables and use these to calculate adjusted values for the primary inputs. In other words, the new radial efficiency measures incorporate environmental variables.

To address the second research question, we revisit the traditional Structure-Conduct-Performance (SCP) approach. The SCP paradigm posits specific causal relationships between market structure, conduct and performance. In particular, market structure determines conduct and conduct in turn determines performance. Profound structural changes took in the banking sectors of SEA countries following the 1997 crisis. A wave of consolidation (largely driven by M&As) and the ensuing rapid increase in market concentration that took place in most countries generated concerns about the rise in banks' market power and its potential detrimental effects on consumers' welfare. In this part of the analysis, we test the market power (Structure-Conduct-Performance and Relative Market Power) and efficient structure (X-efficiency and scale efficiency) hypotheses for our sample of banks in the five SEA countries. We use the results of the previous Data Envelopment Analysis estimation to obtain reliable efficiency measures (technical and scale efficiency). We present evidence which contributes to the structure and performance literature in line with recent developments and expand the analysis on concentration, competition and performance.

In order to address the final research question, we examine competition in the banking markets by employing the Panzar and Rosse approach (1977, 1987). The Panzar and Rosse (PR) model distinguishes between oligopolistic, monopolistic and perfectly competitive markets. The Panzar and Rosse *H*-statistic is calculated using a reduced form revenue equation and measures the sum of elasticities of the total revenue of the firm with respect to the firm's input prices. Rosse and Panzar (1977) show that the *H*-statistics are negative for a neoclassical monopolist or collusive oligopolist, whilst a monopolistic competitor will gain *H*-statistics between 0 and 1 and a value equal to unity implies a perfectly competitive market (all tests only hold if it can be shown that banks / firms are operating under long-run equilibrium). The Panzar and Rosse H-statistic approach has been widely used in previous studies for assessing competition in banking markets in the context of the New Empirical Organisation (NEIO) literature.

1.4 Structure of the Thesis

The thesis is organised into seven chapters. Chapter 2 provides a background on the financial crisis that hit, among other countries, Indonesia, Korea, Malaysia, the Philippines and Thailand. This chapter reviews the actions taken by each country to improve resource allocation, the changes made to the banking system to improve resilience and some of the important consequences individual countries faced. This chapter also gives a summary of policy changes, including the merger and acquisition programmes. Chapter 3 provides a review of literature on the impact of financial reforms on banks efficiency, concentration and competition in banking markets. In particular, this chapter discusses the major caveats in the existing literature, which serves to establish the motivation for our empirical study.

To place the following empirical analysis into perspective, Chapter 4 presents the theoretical concepts of efficiency and the approaches used in measuring efficiency. For the purpose of this thesis we employed the non-parametric DEA approach to the measurement of efficiency. It also discusses the advantages and disadvantages of this approach and highlights the necessity to apply slacks in the empirical analysis of efficiency. This chapter also provides an empirical investigation of bank efficiency in the SEA region after the 1997 financial crisis which accounts for slacks and environmental variables, using the aforementioned non-parametric approach.

Building upon the empirical results of Chapter 4, Chapter 5 investigates the impact of market structure on bank performance by using the Structure-Conduct-Performance framework.

Chapter 6 looks into the relationship between competition and efficiency. This chapter examines competition levels during the period of study and whether the DEA efficiency scores obtained in Chapter 4 have a significant impact on the competition in the investigated region.

Finally, Chapter 7 summarises the main findings and draws some general conclusions and policy implications. It also points out some limitations of the study and offers suggestions for future research.

CHAPTER 2

SOUTHEAST ASIA BANKING FROM CRISIS TO RECOVERY: A BRIEF REVIEW

2.1 Introduction: Economic Background

Banking remains the dominant financial segment in Southeast Asia (SEA), with banking sector assets accounting for almost 60 percent of GDP on average (The World Bank, 2006). Among the Asian emerging economies, the banking sector was considered one of the fastest growing parts of the economy and increased significantly in importance in the three decades up to the crisis. On average, Southeast Asian (SEA) economies have grown at almost eight percent per annum since the 1960s. The increasing pace of financial market liberalization in these countries has also increased competitive pressures. Banks have had to adapt to, and operate in an environment that has become increasingly more integrated[2]. In such an environment efficient banks will have a competitive advantage and those that remain inefficient may be driven out of the market. When banking systems fails, public confidence and the whole economic system are severely affected. In the event of a crises issues of capitalization, governance, risk management and operational inefficiencies become paramount in any policy decisions that seek to re-organize and create more stable banking systems.

Table 2.1: Banking Crisis Periods

Country	Crisis Period
Indonesia	1991-1992, 1997
Korea	1997
Malaysia	1985-1988,1997
Philippines	1981-1987,1997
Thailand	1983-1987,1997

Source: Beck et al., Bank Concentration and Crises (August 2003)

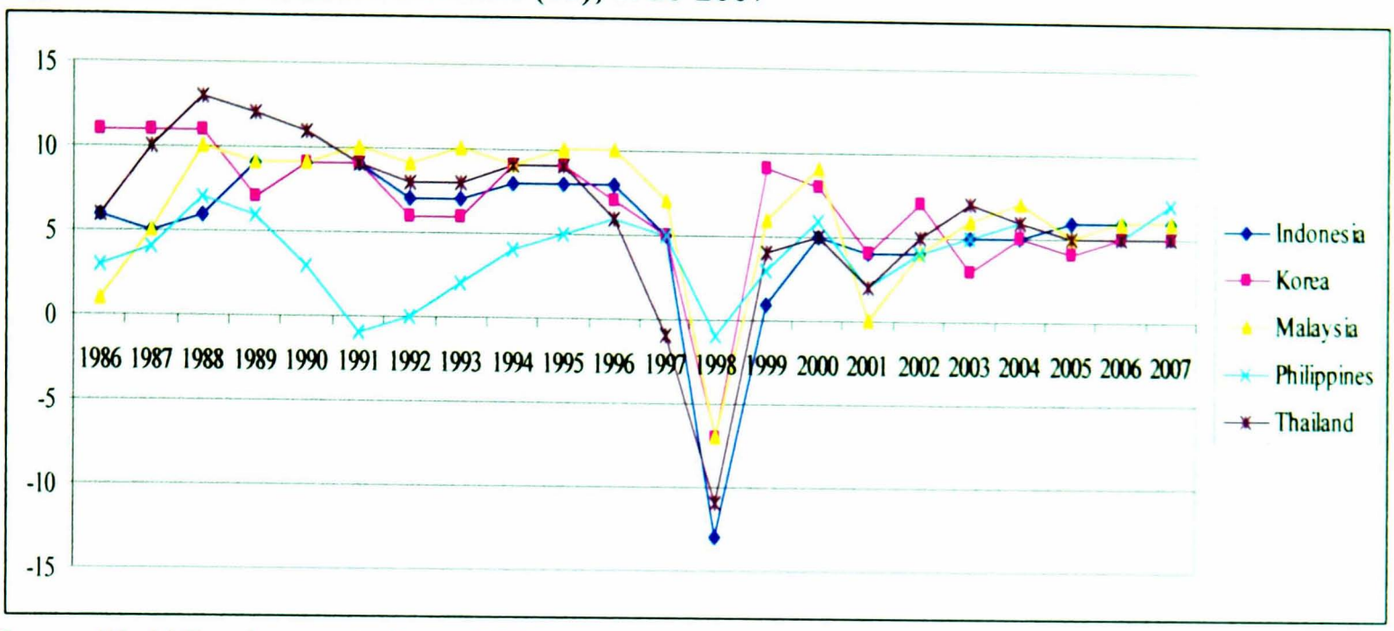
Table 2.1 illustrates the crisis periods presenting the years in which each country experienced a banking crisis (Beck et al., 2003) [3], whereas Figure 2.1 illustrates the

[2] The challenges faced by Asian banks as they grow are focus to four main categories, (1) global integration of the financial markets; (2) financial liberalization and increased competition; (3) maintenance of asset quality; (4) innovation and technological change (Yam, (1997)

[3] In 1990 the world economy was disrupted globally with the beginning of the Gulf War, which resulted in the 1990 spike of oil prices. Indonesia already experienced tight economic activities since 1991 global economy depression when facing higher inflation and interest rates with an increasingly high deficit. Korea's banking system is owned either by the government or business conglomerates. Government heavily intervened in the 1960s through 1980s, in bank management of fund allocation, and limited the incentive for the Korean bank to enhance

growth of domestic product per capita (GDP) for the selected countries from 1986 to 2007.

Figure 2.1: GDP Annual Growths (%), 1986-2007



Source: World Development Indicator (2007)

Table 2.2: Official Exchange Rate Regimes in the Asian Crisis Countries[4]

Indonesia	November 1978 – June 1997 July 1997 – December 2000	Managed Floating Independently Floating
Korea	March 1980 – October 1997 November 1997 – December 2000	Managed Floating Independently Floating
Malaysia	January 1986 – February 1990 March 1990 – November 1992 December 1992 – September 1998 September 1998 – December 2000	Limited Flexibility Fixed Managed Floating Pegged Arranged
Philippines	January 1988 – December 2000	Independently Float
Thailand	January 1970 – June 1997 July 1997 – December 2000	Managed Floating Independently Floating

Source: IMF, Exchange Arrangements and Restrictions (several issues).

their banking management techniques. In 1990s, Government interventions were reduced and allowed banks to have greater decisions in banking management. This situation creates excessive diversification to build a self-contained empire rather than to generate profit (Soon Suk Yoon et al., 2004). Malaysia's steady economic growth had a sudden fall in 1985-1986 due to a sharp drop in world commodity prices. As a result real output was stagnant and Malaysia fell deeply into recession. Malaysia's recovery plan began in 1986 through 1988 and regained its growth. For the Philippines, the economic and political crisis in the 1983-1985 periods and the depletion of the country's natural resources coincided with the increasing prominence of liberalization as the economic policy framework for both the developed and the developing world (Bautista, 2003).In the years 1980-1985, Thailand was in a period of macroeconomic adjustment, economic uncertainty and hardship. 1986-1996, were considered as years of high economic growth. 1997-2003 was thought of as a period of crisis, economic distress and recovery (Pholphirul, 2005). The later years (1997-2003) can also be defined by the time phase experienced by crisis-affected countries as discussed above.

[4] Hernandez and Montiel (2003).

Table 2.3: Key Economic Indicators

Korea	90	91	92	93	94	95	96	97	98
Real GDP growth	9.5	9.1	5.1	5.8	8.6	8.9	7.1	5.5	-5.5
Inflation	8.6	9.3	6.2	4.8	6.3	4.5	4.9	4.4	7.5
Current Account Balance[1]	-0.9	-3.1	-1.6	0.2	-1.3	-2.1	-5.0	-1.6	11.7
Indonesia	90	91	92	93	94	95	96	97	98
Real GDP growth	9.0	8.9	7.2	7.3	7.5	8.2	8.0	4.65	-13.7
Inflation	7.8	9.4	7.5	9.7	8.5	9.4	7.9	6.6	60.7
Current Account Balance[1]	-2.8	-3.5	-2.3	-1.6	-1.8	-3.4	-3.4	-1.8	4.2
Thailand	90	91	92	93	94	95	96	97	98
Real GDP growth	11.6	8.1	8.2	8.5	8.9	8.7	6.4	-0.43	-8.0
Inflation	6.0	5.7	4.1	3.4	5.1	5.8	5.9	5.6	8.1
Current Account Balance[1]	-8.3	-7.8	-5.7	-5.1	-5.7	-8.1	-8.0	-2.1	12.8
Malaysia	90	91	92	93	94	95	96	97	98
Real GDP growth	9.56	8.6	7.8	8.3	9.3	9.3	8.6	7.7	-6.7
Inflation	2.8	2.6	4.7	3.5	3.7	3.4	3.5	2.7	5.8
Current Account Balance[1]	1.9	-8.5	-3.6	-4.4	-6.1	-9.7	-4.4	-5.9	13.2
Philippines	90	91	92	93	94	95	96	97	98
Real GDP growth	3.04	-0.6	0.3	2.1	4.4	4.7	5.9	5.8	-0.5
Inflation	14.1	18.7	8.9	7.6	9.1	8.1	8.4	6.0	9.7
Current Account Balance[1]	-6.1	-2.3	-1.9	-5.6	-4.6	-2.7	-4.8	-5.3	2.4

[1] Percentage of Gross Domestic Product (GDP).

The selected countries experienced high economic growth at an average of eight to nine percent since the early 1990s except for the Philippines which experienced a sharp drop in the early 1990s (Figure 2.1). The Philippines were struck by a world economy slowdown starting in the 1980s and political crisis that continuously adversely affected economic performance. In the early 1990s the economy contracted again but with a stimulus package delivered by the IMF, the economy regained its strength in mid 1990s. Major structural reform involved dismantling monopolies[5] and promoting privatization.

In mid 1997, SEA was put under pressure by financial crisis which in turn made an enormous impact on all the affected countries (Indonesia, Korea, Malaysia, Philippines and Thailand) and they experienced negative annual growth by 1998[6]. SEA countries were seen to engage effectively in pegging their exchange rates against

[5] During President Ferdinand Marcos, the Philippines expended the number of public sectors-enterprises which were considered as government mandated monopolies creating 'crony capitalism'. The action created corruption and recession in the 1980s and brought severe financial difficulties among those enterprises and undermined the viability of the big government-owned banks and led to an economic crisis until the early 1990s where the economy fell deeply into recession with -1 percent of GDP growth in 1991.

[6] Indonesia (-1%), Korea (-7%), Malaysia (-7%), Philippines (-1%), and Thailand (-1%) (World Development Indicator 2007; Figure 2.1).

the US dollar, even when the dollar appreciated against the yen by 50 percent from mid 1995 to the end of 1997. This led to a loss in trade competitiveness and export shares, widening current account deficits. At the same time the region was impacted by other external factors, namely the cyclical slowdown in world trade and low growth in Japan between 1996 and early 1997. Overcoming the impact of the crisis proved costly, and according to a study by Honohan and Klingebiel (2000), the most expensive casualties in the 1997 financial crisis were Indonesia followed by Thailand. Several actions were taken for recovery including bank recapitalization plans, capital injections, deposit guarantees, liquidity support, regulatory forbearance and debtor bailout schemes (Vodová, 2008).

Obtaining an accurate assessment of the significant banking structural changes as well as broader economic developments resulting from the crisis are important, as they enable policy makers to make appropriate regulations and policies to create a more efficient and stable banking industry. As a consequence, an empirical investigation of the regions experience of the 1997 financial crisis, and the impact on bank efficiency and competition is important especially as banks play a prominent role in the credit intermediation process. In addition, past literature has found banking crises may also lead to disruption in the real economies and failing banks tends to be inefficient (Berger and Humphrey 1992).

The objective of this chapter is to provide an overview of the development of the SEA banking sector. The chapter is organized as follows. A brief account of the SEA banking sector before and after the crisis in each selected country is presented in Sections 2.2 to Section 2.7. The approach to banking sector reforms and the measures adopted by the affected government will be analyzed in Section 2.8. Section 2.9 presents the present global crisis and is followed by the concluding remarks in Section 2.10.

2.2 Southeast Asian Banking Sectors

Before the financial crisis in 1997, SEA banking structures were based on either state owned or privately owned banks. According to Laeven (2005, pp.1) commercial banks in these countries have traditionally been linked through ownership of other

financial institutions, such as merchant banks and finance companies. In Korea, banks were often owned merchant banks; in Thailand, banks frequently owned finance companies; and in Malaysia, banks holding companies often included commercial banking, investment banking, asset management, and insurance companies. Whilst the crisis has led some banks to focus on more traditional banking activities, other banks have continued to expand the range of their services, with increasing focus on income from fee-based activities.

The state also played an important role in terms of bank ownership. These institutions generally had the most government backing or obtained subsidies to protect them from failing or having to withdraw credits because of poor financial condition (Berger et al., 2006). The economic culture of 'managed development' allowed strong linkages between government, banks, and the corporate sector, and led to implicit guaranties against future failure (Gochoco-Bautista et al., 2000). Without proper and appropriate supervision the process of state involvement may have distorted incentives to adapt to new challenging environments and adversely affected the banks performance.

The Asian crisis emphasised the need for the banks to balance their development roles along with sound operational performance. The 1997 financial crisis also ended the liberalisation trend in the region and since then a restructuring programme immediately started which ended in early 2002 (William and Nguyen, 2005). The restructuring programme involved government interventions with major changes including; (a) bank acquisition by the state, (b) failed and unviable banks were asked/forced to close, (c) compulsory purchases and assumptions and transferring assets to healthier banks, creating larger core banks, (d) removing bad assets to state owned and managed asset management companies, and (e) providing capital injections to recapitalise banks (Williams and Nguyen, 2005; Lindgren et al., 2000). Other major measures included; (a) reprivatisation, (b) wider access for foreign owned banks by allowing foreign banks ownership, (c) replacing underperforming bank management, (d) providing new managerial incentives, and (e) other restructuring activity.

Some have argued that various early warning signals may have helped predict the crisis and such indicators would enhance the ability of the involved country to manage

and resolve banking crisis and facilitate in lessening the consequences to the banking sector and economy as a whole. Reinhart and Rogoff (2009), for instance, discuss early warning signals, arguing that:

'The greatest barrier to success is the well-entrenched tendency of policymakers and market participants to treat the signals as irrelevant archaic residuals of an out-of-date framework, assuming that old rules of valuation no longer apply. If the past we have studied in this book is any guide, these signals will be dismissed more often than not'.

Vodová (2008) classifies several macroeconomic indicators as early warning signals: (1) real GDP growth; (2) investments; (3) consumption; (4) rate of inflation; (5) exchange rate and its changes; and (6) domestic credit provided to private sectors. Having said this, it is by no means certain whether such 'signals' were monitored by policymakers in the respective countries in the run-up to the crisis. In general, there appeared limited monitoring and misperceptions of the performance of the economies that no doubt contributed to the onset of the systemic banking crisis. The impact of the SEA crisis could probably have been much smaller if the region implemented more reliable accounting and greater disclosure standards serving as an early warning sign for banking institutions. This led to the recommendation post-crisis that concerted national and international efforts should be made to develop and implement international accounting and reporting standards, compliance with which should be monitored and enforced. (Yao, 2008, pp.1).

The following section will briefly illustrate the experience of selected crisis-effected countries. A strong banking system is essential to a country's economic growth and an efficient financial system will definitely help to mobilise the financial resources and better allocation of resources. The core functions of the banking system in an economy were (the obvious) reasons why Indonesia, Korea, Malaysia, Philippines and Thailand needed to rapidly restore their banking systems post-crisis. The following provides a snapshot of the economic and financial features of the SEA countries under study.

2.3 Indonesia

Indonesia is one of the most vast and densely populated countries in SEA. Indonesia's financial system comprises banks and non-bank financial institutions. The Indonesian financial system is dominated by banking intermediation or indirect finance, and the banking system consists of commercial banks which account for almost 99 per cent in terms of total asset to the banking system. Throughout the 1980s, state-owned banks dominated the banking sector. The soaring oil prices in the 1970s had generated greater revenue for the country for further economic development. This enabled the financial system to capitalize on the abundant funds provided through foreign aid. At the beginning of 1982, Indonesia was overwhelmed by world economy recession and the plummeting price of oil. As a result the country's revenues dropped and the economy faced stagnation. The government implemented drastic measures by cutting government expenditure, borrowed from private banks, floated bonds on the Euro market and took loans from the World Bank as well as assistance from the International Monetary Fund (IMF).

The banking system experienced large structural changes even before the 1997 crisis and this involved five stages: (i) the rehabilitation period (1967-1973) to restore the economy from high inflation; (ii) the ceiling period (1974–1983) where interest rate ceilings were applied; (iii) the growth period (1983–1988) following banking deregulation in June 1983 which removed interest rate ceilings; (iv) the acceleration period (1988–1991) following the impact of extensive bank reforms in October 1988; and (v) the consolidation phase (1991–1997) in which prudential banking principles were introduced, including capital adequacy and bank ratings (Batunanggar, 2005). Prior to the 1997 financial crisis, Indonesia underwent major structural changes in the banking sector which consisted of (1) privatisation; (2) mergers and consolidations; and (3) increasing the role of foreign banks.

2.3.1 Indonesian Financial Institutions

The following section will look into the Indonesian banking reforms phases since 1966.

1) The Indonesian banking system 1966 – 1982:

The financial sector during this time was considered a subsidiary of the state because banking capital was financed by the Central Bank and the government. During this period, the financial system was transformed. Reforms introduced in April 1974 aimed at stabilizing the financial and monetary sectors. Through various monetary measures, the Bank of Indonesia managed individual monetary policy against excessive domestic monetary growth and regulated deposits and lending rates. The banks utilized their excess funds (through increased oil export prices in the 1970s and greater foreign reserves) by lower lending rates. The distribution of funds was focused on priority sectors in conjunction with various government programs. These measures enabled the banks to utilize their function as an agent of economic development, with the support of Bank Indonesia. The government's balanced budget policy was introduced as part of action to reduce the high inflation rates in 1978 until 1982 and to reduce a large fiscal deficit. Indonesia's revenue fell dramatically due to the decline in world oil prices in 1983 and started its economic reforms strategy to gain growth and financial sector stability.

2) Indonesian Economic Reforms 1983- 1991[7]

Indonesia's economic performance improved between 1970 and 1981 at an annual average rate of 7.4 percent. The country steadily sustained inflation at a lower rate and the economy went through an expansion from the increase in export oil prices in 1973 and 1979. In 1982 Indonesia faced a world oil prices crisis and the economy contracted which had an adverse effect on GDP growth, in turn creating significant inflation. The situation worsened when the dollar depreciated between 1982 and 1986, having an indirect impact on the economy as a whole. The government acted by implementing a reform program with the objective of liberalizing the banking sector as well as other trade and regulatory reforms. The program started with deregulation which focused on; (1) exchange rate management; (2) various monetary and financial

[7] Resosudarmo and Kuncoro, (2006).

reforms; (3) reformulation of fiscal policy: and (4) revised trade policy and other regulatory reforms.

The financial system reform program began in 1983 through to 1990 and 1991. The aims included liberalizing the financial sector, allowing the private banking sector to open more branches with requirements including: extending their activity to other cities than just Jakarta and reducing commercial bank reserve requirement[8]. The main changes in the economic reforms of the 1980s permitted a greater degree of competition between state and private banks. In October 1988 further deregulation of the financial sector removed restrictions on bank competition and allowed more joint ventures between private and foreign banks. The underpinning deregulation, guided by the World Bank and IMF aimed to promote competition in the financial sector and improve management effectiveness in the banking and non-banking sectors (Hamada, 2003). It was also important that new prudential regulations were introduced aimed at enhancing sound bank management practices. The financial reforms were successful in promoting financial sector expansion along with growth in the economy.

3) Period of financial expansion: 1992-1997[9]

Following the implementation of extensive bank reforms in October 1988 and by tightening Indonesia monetary policy in 1991, the banking sector grew rapidly. Further reforms packages concentrated on a few areas; (i) promoting fairer competition among banks by allowing new entry, more access to networking, closer relationships between state and private banks and allowing banks to make decisions independently; (ii) introduction of prudential regulations through the introduction of international banking rules including the Basle Capital requirements of 1988; (iii) the introduction of a wider array of money market instruments and; (iv) implementing floating interest and exchange rates. These improvements were impaired by a lack of enforcement from Bank Indonesia as well as a lack of commitment by bank management. The growth in number of banks and branches increased the complexity in banking operation. Banks increasingly promoted more diversified products such as derivatives but failed to participate in improving their supervisory and bank management skills in accordance with development in the banking industry. As a

[8] Resosudarmo and Kuncoro, (2006)
[9] Hamada, (2003); Batunanggar (2005)

result, Bank Indonesia faced difficulties in tracking problem banks and eventually some banks started experiencing financial problems in the mid-1990s.

4) The crisis 1997

The comprehensive financial reforms in 1988 built up several vulnerabilities in the banking sector pre-crisis. Besides having poor supervision and a lack of corporate governance and management, the industry also faced liquidity management weaknesses which can be seen through large volatile deposits in the composition of bank's funds and excessive ratios of loan to deposit (Batunanggar, 2005). Rinakit and Soesastro (1998) concluded that, based on their survey in Indonesia, the liberalization and globalization reforms caused turbulence in the economy by increasing the domination of foreign enterprises and witnessed deterioration of the small and medium sized enterprise sector. A study by Hill (1997) indicates that the impact of liberalization and deregulation created conglomerates and monopolies, enlarged inequality and poverty, expanded regional disparities, and led to the demise of many small firms. The crisis that hit Indonesia in mid 1997 was seen as providing an opportunity to redress this problem and the government began to introduce fiscal and monetary measures to cope with the crisis quite early on. Furthermore a substantial number of large government-sponsored and private infrastructure projects were cancelled for balance-of-payments reasons.

Meanwhile, the adoption of a tight monetary policy by Bank Indonesia to reduce speculative attacks on the Rupiah, further tightened market liquidity. The banking system soon faced a severe liquidity crisis (Batunanggar, 2005) and the Indonesian government asked for International Monetary Fund (IMF) assistance with an agreement encompassing a programme for economic and financial restructuring, complemented by monetary and fiscal programs. The programs gradually showed changes but Indonesia still needed a further recovery action plan. The immediate policy response may have reduced the impact of the crisis but the country was still in political and social turmoil. Chronologies of crisis events are outlined in Box's 1 and 2.

Table: 2.4 Key Economic Indicators

Indonesia	99	00	01	02	03	04	05	06	07
Real GDP growth	0.2	3.4	2.1	4.1	3.0	3.8	2.8	2.8	3.9
Inflation	2.0	3.8	11.5	11.8	6.8	6.1	10.5	13.1	6.4
Current. Account Balance[1]	4.1	4.8	4.3	4.0	3.5	0.6	0.1	3.0	2.5

Source: Asia-Pacific Economic Cooperation (APEC); [1]percentage of gross domestic product (GDP).

Box 1: Indonesia[10]

The IMF-Supported Program of Economic Reform

The shift in financial market sentiment that originated in Thailand, exposed structural weaknesses in Indonesia's economy, notably the large amount of short-term foreign debt owed by the private corporate sector. On November 5, 1997 the IMF's Executive Board approved financial support of up to SDR 7.3 billion or about US$10 billion, equivalent to 490 percent of Indonesia's quota, over the next three years.

Chronological Highlights

1997

October 8	The IMF announces support for Indonesia's intention to seek support from the IMF and other multilateral institutions.
November 5	The Executive Board approves a US$10 billion stand-by credit for Indonesia and releases a disbursement of US$3 billion.

1998

Mid-January	IMF Management visit Jakarta to consult with President Suharto on an acceleration of reforms already agreed under the program, after further depreciation of the rupiah.
January 15	Indonesia issues Memorandum of Economic and Financial policies on additional measures.
January 26	The IMF welcomes Indonesia's plans for a comprehensive program of the rehabilitation of the banking sector and puts into place a framework for creditors and debtors to deal with the external debt problems of corporations on a voluntary and case-by-case basis.
April 10	Indonesia issues a Supplementary Memorandum of Economic and Financial Policies on additional measures.
May 4	The Executive Board completes the first review of the stand-by arrangement and disburses US$1 billion.
June 24	Indonesia issues a Supplementary Memorandum of Economic and Financial policies on additional measures.
July 15	The Executive Board completes the second review of the stand-by arrangement, disbursing US$1 billion, and approves an increase in the IMF financing under the stand-by credit by US$1.3 billion. The Fund also announces that additional multilateral and bilateral financing for the program will be made available, in part through an informal arrangement among bilateral creditors that involves debt rescheduling or the provision of new money, for total additional financing of over US$6 billion, including the increase in IMF financing.
July 29	Indonesia issues a Letter of Intent and Memorandum of Economic and Financial Policies on additional measures.
August 25	The Executive Board completes the third review of the stand-by arrangement and disburses US$1 billion. At the same time, the Board approves an Extended Fund Facility (EFF) for Indonesia, with the access and duration under the new arrangement the same as under the stand-by arrangement it replaces, but with a longer repayment period under EFFs, which are intended to support economic programs dealing with deep-seated structural problems.
September 11	Indonesia issues a Letter of Intent and Supplementary Memorandum of Economic and Financial Policies.
September 25	The Executive Board completes the first review under the extended arrangement (EFF) and disburses US$940 million.
October 19	Indonesia issues a Letter of Intent and Supplementary Memorandum of Economic and Financial Policies.
November 6	The Executive Board completes the second review under the extended arrangement (EFF) and disburses US$960 million.
November 13	Indonesia issues a Letter of Intent and Supplementary Memorandum of Economic and Financial Policies.
December 15	The Executive Board completes the third review under the extended arrangement (EFF) and disburses US$957 million.

[10] A Factsheet (January 1999): The IMF's Response to the Asian Crisis.

Box 2: IMF Program of Economic Reform[11]

- financial sector restructuring, including closing unviable institutions, merging state banks, and establishing a timetable for dealing with remaining weak institutions and improving the institutional, legal, and regulatory framework for the financial system; the establishment of the Indonesia Bank Restructuring Agency (IBRA)[12]; a government guarantee on bank deposits and credits; elimination of existing foreign ownership restrictions on banks; and the issuance of a new bankruptcy law;
- structural reforms to enhance economic efficiency and transparency, including liberalization of foreign trade and investment, dismantling of domestic monopolies, and expanding the privatization program;
- stabilizing the rupiah via the retention of a tight monetary policy and a flexible exchange rate policy; a strong monetary policy to ensure stabilization of the rupiah;
- The fiscal measures included cutting low priority expenditures, including postponing or rescheduling major state enterprise infrastructure projects; removing government subsidies; eliminating VAT exemptions; and adjusting administered prices, including the prices of electricity and petroleum products;
- A comprehensive agenda of structural reforms to increase competition and efficiency in the economy, reinforcing the commitments made in January and including the further privatization of six major state enterprises and the identification of seven new enterprises for privatization in 1998/99;
- Restructuring the banking system through measures to strengthen relatively sound banks partly through the infusion of new capital, while moving swiftly to recapitalize, merge, or effectively close weak banks, while maintaining the commitment to guarantee all depositors and creditors; and
- Strengthening the monitoring of the economic program.

2.4 Korea

In Korea, the financial industry consists of three large groups; (1) a central bank (Bank of Korea, BOK); (2) deposit money banks, including commercial and specialised banks; and (3) Non-bank Financial Institutions (NBFIs), which include development savings, investments, insurance and other institutions[13]. Banks in Korea include commercial and specialised banks (including national banks, regional banks, and foreign banks branches). The banking sector has grown rapidly over the last 50 years and has contributed to the country's economic growth by mobilising financial resources for business firms when it dominated the financial market in the 1960s and 1970s. Korea has experienced a remarkable increase in its economy over the past three decades with an annual growth rate of over 9 percent. Figure 2.2 and 2.3 clearly shows how the changes have developed the Korea financial institution since the 1970s, and table 2.5 illustrates changes in the number of banks in the system.

[11] Summarized from secondary source: A Factsheet - January 1999:The IMF's Response to the Asian Crisis

[12] Accelerated bank restructuring with IBRA to continue its take-over or closure of weak or unviable institutions and empowered to issue bonds to finance the restoration of financial viability to qualified institutions;

[13] Ji and Park (1999). The Korea Banking Sector: Current Issues and Future Direction. A Study of Financial Markets.

Figure 2.2 Financial Institutions in Korea (as in 1978)[14]

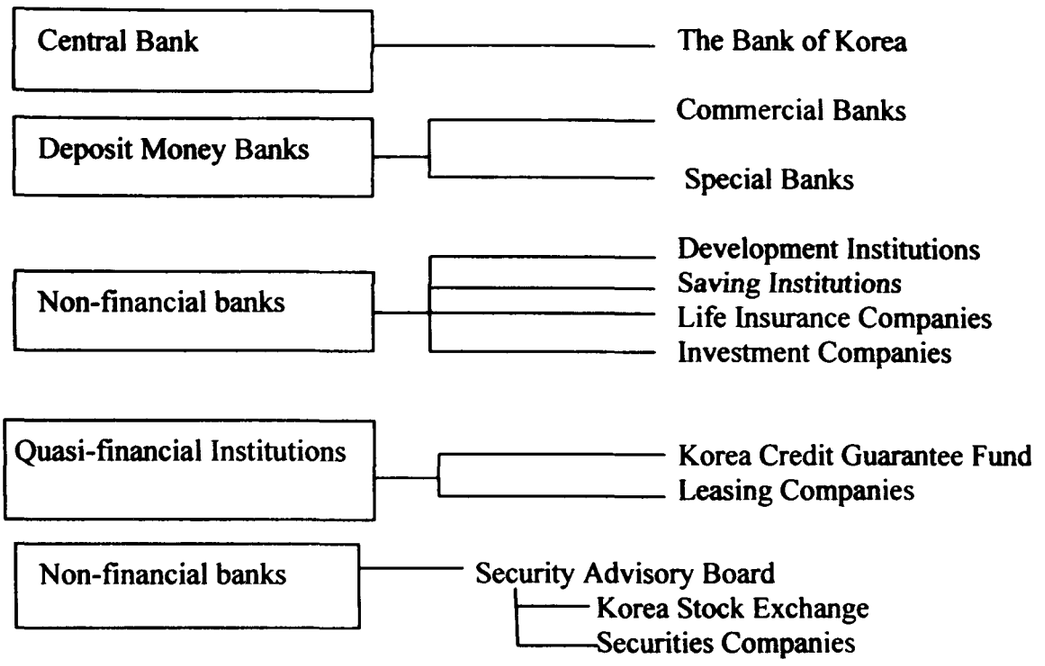
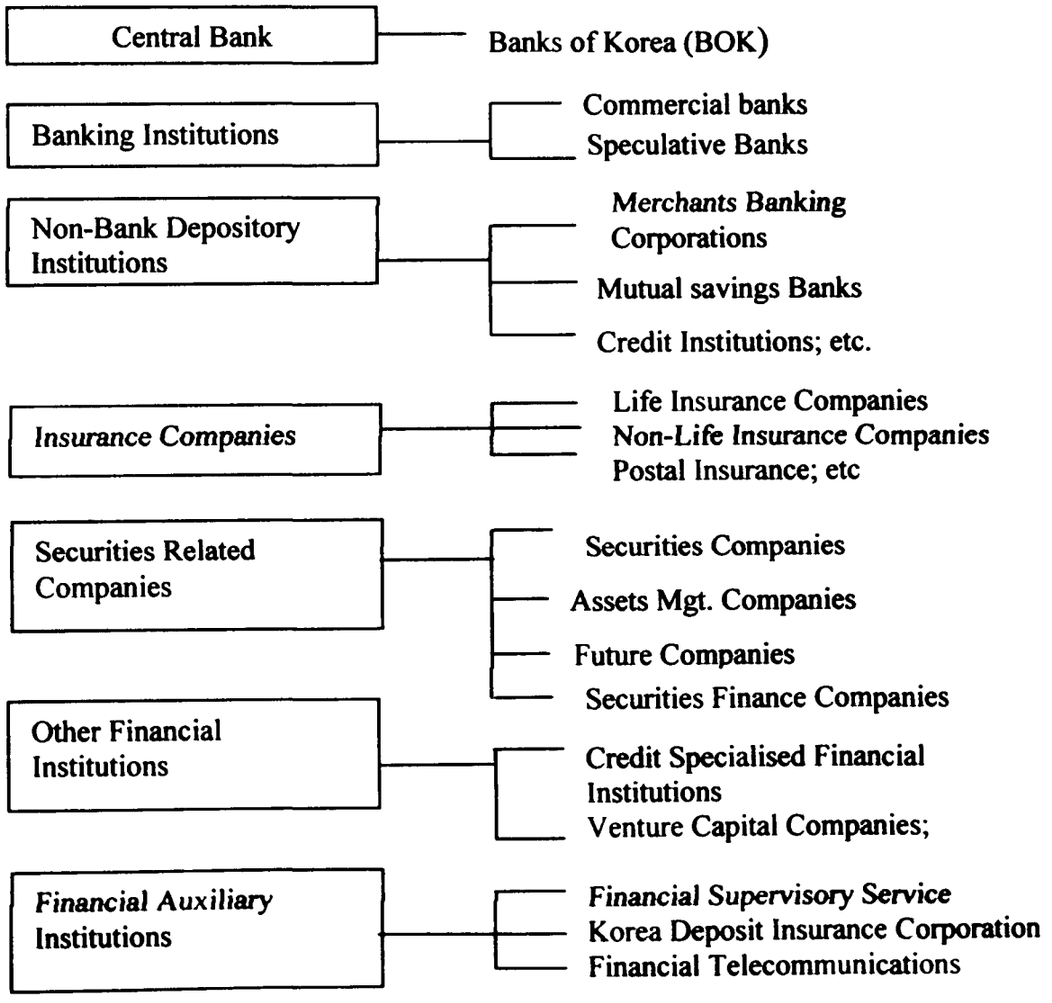


Figure 2.3 Financial Institutions in Korea (as in 2008)[15]



[14] Cole and Park. pp. 40, Financial Development in Korea, 1945-1978. Harvard University Press, (1983).
[15] Bank of Korea, (2008).

Table 2.5: Decline in the Number of Financial Institutions

	End of '97	End of '99	Rate of Decline (%)
No. of Financial Inst.	2102	1755	-16.5
Banks	33	23	-30.3
Security Companies	36	30	-16.7
Insurance	50	44	-12.0
Investment Trust	31	23	-25.8

Source: Ministry of Finance and Economy; Lee, Figure 8, pp. 19, (2000).

2.4.1 Korean Financial Sector

The following section will look at Korean banking reforms from the 1960s to the present day.

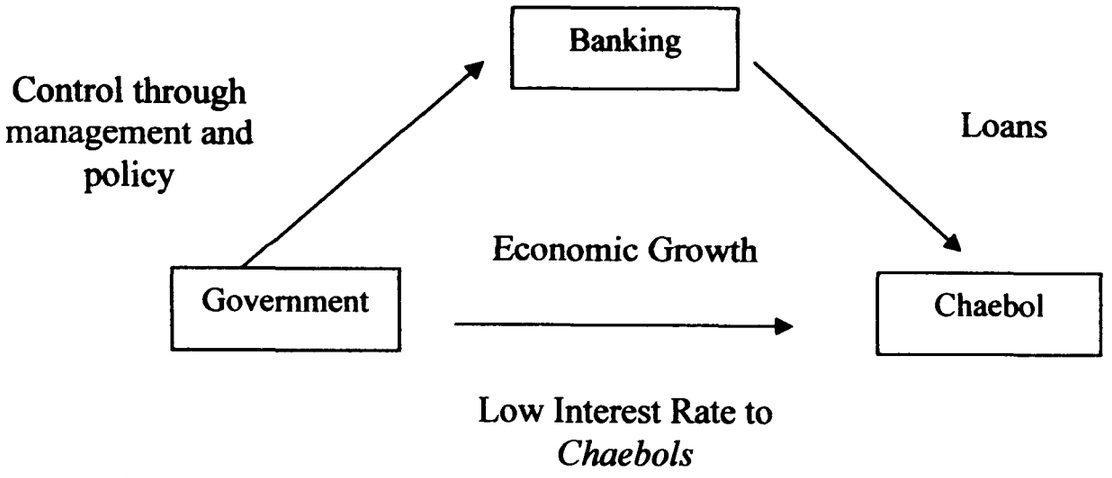
1) Korean Financial Institutions before the Crisis: 1960s-1990s

The Korean financial system has experienced several phases of regulatory developments that have shaped the system impacted on economic and financial systems development[16]. The financial system in the early 1960s was basically under state control and worked at channelling funds allocated by the government to high priority sectors in the economy. A series of policy measures were established in the late 1960s to encourage and create a more favourable environment for the expansion of capital markets. Despite this development, the economy and the financial system were in a state of stagnation after the Korean War (1953-1960), together with economic dislocation and social and political turmoil. Tight government controls prevented development in the financial sector resulting in inefficient internal management. The financial sector had limited authority, and acted only as a channel for allocating funds government high priority sectors[17], limiting financial sector initiative and innovation.

[16] http://www.asianinfo.org/asianinfo/korea/economy.htm

[17] Most funds are allocated to 'Chaebols' with government given full support to which can be defined as the business conglomerates/ family business or monopoly.

Figure 2.4: The Relationship between the Korean Governments, the Banks and the *Chaebols* 1960s – 1970s



Source: Rishi (2001)

The Korean government needed to strengthen financial sector competitiveness and efficiency, and to do so the Ministry of Finance and Economy engaged in a series of reforms aimed at; (1) restoring market credibility through financial restructuring; (2) developing capital markets by introducing long term financial products and risk management skills; (3) rebuilding a stronger finance infrastructure through improving the economic system, deregulation, developing a credit bureau and introducing more advanced information technology (IT). There was also the goal of creating major financial institutions to emphasise the strategic importance of the sector.

The role of Korean banks as government intermediaries continued throughout the 1970s. In the 1970s a lot of focus was on the diversification of finance; in other words, to develop private sector financial institutions. The Korean government also embarked on a plan to eliminate the existing unofficial sector, commonly known as the'curb market[18]' in the early the 1960s and again in the 1970s. In 1972, the Korean government announced a decree to stimulate economic activities and reform the financial and investment sectors aimed at improving domestic mobilisation of funds.

[18] Business financing was obtained primarily through bank loans or borrowing on the informal and high-interest "curb market" of private lenders. The curb market served individuals who needed cash urgently, less reputable businesspeople who engaged in speculation, and the multitudes of smaller companies that needed operating funds but could not procure bank financing. The loans they received, often in exchange for weak collateral, had very high interest rates. The curb market played a critical role in the 1960s and 1970s in pumping money into the economy and in assisting the growth of smaller corporations. The curb market continued to exist, along with the formal banking system, through the 1980s (http://countrystudies.us/south-korea/49.htm; US Library of Congress).

2) Korea Pre-Crisis: 1980s-1990s[19]

The Korean economy in the 1960s and 1970s experienced significant economic growth. Despite these achievements, the government's role in economic management began to adversely affect the economy's efficiency as a whole. In the 1980s, the government undertook major action to liberalise further and internationalised the financial sector. This involved the following actions:

a) A reduction in government intervention over financial sector

In 1983 all commercial bank ownership was returned to the private sector. As a result this loosened government control over commercial banks, internal operations and management. One notable development was the replacement of direct credit controls with an indirect system in 1982.

b) New entry regulations

In order to promote competition amongst banks, the government lowered regulatory entry barriers; this increased the number of banks as well as non-financial institutions and enhanced competition in the financial industry. By the end of the 1980s, the number of new banks and non-financial institutions increased significantly and created a healthier competitive environment.

c) Relaxation of restriction on financial institutions activity

Without government intervention the banks began to be more innovative in expanding their products and activities. They were more able to operate at full capacity and expanded to introduce new business products[20].

d) Deregulating the interest rates

Banks were given more discretion in setting their own loan rates and terms on other financial instruments.

e) Internationalising the financial market

More foreign banks were able to operate in the Korean financial sector raising the number of banks in the 1980s. The number of foreign bank branches increased significantly from only 18 in 1979 to 66 in 1989. The Korean government

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[19] Oh and Park (1998).

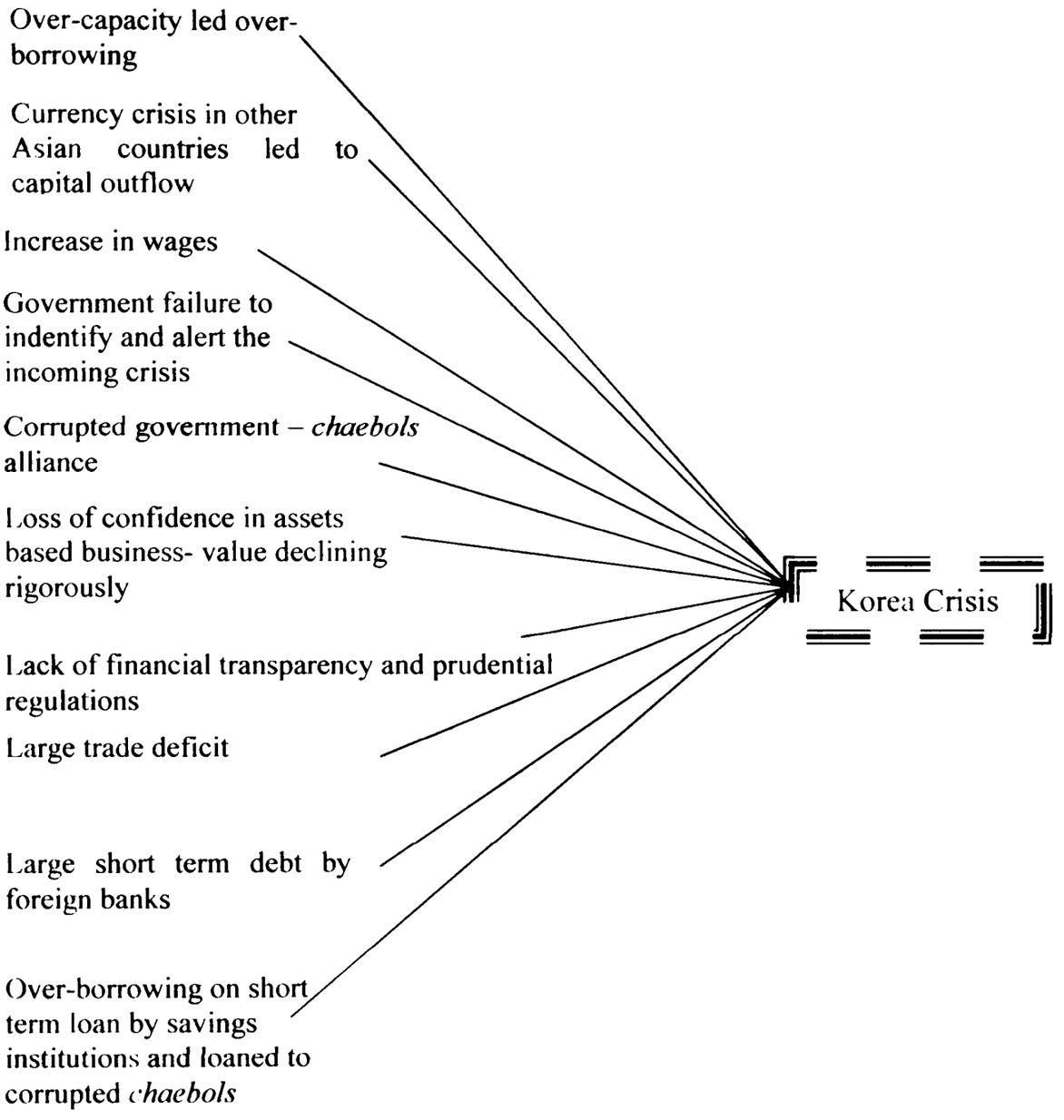
[20] Among new fields ventured by the banks are sales of commercial bills, credit cards, sales of government bonds under repurchase agreements (RPs), factoring, mutual installment savings, and trusts, negotiable certificates of deposits (CDs), as well as the acceptance, discount and sale of trade bills. Among non-financial institutions, investment and finance companies and merchant banking corporations were permitted to offer commercial paper (CP) and cash management accounts (CMAs) See Oh and Park (1998).

introduced new financial instruments involving open and closed-end funds targeting foreign investors. Loosening entry allowed the foreign security companies to build up their representatives offices in Korea and by the mid 1990s they were permitted to establish wholly owned subsidiaries (Sang Koo Nam, 1998).

Korea's economy grew significantly from 1986 to 1989, impacted by a weak dollar, low oil prices and global interest rates. However, the transition to democracy in 1987 adversely affected economic growth and this had an impact on the competitiveness of the economy. Despite the downturn, liberalization of the financial sector and capital account accelerated rapidly in the 1990s and this further improved the efficiency and internationalization of the financial market. The most notable financial reforms included four stage interest deregulations that included; (1) deregulating short term lending and deposit rates for all banks and non-financial bank institutions (NBFI); (2) in 1993 all regulations on lending rates were lifted and rates on long term deposits with maturities of two years or more were freed-up; (3) the third stages implemented in 1994 and 1995 involved further interest rate deregulation; and (4) all regulations on interest rates were abolished.

The financial crisis in 1997 brought a shock to the Korean economy and forced the government to seek financial assistance from the IMF. During the 1990s, Korea's economy had grown and shown significant changes through financial deregulation, but this abruptly ended due to rising inflation, the appreciation of the Korean Won, and recession in the world economy. Despite the liberalisation process, the Korean banking sector collapsed prior to the 1997 financial crisis and as a recovery plan, Korea launched two restructuring stages as summarised in Park and Weber (pg, 2374, 2006) as: '*The first stage involved the nationalisation of banks for later sale to foreigners, five insolvent banks were closed and then merged with blue-chip banks, foreign capital injections were given to seven banks, and public funds were used to normalise operations of the remaining surviving banks*'; and '*The second stage focused on restoring bank profitability. Financial holding companies were created to make merger and acquisition easier and help banks realise scare economies*'. Figure 2.5 lists ten major causes for Korean financial crisis (Lee, 1998).

Figure 2.5: Ten Major Causes for Korean Financial Crisis[21]



[21] Lee (1998)

Box 3: Korean Chronological Highlights[22]

	1997
November 21	The IMF welcomes Korea's request for IMF assistance.
December 3	The IMF notes the successful conclusion of discussions with Korea and the pledges of support coming from the World Bank, ADB, and countries in the group of potential participants in the supplemental financing support package for Korea.
December 4	The IMF Executive Board approves a US$21 billion stand-by credit for Korea, and releases a disbursement of US$5.6 billion.
December 18	The IMF Executive Board concludes the first bi-weekly review of the stand-by arrangement and disburses US$3.5 billion, activating the IMF's new supplemental Reserve Facility.
December 24	Korea issues a Letter of Intent, concerning intensification and acceleration of its program. The IMF Managing Director announces his intention to recommend to the executive Board a significant acceleration of the resources available to Korea, in light of Korea's Letter of Intent and in context with the progress between Korean and international banks in dealing with Korea's external debt, and notes that the World Bank and ADB would disburse a total of US$5 billion before the year's end and the group of potential participants in the supplemental financing support package for Korea would be prepared to disburse up to US$8 billion.
December 30	The Executive Board approves the request by Korea for modification of the schedule of purchases, bringing forward part of the amounts originally scheduled for February and May 1998, but without changing overall access to fund resources, and disburses US$2 billion to Korea.
	1998
January 7	Korea issues a Letter of Intent providing additional details on measures described in the December 24, 1997 Letter of Intent.
January 8	The IMF Executive Board concludes the second bi-weekly review of the stand-by arrangement and disburses US$2 billion.
February 7	Korea issues a Letter of Intent on additional measures.
February 17	The Executive Board completes the first quarterly review of the stand- by arrangement and disburses US$2 billion.
May 2	Korea issues a Letter of Intent on additional measures.
May 29	The Executive Board completes the second quarterly review of the stand-by arrangement and disburses US$2 billion, and concludes the 1998 Article IV consultation.
July 24	Korea issues a Letter of Intent on additional measures.
August 28	The Executive Board completes the third quarterly review of the stand- by arrangement and disburses a further US$1 billion.
November 13	Korea issues a Letter of Intent on additional measures.
December 9	Korea announces it will make Supplemental Reserve Facility repurchases of US$2.8 billion during December 1998.
December 14	The Executive Board completes the fourth quarterly review of the stand- by arrangement and disburses a further US$1 billion.

[22] Summarization from secondary source: A Factsheet (January 1999);The IMF's Response to the Asian Crisis

Box 4:The IMF-Supported Program of Economic Reform[23]

Over the last several decades, Korea transformed itself into an advanced industrial economy. However, the financial system had been weakened by government interference in the economy and by close linkages between banks and conglomerates. Amid the Asian financial crisis, a loss of market confidence brought the country perilously close to depleting its foreign exchange reserves. On December 4, 1997 the IMF's Executive Board approved financing of up to SDR[24] 15.5 billion or about US$21 billion, equivalent to 1,939 percent of Korea's quota, over the next three years.

The initial program of economic reform assumed growth in 1998 of 2.5 percent and featured:

- Comprehensive financial sector restructuring that introduced a clear and firm exit policy for financial institutions, strong market and supervisory discipline, and independence for the central bank. The operations of nine insolvent merchant banks were suspended; two large distressed commercial banks received capital injections from the government, and all commercial banks with inadequate capital were required to submit plans for recapitalization;
- Fiscal measures equivalent to about 2 percent of GDP to make room for the costs of financial sector restructuring in the budget, while maintaining a prudent fiscal stance. Fiscal measures include widening the bases for corporate, income, and VAT taxes;
- Efforts to dismantle the non-transparent and inefficient ties among the government, banks, and businesses, including measures to upgrade accounting, auditing, and disclosure standards, require that corporate financial statements be prepared on a consolidated basis and certified by external auditors, and phase out the system of cross guarantees within conglomerates;
- Trade liberalization measures, including setting a timetable in line with WTO commitments to eliminate trade related subsidies and the import diversification program, as well as streamlining and improving transparency of import certification procedures;
- Capital account liberalization measures to open up the Korean money, bond, and equity markets to capital inflows, and to liberalize foreign direct investment;
- Labour market reform to facilitate the redeployment of labour; and
- The publication and dissemination of key economic and financial data.

2.5 Malaysia

It has been over 50 years since Malaysia gained its independence in August 31, 1957. The Malaysian economy, referred to as a Newly Industrialized Country (NIC)[25], has been driven by high technology, knowledge based and capital intensive industries. From a country dependent on agriculture and primary commodities in the 1960s, Malaysia has today become a manufacturing based export driven economy.

The Malaysian economy has experienced rapid structural and economic changes since independence in 1957. Since 1970 Malaysia's economy has experienced many structural changes and these changes were guided through three long term

[23] Summarization from secondary source: A Factsheet – (January 1999);The IMF's Response to the Asian Crisis

[24] Special Drawing Rights (SDRs) are international foreign exchange reserve assets. Allocated to nations by the International Monetary Fund (IMF), a SDR represents a claim to foreign currencies for which it may be exchanged in times of need.

[25] Countries with more advanced economies than other developing nations, but which have not yet fully demonstrated the signs of a developed country, are grouped under the term newly industrialized countries.

development programs, namely the New Economic Policy (NEP), 1970 – 1990, The National Development Policy (NDP), 1990 – 2000, and the National Vision Policy (NVP), 2001-2010. The aims and objectives have remained consistent and interrelated with the need for the country to sustain its economic growth whereas financial restructuring aimed at improving the financial system performance and assuring the program benefitted all groups and communities. Malaysia has a very diverse economy and can be divided into four broad phases;

1) 1957-1970 – the years after the independence

Within this period, Malaysia continued its 'open-door' policy by supporting and permitting more trade and industry activity, redressing ethnic and regional economic imbalances through providing social and physical infrastructure (Snodgrass 1980), (Athukorala 2005). Malaysia's financial system has changed from a commodity based country into an industrialised economy with a strategy directed towards 'promote effort, geared to the provision of an investment climate favourable to the private enterprise' (Wheelwright 1963, pg 69). The racial riots of May 1969 were a turning point that led to the introduction of the New Economic Policy (NEP) in 1971, the publication of the Second Malaysia Plan, 1971-1975 and the Outline Perspective Plan (OPP) 1971-1990. NEP came with objectives to eradicate poverty, restructuring of Malaysian society and to continue attracting foreign investors.

2) 1971-1990 – Post war growth

The 1970s showed further development in economic and structural changes with a strong emphasis on economic growth and enhancing income/wealth distribution. Malaysia also faced the international oil crises in 1973-1974, the 1978-1979 global economic slowdown and a major reduction in demand for electronics and primary commodities by the mid-1980s. The move towards heavy industrialization in the 1980s brought economic crisis during 1985-1987 which was caused by a large deficit due to heavy industrialisation plans and a downward trend in major export product prices. In response to the crisis a recovery package was launched putting emphasis on the private sector and participation of Foreign Direct Investment (FDI) (Corden, 1996).

3) 1991-1999 – the year of crisis and recovery program

In the mid 1990s, after an impressive economic performance, the country was shaken by the Asian Financial Crisis. In 1998 the Malaysian government launched a policy package to insulate monetary policy from external volatility. Malaysia reacted by adopting a strong capital control policy and a fixed exchange rate system.

4) 2000-2005 – post crisis period

In 1999 the Central Bank of Malaysia, Bank Negara Malaysia (BNM), proposed a merger plan to restructure its 54 domestic financial institutions. The merger plans were implemented to consolidate the banks into 10 major institutions by 2002. The plan ended in 2002 with 9 'anchor banks' as shown in Table 2.8. The proposed merger plans by BNM in 1999 were to restore stability in the banking sectors and maintaining the integrity of public savings. In order to succeed BNM acquired shares in some of the troubled commercial banks and through absorption of the assets and liabilities of insolvent institutions.

Table 2.6: General Policy Package

Pre-Liberalisation[+]	Post-Liberalisation[++]
1958-70: launched market-led development policy 1968-85: promotion of export-oriented policy 1965-70: launched First Five-year Malaysia Plan 1971-75: Second Five-year Malaysia Plan 1976-80: Third Five-year Malaysia Plan 1970: Establishment of Free Trade Zone	1980-90: heavy industrialisation push 1983: beginning of Privatisation Policy 1986-90: adjustment and liberalisation 1986-95: Industrial Master Plan 1981-85:Fourth Five-year Malaysia Plan 1986-90: Fifth Five-year Malaysia Plan 1991-95: Sixth Five-year Malaysia Plan 1991: Launched Vision 2020 / New Development Policy 1996-2000: Seventh Five-year Malaysia Plan

Source: The Malaysia Economy and Monetary Policy. Mohamed, (2000), pp. 2.

Note: [+]Pre-liberalisation – from the year Malaysia gained her independence from Britain in 1957 until the end of 1978 when domestic interest rates were deregulated;

[++] Post-liberalisation period (post-1978) – era of financial reforms and is designed to enhance domestic monetary policy control in achieving economic growth.

Table 2.7: Financial Liberalisation and Monetary Policy Reform

Monetary Policy Reform	Exchange Rate & Capital Flow	Financial System Reform
1978: deregulation of domestic interest rates; 1975: Quantitative control on credit was abolished but maintained credit to selected sectors; Since 1987, sales and purchases of government and central bank securities have become increasingly important 1991: removal of the Base lending rate that was introduced in 1983.	1972: adoption of US dollar as intervention currency; 1973: conversion from fixed to a flexible exchange rate regime; since 1978 there has been no restriction on capital inflows.	1959: establishment of Central Bank; 1960: establishment of Malayan Stock Exchange (equity market) and the birth of Malaysian Government Securities; 1963: establishment of discount houses; 1973: Malaysia and Singapore agreed to terminate their common currencies and at the same time the stock market was disjointed; 1978: the birth of banks NCD (Negotiable Certificate of Deposits); 1980s: the development of private debt securities market; 1990: actual splitting of The Kuala Lumpur Stock Exchange and Singapore Stock Exchange; 1990:establishment of the International offshore financial centre; 1997: establishment of future options market.

Source: The Malaysia Economy and Monetary Policy. Mohamed, (2000), pp. 2.

Table 2.8: Changes in Malaysian Banking

Banking Groups (Anchor bank)[a]	Banking institutions in the group	
	Subsidiaries	**Acquired institutions**
Alliance Bank Malaysia Berhad[c]		Multi-Purpose Bank Bhd, International Bank Malaysia Bhd, Bolton Finance Bhd, Bumiputra Merchant Bankers Bhd, Sabah Bank Bhd, Sabah Finance Bhd and Amanah Merchant Bank Bhd
AmBank[c]	Arab Malaysian Finance Berhad	MBF Finance Bhd.
CIMB[b]	Commerce Finance Berhad	Commerce International Merchant Bankers Berhad, Bank Bumiputra; Southern Bank
EON Bank	EON Finance Berhad	Oriental Bank; City Finance; Perkasa Finance; Malaysia International Merchant Bankers
Hong Leong Bank	Hong Leong Finance Berhad	Wah Tat Bank; Credit Corporation Malaysia
Malayan Banking Berhad	Mayban Finance Berhad	PhileoAllied Bank; Pacific Bank; Sime Finance
Affin Bank	Affin Finance Berhad Perwira Affin Merchant Bankers	BSN Commercial Bank; BSN Finance; Asia Commercial Finance; BSN Merchant Bank
Public Bank	Public Finance Berhad	Hock Hua Bank; Advance Finance; Sime Merchant Banks
RHB Bank	RHB Sakura Merchant Bankers	Sime Bank; Bank Utama; Delta Finance; Interfinance Berhad
9 institutions	9 institutions	36 institutions

Source: Bank Negara Malaysia Annual Report (2009).

Note: [a]The six original acquirers or 'anchor banks' in the government-led merger programme were Maybank, Bumiputra Commerce Bank, Public Bank, Perwira Affin Bank, Multi-Purpose Bank and Southern. [b]Bumiputra-Commerce was created from the merger between Bank of Commerce and Bank Bumiputra, the second largest banking institutions prior to 1997 crisis. The latter suffered from non-performing loans and so was rescued by the Bank of Commerce. The mergers between Bank of Commerce and Bank Bumiputra as well as RHB Bank and Sime Bank happened in 1999 prior to the government merger announcement in October 1999. In 2006 Southern Bank was bought out by Bumiputra-Commerce Holdings (BCHB). BCHB planned to delist the bank from public listing as well as Bumiputra-Commerce and CIMB (Investment bank division). Therefore these three banks converted into one universal bank and was renamed CIMB Bank commencing, on 18th March 2007. [c]AmBank and Alliance Bank were previously known as Arab Malaysia Bank and Multipurpose Bank respectively.

2.5.1 Malaysian Financial Institutions

The banking system in Malaysia comprises commercial banks, investment banks and Islamic banks. These are the main source of funds and the main contributors in financing the economy and development activities in the country. By the end of 1959, two years after gaining independence and the establishment of BNM, there were 26 commercial banks with only 8 of them being Malaysian, whilst the rest were foreign

owned (Matthews and Ismail, 2005). At the time the foreign banks dominated the system specialising in foreign exchange business and finance of foreign trade (Lin 1977; Matthews and Ismail, 2005).

In the 1960s, BNM took drastic measures to develop the banking structure with the main concern being to develop a domestically oriented banking system. As a result, the domestic banking network was extended and foreign banks were asked for reorientation of their operations towards meeting and catering for domestic needs. In 1982 the local banks improved considerably by increasing the number of commercial banks to 38 with 21 Malaysian and 16 foreign banks, and by 1993 the number of domestic banks had increased to 23. Since 1971, BNM has prohibited any opening of new foreign bank branches and the last license to a foreign institution was granted in 1973 (Detragiache et al. 2005).

1) Malaysian Banking – 1980s

In the 1980s and early 1990s, Malaysian banking experienced a severe banking crisis and underwent financial deepening, following the mid 1980s recession and the collapse of the stock market. The Government supported by BNM, moved towards reforming the policies and to improve banking supervision and regulations. In 1989, BNM launched the Banking and Financial Institutions Act (BAFIA) to improve supervision and regulation.

2) Malaysian Banking – 1990s

Malaysia's performance peaked in the early 1990s (before the 1997 crisis) and successfully sustained a rapid annual growth averaging almost 8 percent annually. During this period, the banking sectors and the economy experienced a significant change in its operating environment and structure.

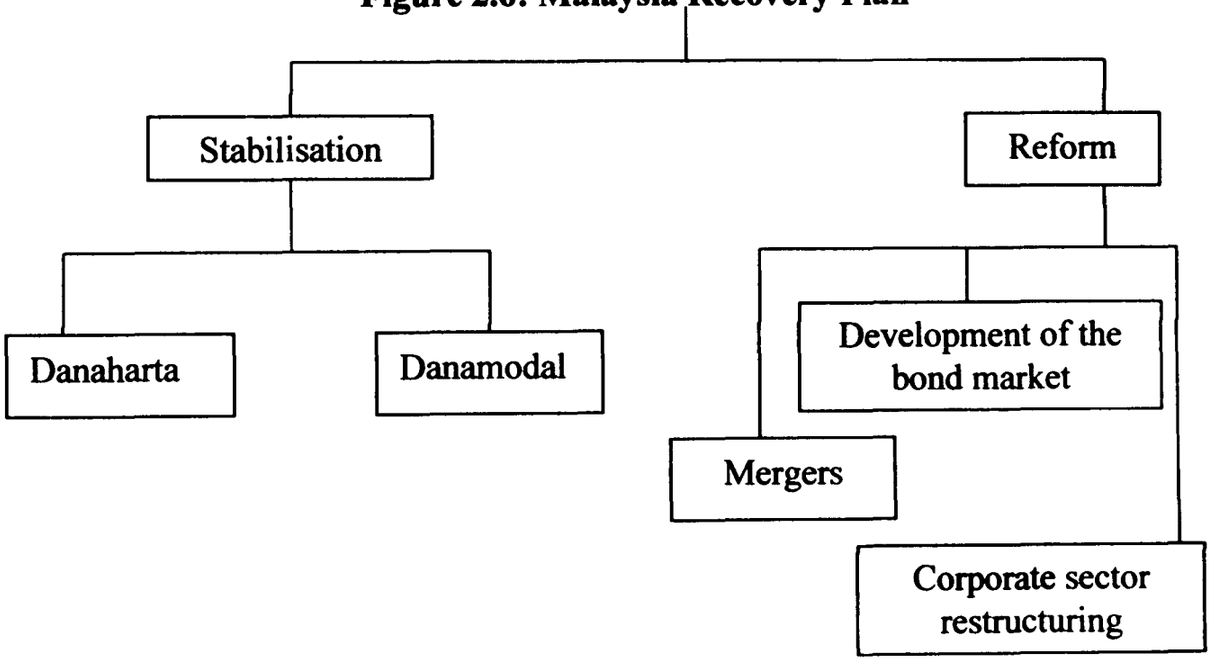
The Malaysian economy underwent sharp economic deepening in 1997 – 1998 during the Asian crisis. In 1998 the economy contracted by more than 7 percent this also affected the surrounding countries, including Korea, Indonesia, Thailand, and the Philippines. Large capital outflows, declining in equity values, ringgit depreciating and equity and real estate value plunging were among the first signs of the onset of the crisis in mid 1997. As the economy continued to deteriorate, the government

launched a plan to restore the economy, amongst other things by creating Danaharta and Danamodal. Danaharta was responsible for buying non-performing loans (NPL) at a discount from banks and Danamodal helped to provide new capital to banks in trouble.

3) Crisis and recovery plan – 1997 - 2005

There were two important reform processes associated with the restructuring (Zakaria, 1999). Besides launching Danaharta and Danamodal to recapitalise the financial institutions, the reform process included restructuring of the corporate sector, mergers and developing a stronger and more secure bond market. In September 1998, the Malaysian Government imposed capital controls by imposing restrictions on capital repatriation by investors and offshore trading of ringgit denominated assets (Sharma D. S., 2003).

Figure 2.6: Malaysia Recovery Plan



Malaysia was the only country (under study in this thesis) that did not agree to IMF assistance post crisis. Instead they launched a 'capital control' plan as part of the recovery process. The control was aimed at stemming the speculative pressure on the ringgit, and to provide stabilisation though moderation of domestic interest rates and pegged exchange rates.

Box 5: Malaysian Controls on Capital and Exchange Controls
Sept. 1-2, 1998

1) Malaysia fixed the exchange rate at RM 3.80 per $US
2) Prior approval was required for non-residents to be able to buy or sell ringgit forward.
3) All sales of ringgit assets were required to be transacted through approved domestic intermediaries. This effectively shut down the operation of the offshore ringgit market.
4) Non-residents were required to obtain BNM approval to convert ringgit held in external accounts into foreign currency, except for the purchase of ringgit assets in Malaysia or for the purposes of conversion and repatriation of sale proceeds of investment made by foreign direct investors.
5) Settlements of imports and exports were required to be settled in foreign currency. However, free exchange was maintained for all current account transactions in addition to supply of trade credit to non-resident exporters of Malaysian goods.
6) Credits to External Accounts were limited to the sale of foreign currency, ringgit instruments, securities or other assets in Malaysia; salaries, wages, rentals commissions, interest, profits, or dividends.
7) Debits to External Accounts were restricted to settlement for purchase of ringgit assets and placement of deposits; payment of administrative and statutory expenses in Malaysia; payment of goods and services for use in Malaysia; and granting of loans and advances to staff in Malaysia.
8) Domestic nationals were forbidden to export more than RM10, 000 during any travels abroad. Foreign nationals were forbidden to export more than RM1000 upon leaving Malaysia.
9) After September 1, 1998, non-resident sellers of Malaysian securities were required to hold on to their ringgit proceeds for at least 12 months before repatriation was to be allowed. Ban on the provision of domestic credit to non-resident correspondent banks and stock broking companies.

Changes in Controls -1999

1) As of February 15, 1999, the year-long moratorium on repatriation of investments was replaced with a graduated tax. All capital that had entered Malaysia before February 15, 1999 was subject to the following levies on the capital being removed: (a.) 30% if repatriated within the first 7 months after entering Malaysia, (b.) 20% if repatriated between 7 and 9 months after entry, (c.) 10% if repatriated between 9 and 12 months of entering, and (d.) no levy if repatriated after one year of entry.
2) For funds entering Malaysia after February 15, 1999, capital was free to enter and leave without taxation; however, profits were taxed at the rate of 30% if repatriated within one of entry and 10% if repatriated after one year of enter.

Source: Kaplan and Rodrik, Box 1, pp. 36, (2001)

Table 2.9: A Chronology of Key Events

Malaysia, Asian crisis, 1997-1998	July 14, 1997	Interest rates peak.
	January 5, 1998	Ringgit suffers its largest daily decline (7.5 percent) against the dollar.
	September 1, 1998	Exchange controls introduced.
	September 2, 1998	Exchange rate is fixed.
	September 7, 1998	The stocks market suffers its largest one-day decline (down 22 percent).
	February 4, 1999	Exchange controls modified. New rule introduced to replace one-year holding period rule for portfolio capital. Under the new rules, a declining scale of exit levies replaced the 12-month holding restriction on repatriation of portfolio capital.

Source: Reinhart and Edison, pp. 23, (2001)

Table 2.10: A Chronology of Key Events

Date	Policy Objectives	Specific Measures
September 1998	To deter speculation on the ringgit and gain monetary policy independence	Controls on transfers of funds from ringgit-denominated accounts for non-residents not physically present in Malaysia, in effect imposing a 12-month holding period restriction for repatriation of the proceeds from the sale of Malaysian securities, with retroactive effect. Prohibition of offshore transactions of ringgit. Ringgit pegged at RM3.8 per U.S. dollar.
February 1999	To pre-empt exodus of capital and reengage foreign investors	Easing of some controls, including replacement of the 12-month holding period restriction for repatriation of portfolio capital by a two-tier, price-based graduated exit levy system.
September 1999	To provide further relaxation	Removal of the exit levy on repatriation of principals. The two-tier graduated levy system on repatriation of profits simplified and replaced by a flat 10 percent exit levy, irrespective of when the profits are repatriated.
February 2001	To provide further easing	Removal of the 10 percent exit levy on portfolio capital profits repatriated after twelve months.
May 2001	To eliminate controls on portfolio investment	Complete removal of the 10 percent exit levy

Source: Kawai and Takagi, pp. 10 (2003)

2.6 Philippines[26]

Since independence in 1946[27] the Philippines economy can be characterised as a country under financial repression. In the 1950s and 1960s, the Philippines managed to experience modes growth but it began to deteriorate after 1965 due to political and social unrest. The deterioration was mainly caused by inefficient allocation of foreign debt-financed public investment, the oil shock, world recession and the increasing dependence on commercial foreign debt. The problems persisted when the country faced severe recession from 1984 through 1985 and perceptions of political instability during the Aquino administration further dampened economic activity. Furthermore the Philippines Presidency critically faced unrest experiencing major changes:

* The presidency of Ferdinand Marcos (1965–1986)
* The presidency of Corazon Aquino (1986–1992)
* The presidency of Fidel Ramos (June 1992–June 1998)
* The presidency of Joseph Estrada (June 1998–January 2001)
* The presidency of Gloria Arroyo (January 2001– present)

IMF assistance has been sought to design economic policies for the Philippines since the 1960s. The Philippines entered an IMF-sponsored structural adjustment program in 1970 to overcome the defects of the economy. The program was also supported by the World Bank and Asian Development Bank in ensuring adjustment and this involved: devaluation of the peso, the promotion of manufactured exports and incentive schemes to attract multinationals that were export-oriented (Bautista and Lim, 2006). With the IMF assistance the economy slowly recovered towards the end of the 1980s.

[26] Lim and Montes (2001).

Table 2.11:Decade Highlights

1950 – 1959	Reconstruction financing based on war reparations dries up; Import substituting industrialization strategy implemented to stave off BOP crisis; high growth in manufacturing and the economy; BOP crisis towards end of the decade.
1960 – 1969	1962 devaluation; Abandonment of import-substituting industrialization strategy; Initial IMF help; Infrastructure spending spree in second half of decade; Foreign debt crisis towards end of the decade.
1970 – 1979	1970 devaluation to solve BOP crisis; Centralized government under Martial Law; First oil shock; Foreign debt-driven growth with IMF assistance and support.
1980 – 1989	Second oil shock; High interest rate policies by developed countries; Latin-American foreign debt crisis begins in 1982; 1983 Aquino assassination and BOP crisis; Debt default and moratorium; Capital flight; Political instability; Economic collapse in 1984-85; End of Martial Law; Trade and Financial Liberalization in second half of decade; Recovery with IMF assistance; Series of coups against the Aquino government.
1990 – 2000	Slowdown in 1990 and recession in 1991 due to another crisis brought about by debt overhang, monetarist policies and loss of confidence; Power crisis of 1992-93; Tariff reduction and capital account liberalization / locking into AFTA, WTO and APEC in the early and mid-nineties; Bullish growth in 1994 – 97; Asian currency crisis of 1997 – 99. Weak and uncertain recovery after.

Source: Lim and Bautista, pp.6 (2006).

2.6.1 The Philippines Financial Sectors

The Philippines financial system is made up of four types of banks; commercial banks which are divided into universal and regular commercial banks, thrift banks, rural banks, and cooperative banks. The Philippines banks entered the crisis period in a well capitalised and robust condition. The Philippines implemented measures to encourage competition and strengthen their supervisory and regulatory system in three distinct phases: (i) 1980s financial reforms; (ii) reforms in the mid 1990s; and (iii) reforms in 2000 through IMF recommendations[28]. In 1990s, Philippines promoted openness to foreign banks[29] operations with an aim to create a more competitive environment. In doing so the Government projected economic growth through attracting more foreign investment by creating more variety in financial system services. With these reforms the Philippines emerged as one of the more resilient SEA economies and were less impacted than others from the 1997 crisis (Reyes, 2001).

[28] The reform plan recommended by IMF had three purposes; (1) to strengthen the savings mobilization to financial intermediaries, (2) to devise provision of medium and long term industries funds, and (3) to enhance the productivity of the financial sector by expanding its scale. This plan followed by a number of measures implemented; (1) liberalizing interest rates, (2) selected banks were permitted to operate universal banking, (3) reducing reserve requirements, and (3) revising the tax system on institutions income.

[29] The foreign banks operations are still under strict regulations where they are not to operate as universal banks; not to engage in trust operations and not allowed to open new branches.

Table 2.12:The Philippines Financial System

Type of Institutions	Components
Banking Institutions	Universal banks
	Commercial banks
	Thrift banks
	Rural and cooperative banks
	Specialised government banks
Non-Bank Financial Intermediaries	Investment houses
	Financing companies
	Securities dealers
	Investment companies
	Fund managers
	Lending investors
	Pawnshops
	Government NBFIs
	Venture capital corporations
Non-Bank Thrift Institution	Mutual building and loan associations
	Institutional associations
	Non stock savings and loans associations

Source: Gochoco-Bautista, pp. 35 (1999).

1) Financial Restructuring in the 1980s

In 1980 the Philippines experienced a serious economic and financial crisis that forced the government to restructure the banking system in order to add stability and to promote competition. The banks were given the responsibility to allocate funding to various economic activities. To achieve these objectives, numerous types of banks were pared down to five main types, namely; universal banks or banks with expanded commercial banking functions; ordinary commercial banks; thrift banks; rural banks; and specialized government banks. Minimum capital requirements varied across these different institutions (Lamberte, 1993; Manlagñit and Lamberte, 2004). In light of several bank failures in the 1980s the reforms continued to be implemented in several other important areas such as: removal of interest rate ceilings, restricting bank entry (lifted in 1991) and the tightening of prudential regulations.

2) Financial Reforms – mid 1990s

In the early 1990s, the government aimed to encourage foreign participation in economic activities, contribute towards foreign investment and increases variety in banking services (Manlagñit and Lamberte, 2004). The reforms continued with greater changes and emphasis was given to developing foreign that involved;

- Deregulating the foreign exchange market to enhance efficiency consistent with economic development;
- Redefining prudential limits on foreign exchange activities of banks;
- Introducing legislation, the New Central Bank Act in 1993, to ensure independence from political interference in the conduct of monetary policy;
- In 1991, bank entry restrictions were lifted, 10 new foreign banks were allowed licences by 1993.

Reforms in early 1990's significantly improved economic and financial sector development. These changes however, also brought some weaknesses and vulnerability (Alburo, 1999), namely;

- a surge in short-term capital mostly in the form of portfolio investments relative to the flows of foreign direct investment[30];
- emergence of a stock market bubble and real estate and non-tradable good inflation;
- a rapid expansion of domestic credit extended by the commercial banking system,
- widening current account deficits; and
- an overvaluation of the local currency (similar symptoms to the Mexican crisis in 1994).

In 1997, the economy was again in turmoil, when the Asian financial crisis (which started in Thailand) struck the region. The crisis left significant macroeconomic effects such as;

- A downward shift in economic growth and credit availability;
- Higher interest rates;
- Policy action designed to reduce credit rationing seemed to have the opposite; effect and credit availability increasingly tightened;
- Large depreciation of the Peso resulting from a large outflow of foreign capital;

[30] Portfolio investment inflows in the Philippines have found their way into the property sectors, into the stock markets, or into financial institutions, among others. Driven by continued privatization of public enterprises, initial public offerings by corporations, and overall "irrational exuberance," these investments drove up asset prices and created large paper gains in the stock market. The flotation of the First Philippine Fund (FPF) in the New York Stock Exchange helped this along especially after 1992. Evidence of the property bubble can be readily observed in the rapid decline in property prices around the prime areas of the country, the shelving of planned property construction, and the sharp drop in prices of club and golf course shares in the immediate aftermath of the crisis (Alburo, 1999, pp. 443)

- Rise in inflation; and
- A fall in government revenue due to a shortfall in income tax and import tax collections.

The Philippines recovery plan involved extending the IMF supported program which was already in place (since late 1980s and early 1990s) to mitigate the effects of the crisis. The IMF supported programs successfully implemented macroeconomic adjustment and structural reform. This enabled the Philippines to weather the crisis at a relatively lower cost in terms of output loss, employment and social distortion compared to other SEA economies (IMF, 2000).

Table 2.13: Competition-Promoting Policies and Deregulation

Early 1980s	Introduction of universal banking; Lifting of interest rate ceilings
1989	Measures to promote competition among banks. Abolition of opening new branches in preferentially treated agricultural areas. Unification of legal reserve ratios
1990	Abolition of moratorium on new entry by domestic banks. Raising the minimum paid-in capital of savings banks. Approved off-site ATMs. Raised minimum paid-in capital of savings banks.
1991	Raised minimum paid-in capital of expanded commercial banks and ordinary commercial banks. Measure to promote bank mergers and consolidation. Liberalization of regulation on opening bank branches. Approval of opening branches across the country was given to agricultural bank. Measure to promote bank mergers/consolidation. The Central Bank's approval was no longer required for installing ATM in areas where bank branch does not exist. Foreign exchange liberalization
1992	Measures to promote the opening of branches. The ceiling was raised on the ratio of foreign exchange holding to receipts from exports to 40%. Abolition of foreign exchange regulation as a principle
1993	Creation of Bangko Sentral ng Pilipinas. Deregulation of ATM installation criteria. Further relaxation of branching policies. Lifting of prior CB Approval in the establishment of ATMs. Gradual reduction of reserve requirements. Capital ratio, liquidity and profitability and sound management became criteria for approving the opening of bank branches. The New Central Bank Act was enacted. Legal reserves were introduced to common trust funds
1994	Liberalization of market entry by foreign banks. Reduction of required equivalent capital for opening branches for savings banks. Revision of minimum paid-in capital for savings banks; Rationalization of the rediscount rate.
1995	Liberalization of entry-exit rules for rural banks. Increase in the minimum paid-in capital for banks. Passage of Thrift Bank Act of 1995. Easier rules on investment in banks.
1996	Guidelines on the issuance of expanded commercial banking authority to local branches of foreign banks operating in the country. Further increase in the capital requirement of banks.
1999	Further encouraged mergers and consolidation. Increased disclosure requirements of banks.
2000	Passage of the General Banking Law of 2000; Electronic Commerce Act. Greater transparency in granting DOSRI loans. Issued rules and regulations to combat money laundering. Issued guidelines on operations of foreign exchange subsidiaries of banks.
2001	Issued regulations to implement the General Banking Law of 2000. Amendments to the New Central Bank Act.
2002	Maintenance of strength and stability. Improvement of banking services and corporate governance. Promote microfinance.
2003	Approved the increase in the liquidity reserve requirement against peso demand, savings, time deposits and deposit substitute liabilities of Universal Banks (UBs) and Commercial Banks (KBs) Issued guidelines in the establishment of a foreign subsidiary by a bank subsidiary
2004	Increase of the liquidity reserve requirement against peso demand, savings, time deposits and deposit substitute liabilities for UBs and KBs and Non-Bank Financial Institutions with Quasi-Banking Functions (NBQBs).

Source: Money & Banking in the Philippines (BSP 2003); Okuda and Saito (2001); Manlagñit and Lamberte, (2004)

2.7 Thailand

Thailand is considered as a middle-income country in the SEA. In the early years, 1960s to mid 1980s, Thailand was the fastest growing country with GNP growth averaging 4.7 percent over the entire period. The economy was mainly dependent on production and export of primary commodities and continued to grow substantially between 1986 and 1990 (Warr and Bhanupong, 1996; Hicken, 2004).

Thailand's economy can be characterised by three sub-periods[31] of development:

- 1980-1985 period of macroeconomic adjustment, economic uncertainty and hardship
- 1986-1996 a period of extraordinary high economic growth, economic surge, speculation and 'bubbles'
- 1997-2003 economic distress and emerging recovery

Table 2.14: Thailand: Economic Background

Year	GDP Growth (%)	FDI (Mill of US$)	Inflation Rate (GDP deflator)	Current Account Balance (% of GDP)	Budget Surplus (% of GDP)
1980	5.2	190	12.7	-6.4	-4.9
1981	5.9	291	8.4	-7.3	-3.4
1982	5.4	191	5.1	-2.7	-6.4
1983	5.6	350	3.7	-7.2	-3.4
1984	5.8	401	1.4	-5.0	-4.0
1985	4.6	163	2.2	-4.0	-5.2
1986	5.5	263	1.7	0.6	-4.2
1987	9.5	352	4.7	-0.7	-2.2
1988	13.3	1,105	5.9	-2.7	0.6
1989	12.2	1,776	6.1	-3.5	2.9
1990	11.2	2,444	5.8	-8.5	4.5
1991	8.6	2,014	5.7	-7.7	4.7
1992	8.1	2,113	4.5	-5.7	2.8
1993	8.4	1,804	3.3	-5.1	2.1
1994	8.9	1,366	5.1	-5.6	1.8
1995	8.8	2,065	6.0	-8.1	2.9
1996	5.5	2,336	4.0	-8.1	2.4
1997	-0.4	3,745	5.4	-1.9	-0.9

Source: Hicken (2004).

Thailand's economy has experienced a remarkably rapid and consistent growth of economy since the early 1960s until the mid 1980s. The growth in GDP amounted to 8.2 percent between 1960 to 1969, 7.2 percent over 1970 to 1979 and 5.4 percent over 1980-85 (Dixon, 2001). The Thai economy developed in the late 1970s until early

[31] Pholphirul (2005)

1980s mainly due to growth of agricultural production and an import substituting manufacturing sector. In the 1970s the economy was adversely impacted by the global oil crisis (and again in the mid 1980s). Thailand's government encouraged (subsidised) expansion of the economy in key areas namely: international manufactured exports, utilising revenues gained from tourism sectors and remittances from foreign workers to help finance this activity. In terms of trade, Thailand is considered the most closed of the Asian economies, as its development was characterized by comparatively low levels of foreign investment and ownership, a low level of trade dependence and from the late 1970s it was the most highly protected (Dixon, 2001).

Table 2.15: Thailand (in 1978)

	Openness ratio (%)	**Trade Weighted Tariff Protection (%)**
Indonesia	44.2	20.0
Malaysia	86.9	6.6
Philippines	48.2	23.0
Thailand	41.7	30.4

Source: Dixon, 2001, pp.48

The level of effective protection increased in 1970 which ranked Thailand as being one of the most protected economies (World Bank, 1980). By the beginning of the mid 1980s, Thailand experienced a sharp and continuous growth and in 1996 the government embarked on an internationalisation programme aimed at integrating into the global economy (Dixon, 2001). The high growth and stable macroeconomic environment from the late 1980s provided enough confidence for Thailand to open-up to the international financial market. Thailand became an international investment hub and attracted funds from new industrial economy countries (NIEs) along with Japan. The country successfully became a key element in the emergent Pacific Asian regional division of labour[32] (Dixon, 2001, pp. 48). After 1990, Thailand experienced an increasing level of foreign direct and short term investment to the private sector. The foreign direct investment in Thailand became an important element towards the development of the country's continuous economic growth in the 1990s and the increase in import and shift towards manufacturing.

[32] Thailand became the main labor relocation spot especially for the manufacturing sectors in the mid 1980s.

Besides experiencing rapid growth in the 1980s and early 1990s, the country has also been affected by strong external and internal economic and political shocks;

- perceived military threat from Vietnam in 1960
- 1972-1973 international commodity crisis
- Oil crisis 1973 – 1974 and 1979 – 1980
- High interest rate of the early 1980s
- World recession in the 1980s
- Overload of foreign investment in late 1980s.
- Severe economic and financial turmoil in 1997

Before being affected by the 1997 financial crisis Thailand's banking sector was viewed as the main element of growth in the economy. The country was considered as one of the "East Asian Miracle' countries for posting record growth and improvements in total factor productivity (World Bank 1993). All this changed by the mid-1990s when an overheated economy and overvalued currency led to the collapse of a highly leveraged and fragile banking system. (Sawanaporn and Menkhoff, 2003, pp.3).

The 1997 Asian financial crisis began in Thailand and spread to the neighbouring countries including Indonesia, Malaysia and the Philippines. The 1997 crisis left the country in severe economic failure resulting in large sectors of the financial sector (banks and finance companies) and the real sector (property companies) becoming insolvent.

Table 2.16: Thailand Financial Crisis: Key Elements[33]

1988-1995	Thailand's economy's booming periods with large current account deficit, weak financial system and overvaluation of Thai baht.
May 1997	Foreign speculators attack the baht. Thailand spends 90% of foreign reserves to defend the baht against speculative attack.
July 1997	Thailand changed its exchanged rate system from fixed exchange rates to manage floated. Thailand accepted financial assistance from IMF.
August 1997	Thailand receives US17 billion loans from the IMF and agrees to adopt tough economic measures to overcome the situation.
December 1997	Financial sectors collapse when 56 solvency financial companies and one commercial bank are closed. Thailand economy slips into recession.

[33] Willman, (2004).

The main causes of Thailand's financial crisis include:

- Weakness in domestic macro-economic fundamentals – a deficit in the current account due to appreciation of Thai baht and large increase in the real wages;
- Weaknesses in the financial system, namely; excessive lending to high risk investors without prudent procedure of lending and monitoring;
- Adverse effects of financial liberalisation and the massive influx of capital;
- Speculative attacks and the floatation of the currency (baht);
- Mis-timed political intervention, delays in policy implementations and an unstable political regime.

To restore the economic and financial sectors from crisis, the Thai government agreed IMF financial assistance conditions of which the most important are listed as follows[34]:

- Restoring fiscal, monetary and economic stability immediately;
- Retaining reserves equal to 3.5 months' import value, or at least US$25 billion;
- Restoring confidence and trust in the finance and banking industry to counter any run on funds;
- Restructuring the Financial Institutions Development Fund to ease the burden on government;
- Restructuring policies, amend economic reforms, and tighten financial institution operating systems and macroeconomic steps;
- Cut the current deficit from 8% of GDP in 1996 to 5% in 1997 and 3% in 1998;
- To maintain annual economic growth at 3- 4 % in 1997 and the year after;
- Cap inflation at 8-9% in 1997;
- Maintain fiscal stability balancing income and expenditure; and finally to
- Tackle economic problems and build international credibility through financial and technical assistance from the IMF, foreign governments and foreign financial institutions.

[34] Ye Myint, pp. 8-9

Thailand undertook other actions[35]:

- Raised value-added tax from 7% to 10%;
- Restricted spending on essentials such as education, public health, infrastructure and social welfare;
- Retained the managed float of the Baht; and
- Followed austere monetary policies. The Bank of Thailand and the Financial Institutions Development Fund provided liquidity to support the operations of the 33 financial institutions whose operations were not suspended.

2.7.1 Thailand's Financial Sector

The Thai banking system is bank-oriented with limited financial intermediation through mutual funds and other types of institutional investor (Alba et al., 1999; Chantapong, 2005). Thailand's financial institutions can be divided into four types: (1) commercial banks; (2) capital market firms[36]; (3) government-owned specialised financial institutions (SFIs) and non-bank financial intermediaries (finance companies, credit foncier companies, life insurance companies, and various co-operatives).

Before the 1997 financial crisis, Thailand's financial sector was dominated by commercial banks, which remained the oldest type of financial institution operating in the country. The environment experienced massive landscape changes following the 1997 crisis due to closures and mergers of many of the finance companies.

Table 2.17 Pre and post Crisis in Thailand Experience

Pre-financial Crisis Jan 31, 1997	Post-financial Crisis December 31, 2003
– Commercial Banks (31) – Thai (15) – Foreign Bank Branches (16)	– Commercial Banks (31) – Thai (13) – Foreign Bank Branches (18)
– International Banking facilities (IBFs) attached to commercial banks (25)	– International Banking facilities (IBFs) attached to commercial banks (24)
– Stand alone IBFs (17)	– Stand alone IBFs (5)
– Finance and Security Companies (91)	– Finance and Security Companies (18)
– Credit Foncier (12)	– Credit Foncier (5)
– Total Financial Institutions (176)	– Total Financial Institutions (83)

Source: Bank of Thailand

[35] Ye Myint , pp. 8-9

[36] Thailand's capital market can be divided into stock and bond markets.

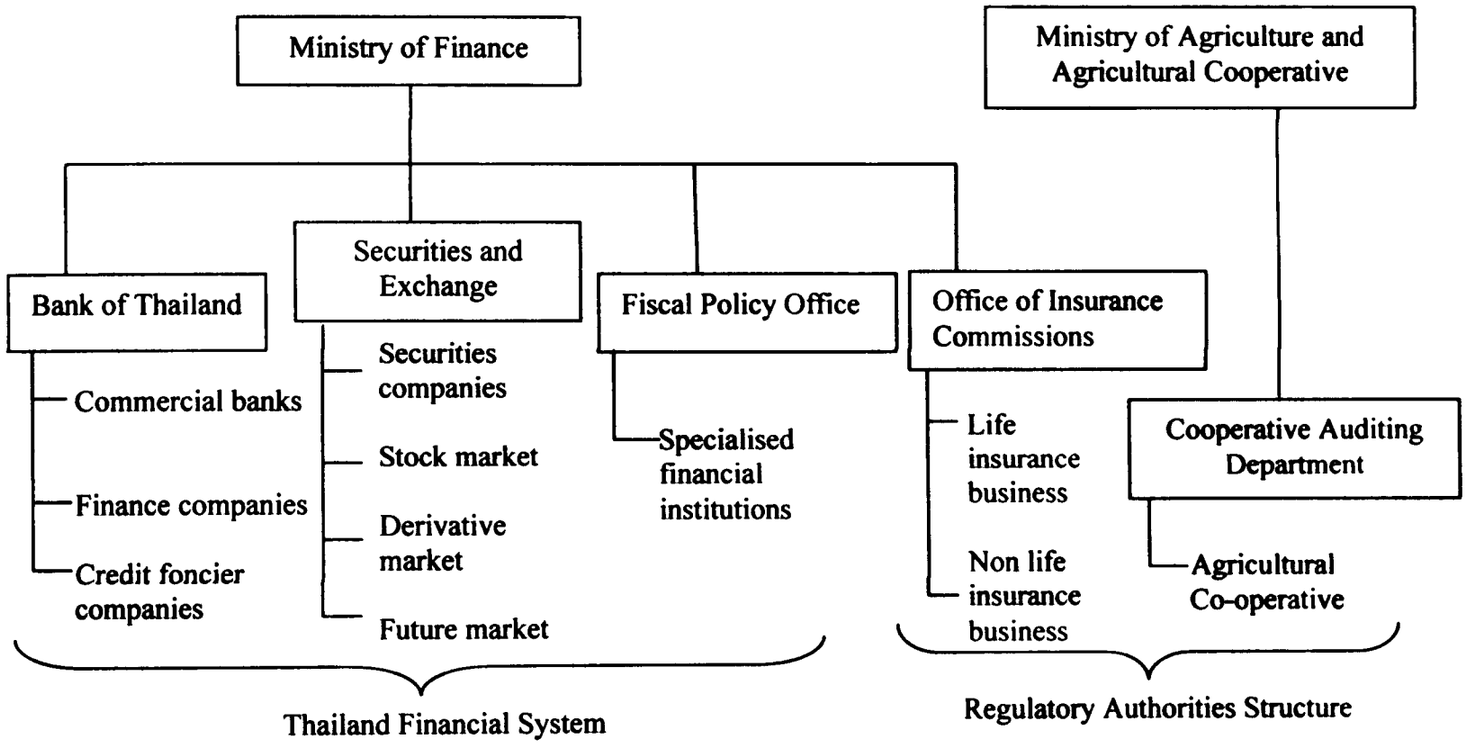
2.7.2 Weaknesses in the Thai Financial Sector

Although the aforementioned reforms helped stabilise the country's banking and financial system, there remain some underlying issues:

i) Too many regulatory authorities

Financial institutions in Thailand are subject to different laws and are regulated by several different agencies.

Figure 2.7 Thailand Financial Institutions



The structure has left the financial sector less efficient, costly and has created inconsistencies in supervising and regulating the various monetary regulators. Thailand's system needs a convergence of regulatory practices.

ii) Thailand's commercial banks became less efficient

According to Charnsan (2005), Thailand's commercial bank efficiency diminished over the post-crisis period from 1998 – 2004. The banking sector experienced a sharp fall during the period 1998-1999 and gained a slight increase during 1999-2004. The finding also indicates no changes in the level of efficiency for domestic and foreign commercial banks. Compared to foreign banks activities, Thailand's commercial banks operated the least efficiently. Williams and Intarachote (2002) indicate that foreign entry was allowed into Thailand's financial sectors due to diligence and

monitoring, evaluating and disclosing of credit risks. Thai banks are still not able to compete with foreign counterparts as the foreign branch banks have skill advantages in sales and marketing, product innovation, and risk management as well as access to a cheaper source of funds.

iii) Small Capital Market

Stock Exchange of Thailand (SET) is still developing with a limited number of listed firms and small a trading volume. Operating for more than 30 years, SET still has lack of good governance and transparency.

2.7.3 Reform in Thailand's Banking Sector

The liberalisation process in Thailand took place during the 1980s and early 1990s under the supervision of the Bank of Thailand. This process included deregulation of international capital flows and movement towards a more flexible exchange rate system. The government took steps in turning Bangkok into a regional financial sector with the establishment of Bangkok International Banking Facilities (BIBFs) in 1993. Thailand financial liberalisation between 1990 to 1997 can be subdivided into three phases (Williams and Intrachote, 2002, Chantapong, 2005): (1)1990-1992 – increased competition and efficiency in the banking system; (2) 1993-1995 – enhanced savings mobilisation, expanded financial services to rural areas and developed Bangkok as a regional financial centre: and (3) 1996-1998 - deregulation of foreign exchange controls and relaxation of entry barriers into the domestic financial sector.

During the early stage of liberalisation in the early 1980s, Thailand's financial sector was segmented between domestic banks, and other domestic and foreign bank institutions. The situation limited the ability to compete with domestic banks with both foreign banks and domestic financial institutions. The environment also made it difficult to compete between banking sectors and undeveloped domestic financial markets. Financial liberalisation policy in Thailand can be divided into four components (Williams and Intarachote, 2003; Okuda and Mieno, 1999): (1) deregulate the financial system; (2) developing financial instruments; (3) improve the payment system; and (4) improve supervision and examination. The objective for implementing financial liberalisation can be categorised into three: (1) to increase

competition in the domestic financial sector in the expectations of raising the efficiency of savings mobilisation and resource allocation; (2) expand the financial sector to support economic growth; and (3) establish Bangkok as the leading offshore financial centre in the region.

The main mistakes made were the pursuit of financial liberalization without an adequate supervisory framework as well as the lack of appropriate monetary and exchange rate policies. These mistakes substantially increased the risk of economic stability, resulting eventually in the 1997 crisis. The financial liberalisation measures built up vulnerability towards economic and financial shocks. This impact can be observed through; (1) liberalization of foreign capital flows while keeping the exchange rate rigid; (2) premature liberalization of financial institutions; and (3) failure to prudently supervise financial institutions.

2.8 Evaluation of the Asian Financial Crisis 1997: Crisis and Action Plan

Banks in the SEA economy were somewhat prone to crisis due to the structural weaknesses in their respective economies and the major financial and ec0onomic changes that took place over the period. As noted by Radelet and Sachs (1998, pp. 1):

"*The East Asian Financial crisis is remarkable in several ways. The crisis had hit the most rapidly growing economies in the world. It has prompted the largest financial bailouts in history. It is the sharpest financial crisis to hit the developing world since the 1982 debt crisis. It is the least anticipated financial crisis in years*".

The Asian financial crisis of 1997[37] is now seen as one of the most significant economic events in recent world history. At the time, one common interpretation was that the crisis debunked the "Asian miracle". Capitalism and globalization were

[37] The 1997 Asian economic crisis was initially a financial one as speculation caused funds to drain out of Thailand and Korea currencies and stock markets. Due to this event, the crisis eventually caused economic growth rates to collapse in several Southeast Asian countries. There have been distinct phases to the Asian crisis: the first from mid-July 1997, when it first struck Thailand then followed by neighboring country, Malaysia, Indonesia and the Philippines, and the second since mid-1998, when the turbulence has spread beyond the region as Russia, China and Brazil have shown signs of contagion. Measures had to be taken to improve overall economic system as depression became uncontrollably serious and prolonged.

repudiated and blamed for the bursting of currency and property bubbles and the resultant difficulties (Kim, 2007).

There were various participants that supported SEA countries post-crisis. These included Asian and Western governments, the private sector, and the International Monetary Fund. Support sought to provide temporary financial assistance to help countries ease balance of payments problems (Muchhala, 2007). In particular, the IMF played a major role in changing the SEA economies mainly by emphasizing the need to restructure their banking systems. Asian crisis hit countries also agreed to proposals which introduced global standards for banking regulation, enhancing the quality of economic statistics and improving the levels of information available to investors in emerging market economies. However, Malaysia refused to be liberalized and open its capital and financial markets and instead took capital control measures as the country believed it is the movement of short term money that caused the crisis (Yoon, 2005).

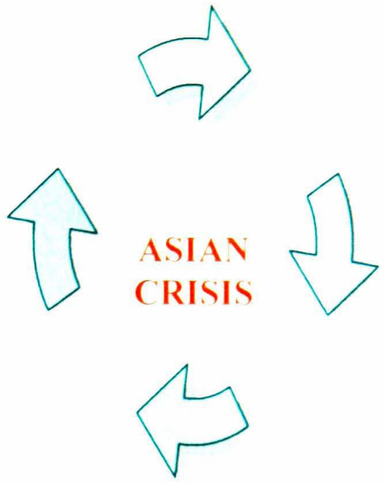
Several factors, both domestic and external, have contributed towards the crisis and these are summarised in Table 2.18:

Table 2.18: Causes Contributed towards Asian Crisis

Domestic factors	External Factors
• A large external deficit and inflated property and stock market values; • Lack of enforcement of prudential rules and inadequate supervision of financial systems, coupled with government directed lending practices that led to a sharp deterioration in the quality of banks' loan portfolios; • Problems resulting from the limited availability of data and a lack of transparency, both of which were hinder by economic fundamentals; and • Problems of government and political uncertainties, which worsened the crisis of confidence, fuelling the reluctance of foreign creditors to roll over short –term loans, and led to downward pressures on currencies and the stock market.	• International investors had underestimated the risks as they searched for higher yields at a time when investment opportunity appeared less profitable in Europe and Japan, owing to their sluggish economic growth and low interest rates; • Since several exchange rates in East Asia were pegged to the US dollar, wide swings in the dollar/yen exchange rate contributed to the building in the crisis through shifts in international competitiveness that proved to be unsustainable; • International investors, who were mainly commercial and investment banks, contributed (along with domestic investors and residents seeking to hedge their foreign currency exposures) to the downward pressure on currencies.

Source: "The Asian Crisis: Causes and Cures". Finance and Development (Quarterly magazine of the IMF). (June 1998, Volume 35, Number 2).

Figure 2.8 Chronology of Financial Crisis



Thailand

1996 and early 1997 The Thai Baht is under speculative attack during 1996 and early 1997. Thai stock markets fall throughout 1996 and early 1997.

Malaysia

Started in July 1997 with a plunge in its currency, the ringgit depreciated by 35 percent from July 1997 to December 1997 against the dollar. This lunge not only severely affected the Malaysian stock market but also destroyed investor confidence. Malaysia introduces capital controls.

Korea

Early 1997 There are seven high-profile bankruptcies of Korean conglomerates, such as Hanbo Steel and Kia Motors. Korea The economy is very dependent on manufacturing-based enterprises, especially large industrial conglomerates known as Chaebol, which dominate the economy.

The Philippines

July 1997 The Philippines abandons its dollar-peg and imposes certain foreign exchange controls. Malaysia also abandons its pegged exchange rate. Overnight interest rates are raised in the Philippines to 32% at one point.

Indonesia

14 August 1997 Indonesia raises interest rates but lowers them from late August, as it devalues the Rupiah on 14 August.

The nature of this crisis, and the need to restore confidence as soon as possible, also drove each country to take several measures towards recovery. The financial crisis of SEA countries (initiated in Thailand in June 1997) was generally met treated with two countermeasures;

Table 2.19: Countermeasures of countries and IMF supports

		IMF Support and Policy Intervention	
		Support	**Refusal to support**
Accepting IMF	**Positive**	Korea	**Malaysia (Capital Control)**
	Passive	Thailand	
		Indonesia	
		Philippines	

Source: Yoon, (2005).

Measures shown in Table 2.19 can be classified as follows:

- Accepting IMF assistance: Korea and Thailand received IMF help and propelled finance and corporate structural reshuffles as requested by IMF.
- Accepting IMF with complications: Indonesia received IMF help but didn't accomplish the IMF program because of their political situation. The Philippines adopted its own policies from its successful IMF supported program of macroeconomic adjustment and structural reforms in the late 1980's and early 1990's, enabling the country to confront the crisis at a relatively lower cost in terms of output loss, unemployment and social dislocation.
- Without the IMF: Malaysia refused IMF help and undertook its own policies which refused the opening-up and liberalizing the financial market.

International Monetary Fund (IMF) intervention. Three of the most affected countries accepted IMF financial support packages and these can be briefly explained as follows:

(1) *Financing*: Indonesia, Korea and Thailand were given IMF financial support worth US$35 billion as assistance for adjustment and reform programs. Some US$85 billion of financing was committed from other multilateral and bilateral sources. Besides financing, additional action was taken at various stages in different countries

after the start of IMF programs, to stem private capital outflows through making the return on domestic assets more attractive.

(2) *Macroeconomic Policy*: Monetary policy was tightened according to each countries background, in order to stop the exchange rate from falling further and to prevent the currency from depreciating and leading to inflation and continuing depreciation[38].

(3) *Structural Reform*: The main structural reforms were in the financial and corporate sectors. First of all to clear up the fallout from the crisis, unviable insolvent institutions that needed intervention were closed and the potentially viable were strengthened. In addition, actions had to be taken to limit the risks of bank runs and uncontrolled liquidity expansion. Secondly, financial supervision and regulation was improved to help minimize the likelihood of problems recurring[39] (Lane, 1999).

As for the Philippines, they embarked on a successful IMF supported program of macroeconomic adjustment and structural reforms in the late 1980s and early 1990s. Crisis management after mid-1997 was sound, and the Philippines adopted its policies including floating of the Peso (tightening of monetary policy) and strengthening the banking system (IMF Quarterly Magazine, 2000).

[38] In the IMF Asian program, interest rates were raised to halt inflation. However, this was only a temporary measure as confidence began to recover and market conditions stabilized, interest rates were lowered.

[39] Other areas covered are (1) enhancing governance and competition; (2) increasing the transparency of economic and financial data; (3) international trade reform; and (4) social sector reform.

Table 2.20: IMF Programmes: Objectives and Strategies

Indonesia	Korea	Thailand
Macro-targets for 1998 Economic Growth: -5% Inflation: 50%	*Macro-targets for 1998* Economic Growth: 2.5% Inflation: 5.2%	*Macro-targets for 1998* Economic Growth: 3.5% Inflation: 5%
Fiscal policy Reduction/removal of subsidies, tight budget (no cuts in social sector expenditures), revoking fiscal concessions to special national projects, and divestiture of state owned enterprises, and cancellation of some of the public sector infrastructure projects.	*Fiscal policy* Fiscal consolidation comprising reduction of government expenditure, broadening VAT base, and selective increases in income and corporate taxes	*Fiscal policy* Fiscal consolidation comprising reduction of government expenditure, (except for health and education), raising of VAT rates, and divestiture of state owned enterprises, and reduction/removal of subsidies.
Monetary policy Promotion of central bank independence, tight monetary policy and flexible exchange rates	*Monetary Policy* Policy Promotion of central bank independence, tight monetary policy and flexible exchange rates.	*Monetary Policy* Policy Promotion of central bank independence, tight monetary policy and flexible exchange rates
Financial Sector Reform Bank closures, financial sector restructuring including enforcement of capital adequacy standards and strengthening the regulatory framework, deposit guarantee for small depositors and no government guarantee for private non-financial companies.	*Financial Sector Reform* Financial sector restructuring including enforcement of capital adequacy standards and strengthening the regulatory framework, and improving accounting and disclosure practices in line with international standards.	*Financial Sector Reform* Bank closures, financial sector restructuring including enforcement of capital adequacy standards and strengthening the regulatory framework, and improving accounting and disclosure practices in line with international standards.
Debt Repayment Funds IMF bailout to be used for full payment of foreign debt obligations.	*Debt Repayment Funds* IMF bailout to be used for full payment of foreign debt obligations.	*Debt Repayment Funds* IMF bailout to be used for full payment of foreign debt obligations.
Trade, Tariff and Competition Policy Removal of state sponsored monopolies and cartels, abolition of restrictions on marketing arrangements and reduction of tariffs.	*Trade, Tariff and Competition* Competition Policy Elimination of trade related subsidies, removal of restrictive import licensing, promoting labour market flexibility, and reduction of restrictions on foreign direct investment.	*Trade, Tariff and Competition* Policy promoting competition through education and training.

Source: Based on Radelat and Sachs (1998)

Capital Controls. Despite obtaining financial assistance from the IMF (and other multilateral and bilateral assistance), Malaysia took further steps by implementing its own recovery solution through imposing controls on capital account transactions, fixing the exchange rate at RM3.80 per US dollar, cutting interest rates and embarking on a policy of re-flatiron[40] (Kaplan and Rodrik, 2002). Malaysia's policies aimed to

[40] Under IMF financial assistance, countries like Thailand, Korea, and Indonesia committed to float their exchange rates, raise interest rates, tighten fiscal policy, open up their financial markets to foreigners, close troubled banks and financial institutions, and undertake a range of other structural reforms.

resolve external imbalances, alleviating pressures on the ringgit and to restore market confidence (Table 2.21).

Table 2.21: Brief Summary of Major Exchange and Capital Controls

Date	Policy Objectives	Specific Measures
September 1998	To deter speculation on the ringgit and gain monetary policy independence	Controls on transfers of funds from ringgit-denominated accounts for nonresidents not physically present in Malaysia, in effect imposing a 12-month holding period restriction for repatriation of the proceeds from the sale of Malaysian securities, with retroactive effect. Prohibition of offshore transactions of ringgit. Ringgit pegged at RM3.8 per U.S. dollar.
February 1999	To pre-empt exodus of capital and re-engage foreign investors	Easing of some controls, including replacement of the 12 month holding period restriction for repatriation of portfolio capital by a two-tier, price-based graduated exit levy system.
September 1999	To provide further relaxation	Removal of the exit levy on repatriation of principals The two-tier graduated levy system on repatriation of profits simplified and replaced by a flat 10 percent exit levy, irrespective of when the profits are repatriated.
February 2001	To provide further easing	Removal of the 10 percent exit levy on portfolio capital profits repatriated after twelve months.
May 2001	To eliminate controls on portfolio investment	Complete removal of the 10 percent exit levy.

Source: Meesok et al., (2001), pp. 14-15; Kawai and Takagi, (2003), pp. 12.

Additional policies were taken into account between March and August 1998 in reaction to an output slow down, rebalancing macroeconomic policy, when fiscal policy was relaxed and tightening the credit facility. In order to safeguard the stability of the financial system, several measures were taken including upgrading of capital adequacy, prudential guidelines and disclosure standards for banking institutions and implementing merger plans for finance companies. These actions were followed by comprehensive financial corporate restructuring through the establishment of Asset Management Company, Danaharta, Danamodal and Corporate Debt Restructuring Committee (CDRC). The government also introduced a new liquidity framework for banking institutions which entitled banks to manage assets and liabilities prudently and efficiently.

Ten years after the crisis. Ten years have passed since the financial crisis and abruptly ended financial liberalization in the Asian economic region, it was also been ten years since the beginning of bank restructuring programs[41] and all the measures that were implemented with several changes to accommodate each country's economy, type of leaders and various social conditions at the time. The recent turmoil that struck South East Asian countries has had a significant impact on the financial sector of these economies and this makes it interesting to study the impact of such factors[42] on banking sector efficiency.

A study of bank performance during post-crisis restructuring is significant for a number of reasons[43]. First, during the 1990s the East Asian economies were recognized as the most successful in terms of financial integration, attracting capital flows and providing the (preferred) model of development for other emerging countries (World Bank, 1993). However, the disruption in financial systems in 1997 caused repercussions in many other financial markets (Radelet and Sachs, 1998). This implies that stability of East Asian economies and banking system performance has implications way beyond the region.

Second, bank inefficiency has often been claimed as a major cause of banking crises in developing countries. After the East Asian crisis in 1997, most of the bank regulators in crisis-affected countries adopted several measures to enhance their banking systems, including encouraging or even forcing distressed banks to merge as a way to reduce failure risk and remove inefficiency. However, the effectiveness of different policies at the individual bank level following a crisis has rarely been explored for these countries (an exception is Williams and Nguyen, 2005)

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[41] The programs contained a mixture of stock and flow solutions to financial distress; flow solution aimed to protect banks from making losses whilst stock solutions intended to resolve accumulated losses (Williams and Nguyen, 2005 and Gochoco-Bautista et al., 2000). As a reaction to financial distress, governments may nationalize banks; closing unviable banks; carrying out compulsory purchases and assumptions and transferring assets to healthier banks; creating larger core banks; removing bad assets to state-owned and managed asset management companies; and providing capital injections to recapitalized banks. Adopting international standards in bank supervision and regulation (capital adequacy, loan classification, and loan loss provisioning) and improving the institutional environment are also steps taken by some countries (Williams and Nguyen, 2005 and Lindgren et al., 2000).

[42] For this paper we define environmental variable into microeconomic variable (consisting of gross national income and population density), bank structure variable (equity/total assets and loans /total deposits), regulatory variable (a dummy for capital control), risk control (loan loss provision).

[41] Nakhun and Avkiran, 2009; pp 240-241.

Third, the current study sheds light on the relationship among bank mergers, foreign bank entry, state intervention, and bank efficiency in developing markets. Finally, this thesis seeks to investigate environmental influences on bank efficiency measures, and how bank efficiency impacts on competition and concentration in the industry. In the cross-country bank efficiency literature, research that accounts for the influence of environmental factors is limited to studies based on Europe (e.g., Lozano-Vivas et al., 2002; Weil, 2004). Our results highlight the importance of country-specific conditions that play a significant role in bank efficiency, competition and concentration measurement in developing countries.

A number of studies have also attempted to provide empirical evidence of economic and financial fragility in the affected Asian countries prior to the 1997 crisis. Some studies have compared indicators of fragility in the affected countries at the onset of the crisis with those in non-affected or less-affected emerging economies, using cross-sectional regression approaches (for example Corsetti et al., 2000). Results from these studies, in general, show that the affected countries were on average more fragile than others, although a few non-affected countries were also found to be vulnerable according to the indicators used. These types of study, however, cannot discriminate between the two factors described above. To do this requires testing not only whether there was fragility in the affected countries, but also whether such fragility had reached some "crisis triggering level." Researchers have attempted to show whether early warning system (EWS) models could have predicted the 1997 Asian crisis. The most notable examples are Kaminsky (2000); Berg and Patillo (1999a, b); Goldstein, Kaminsky, and Reinhart (2000); and Edison (2000). Two approaches have been widely used in constructing EWS models in this literature and the most widely used is the so-called signaling approach pioneered by Kaminsky and Reinhart (Kaminsky, Lizondo, and Reinhart 1998)[44].

[44] This involves monitoring a set of high-frequency leading indicators that tend to behave differently prior to a crisis and examining whether they individually or collectively have reached "threshold" values that are historically associated with the onset of a financial crisis. An alternative approach uses probit/logit models (see for example Berg and Patillo 1999b). Probit/logit EWS models are multivariate and allow testing of statistical significance of explanatory variables. But these models usually require large samples to estimate, and can only accommodate a limited number of explanatory variables to avoid multicolinearity. In contrast, the signalling approach-based EWS models are univariate, and do not allow testing of statistical significance, as they are nonparametric. But such models can work with small samples and impose no restriction on the number of explanatory variables.

Overall, much progress has been made in terms of reform during the past ten years. With the exception of Indonesia (mostly due to complicated political instability), all Asian countries including Korea have recovered from the financial crisis of 1999 and 2000. Malaysia and Korea recovered mostly due to reflationary macroeconomic policies and the pre-Y2K electronics boom. However, international economic crises will probably continue to occur in the future as they have for centuries. It has been suggested that emerging market countries which intend to avoid the shocking effects of such crises should create efficient early warning systems, associated with standard country surveillance, reduce the vulnerability of their economies by getting macroeconomic policies right, and creating sound banking, increasing international liquidity and shifting from risk-based incentives to supervision regulations (Feldstein, 1999 and 2000).

Table 2.22: A chronological summary of Asian Crisis[45]

Date	Event	Follow-up Commentary
1996 and early 1997	The Thai Baht is under speculative attack during 1996 and early 1997	Thai stock markets fall throughout 1996 and early 1997.
Early 1997	There are seven high-profile bankruptcies of Korean conglomerates, such as Hanbo Steel and Kia Motors.	Korea Economy is very dependent on manufacturing-based enterprises, especially large industrial conglomerates known as *chaebol*, which dominate the economy.
May 1997	Thailand is forced to impose certain exchange controls	On 27 June, The largest non-bank financial institution in Thailand becomes bankrupt. By the end of the year, fifty-six such finance houses are closed down.
2 July 1997	The Baht's peg against the dollar is officially abandoned.	Hedge funds play a major role in this first devaluation of an Asian crisis current.
July 1997	The Philippines abandons its dollar-peg and imposes certain foreign exchange controls. Malaysia also abandons its pegged exchange rate.	Overnight interest rates are raised in the Philippines to 32% at one point, whereas Malaysia introduces capital controls.
14 August 1997	Indonesia raises interest rates but lowers them from late August, as it devalues the Rupiah on 14 August	
20 August 1997	The IMF puts together a $17.2 billion Thai rescue.	The letters of agreement with the IMF have since been re-negotiated five times.
August 1997	The Hong Kong dollar comes under speculative attack.	
Mid-October 1997	Devaluations vis-à-vis the dollar average 20% to 30% in Thailand, Indonesia, Malaysia and the Philippines.	Stock markets in the western economies are still setting new highs.

[45] Karunatilekka (1999).

Cont'd

17 October 1997	The new Taiwan dollar is forced to devalue, the Hong Kong dollar is attacked again.	Hong Kong overnight interest rate rise to 280%, the Hang Seng index falls 23% in three days. The crisis worsens when Korea's sovereign credit rating is downgraded.
27 October 1997	The Dow Jones index on Wall Street falls by 7% in one day.	Latin American stock markets fall in tandem with the Dow Jones index and Brazil doubles overnight interest rates to 43%.
November 1997	President Clinton calls the developing crisis "a few small glitches in the road".	For most of late 1997, Western stock markets fall, before recovering to new all-time highs in 1998. However, the fourth largest investment bank in Japan, Yamichi Securities, goes bankrupt on 24 November.
5 November 1997	Indonesia finalized a deal with the IMF for funding that could total up to $42.3 billion.	Although the Indonesian authorities close 16 insolvent banks on 1 November, the IMF deal is renegotiated three times as the government is unwilling to meet all the conditions it imposes.
4 December 1997	The IMF organizes a $58.2 billion rescue for Korea.	The Korean Won is eventually allowed to float on 16 December.
December 1997	Talks led by the US Federal Reserve lead to $422 billion of Korea's private sector debts being re-negotiated.	In April 1998, Korea manages to re-negotiate $24 billion of sovereign short-term debt as well.
12 January 1998	The largest investment bank in Hong Kong, Peregrine Securities, goes bankrupt.	
June 1998	The second phase of the crisis "Asia II" begins with another speculative attack on the Hong Kong dollar.	Prompted by the Japanese economy contracting in the first half of 1998, the Bank of Japan cuts short term interest rates to 0.25% from 0.50%.
17 June 1998	The United States begins to intervene in the foreign exchange markets, attempting to support the Japanese Yen for the first time since 1987	The weakness of the Yen causes additional pressure on Asian Crisis currencies because of the linkages between these economies.
June 1998	The Hong Kong dollar peg is defended by the authorities with market intervention.	Concurrently, Hong Kong authorities instigate a plan to intervene in the stock market with public funds to stop it falling. In Singapore, the government introduces measures to curb property transactions to stop price falling.
12 July 1998	Poor results in the upper house elections cause Japanese Prime Minister Hashimoto to lose Power.	

Cont'd

June and July 1998	Latin America Countries are forced into a series of knock-on currency devaluations.	Brazil attempts to prevent a devaluation by pre-emptively imposing economic stringency; the authorities intervene the foreign exchange markets to defend the real and raise short-term interest rates in two stages, from 19% to almost 50%.
July 1998	Sharp Falls in western stock markets of approximately a quarter of their value.	The cause is emergence of problems in Russia, a recipient of investment inflows from Western Europe.
20 July 1998	The IMF agrees to a $5.6 billion Russian rescue deal.	The Russian monetary authorities raise overnight interest rates to over 100%.
August 1998	The Hong Kong dollar is attacked again and $8.8 billion is spent defending it.	In Taiwan, slowing growth leads the government to enact a two-year, $5.7 billion, and economic stimulus package.
17 August 1998	There is a de facto devaluation of the Russian ruble; exchange controls are imposed.	Western markets fall as Russian authorities declare a ninety-day moratorium on the payment of private sector foreign currency debt.
1 September 1998	Malaysia imposes more capital controls; the ringgit is fixed at RM3.80 to a dollar.	
2 September 1998	The Russian Central Banks stop defending the currency.	Russian government defaults on its sovereign obligations later in September.
September 1998	As real economic activity contracts, Korea lowers short term interest rate.	
15 January 1999	Brazil is forced to allow its currency to float freely.	

2.9 Global Financial Crisis of 2007-2009 and Impact on Southeast Asia

The region was hit again by further financial turmoil in late 2008. The shock, which started as a housing sector crisis in the United States (US) resulted in major failures and institutions in the US and Europe, followed by aggressive co-ordinated actions by the affected authorities to inject funds into money markets and to gain confidence in their financial systems.

There is much debate about the causes of the 2008 global crisis, factors cited as important in creating the crisis are as follows: (i) a prolonged period of abundant liquidity; (ii) excessive imprudent lending in the subprime and other parts of the real estate sector; (iii) lack of adequate prudential regulations over financial institutions; and (iv) the bursting of the housing price bubble.

The global financial crisis has placed developing Asia in a more difficult economic position than the financial crisis of 1997-1998 with expectations of lower growth and credit availability although there is some evidence that these economies are 'bouncing back' much quicker than their developed counterparts.

Box 6

Then and now: Comparing the 1997-98 Asian Financial Crises and the Current Crisis

World output	• rose robustly	• is contracting sharply
Global trade volumes	• slowed only modestly in 1998.	• set to contract in 2009 by the largest amount since 1982.
The crisis	• started in the region • affected some countries developing • affected East Asia severely, and others more modestly.	• started in the U.S. and developed economies. • has affected virtually all countries in the world.
GDP growth in the region	• bounced back quickly, thanks to robust world markets and export growth.	• is projected to recover slowly as global recovery takes time.
Contraction reflects	• drop in domestic demand despite a large positive contribution from net exports.	• contraction in exports, weaker investment, despite government stimulus.
Export volumes	• expanded strongly in most EAP countries	• are set to contract with almost no exception
Commodity exporters	• benefitted because of robust global demand	• are suffering because of a drop in prices and global demand
Current accounts	• adjusted sharply during the crisis	• except in China and Malaysia, where they worsened modestly in 2008 due to oil prices and the contraction in exports.
Capital flows	• fell sharply in Indonesia, Korea, and Thailand.	• have weakened sharply in all countries.
Currencies	• weakened in several countries, led by a depreciation of 111 percent from the end of 1996 to the weakest point in Korea, 86 percent in Indonesia and 56 percent in Thailand.	• have weakened by 10 percent since the end of 2007 in Thailand, 23 percent in Indonesia, and 48 percent in Korea.
Foreign exchange reserves	• were depleted in many countries	• remain strong, with very modest reductions thus far in some countries.

Source: Battling the Process of Global Recession, Chapter 1. (2009), pp.10.

Indonesia, Korea, Malaysia, Philippines and Thailand have all taken immediate action to strengthen economy and implement fiscal stimulus packages. These countries also took sharp action in maintaining financial and monetary stability.

Table 2.23: Financial, Monetary and Fiscal Policy Responses

Components/Country	Indonesia	Korea	Malaysia	Philippines	Thailand
Fiscal Policy	✓	✓	✓	✓	✓
Deposit Guarantee	☐	✓	☐	☐	☐
Government Stakes in banks	✓	✓	✓	✓	✓
Regulatory Forbearance	✓	✓	✓	✓	✓
Stock Market interventions	✓	✓	✓	☐	✓
Monetary Policy					
Policy Rate	✓	✓	✓	✓	✓
Reserve Ratio	✓	☐	✓	✓	✓
Liquidity Injection	✓	✓	☐	☐	☐
Exchange Rate Arrangement	✓	✓	☐	✓	☐
Expenditure					
Infrastructure Investments	✓	✓	✓	✓	✓
Support to SMEs and/or farmers	✓	✓	✓	✓	✓
Safety Nets	✓	✓	✓	✓	✓
Housing Construction	✓	✓	✓	☐	✓
Support Strategise Industries	✓	☐	✓	✓	✓
Support Increase/subsidy in wage	✓	☐	✓	☐	☐
Employment Generation	✓	✓	✓	✓	✓
Other	☐	✓	✓	☐	✓
Revenue					
Corporate Income Tax Incentives	✓	✓	✓	✓	✓
Personal Income Tax Incentives	✓	☐	✓	✓	✓
Indirect Tax Exemptions	✓	✓	✓	☐	✓
Other	✓	✓	✓	☐	☐

✓ = with policy response
☐ = no policy response or data not available
Source: ADB 2008 Asia Economic Monitor, December 2008. Pp. 9

Table 2.24: Fiscal Stimulus Plans[46] of Selected Asian Developing Member Countries

Indonesia		
Fiscal expenditure and tax cuts (IDR 73.3 trillion USD 6.1 billion 1.2% of GDP)	- Tax breaks for individuals and companies (43 trillion) - Waived import duties and taxes (13.3 trillion) - Infrastructure spending (12.2 trillion) - Diesel subsidy (2.8 trillion) - Rural development (0.6 trillion)	Jan 2009
Republic of Korea		
Fiscal expenditure and tax cuts under "2009 Budget and Public Fund Operations Plan to Overcome Economic Difficulties" (KRW 35.6 trillion, USD 26 billion, 4% of GDP)	- Creation of more jobs by providing better job training through expansion of the internship system, vitalizing venture enterprises, increased job positions for the underprivileged - Increased welfare support to stabilize livelihoods of low income classes and provide aggressive support in reducing childcare costs - Increased social overhead capital investment with focus on investments in construction projects including leading projects for advancement of the metropolitan economy and provincial traffic network expansion - Support stabilization of SMEs and the financial markets by increasing SME guarantees - Support regional finances to offset reduced real estate tax	13 Dec 2008
Fiscal expenditure under "Green New Deal Job Creation Plan" - measure expected to generate 950,000 jobs over 4 years (consolidation of previous plans) (KRW 50 trillion, USD 37 billion)	- Energy conservation, recycling and clean energy development to build an energy-saving economy - Green transportation networks and clean water supplies to upgrade the quality of life and environment - Carbon reduction and stable supply of water resources to protect the earth and future generations - Building of industrial and information infrastructure and technology development to use energy efficient in the future	Jan 2009
Fiscal expenditure (supplementary budget bill) KRW 29 trillion	- Maintaining job security and revitalizing provincial economies & supporting industries with future growth potential (17 trillion Won) - Remaining amounts to plug tax revenue shortfalls	23 Mar 2009

[46] Fiscal stimulus plans were put into action to stimulate firs, consumer and public investment in the form of economic and social infrastructure.

Cont'd

Malaysia		
Fiscal expenditure (MYR 7 billion, USD 1.9 billion 1% of GDP)	- Investment funds to promote strategic industries and high-speed broadband (1.9 billion) - Small-scale infrastructure projects (1.6 billion) - Education and skills training programmes (1 billion) - Public transport and military facilities (1 billion)	Nov 2008
Fiscal expenditure (MYR 7 billion, USD 1.9 billion 1% of GDP)	- Fiscal injection (15 billion) - Equity investment (10 billion) - Tax incentives (3 billion) - Guarantee funds (25 billion) - Private finance initiatives and off-budget projects (7 billion)	Mar 2009
Philippines		
Fiscal expenditure and tax cuts (PHP 330 billion, USD 6.5 billion, 4.6% of GDP)	- Job creation programme expected to provide 824,000 temporary jobs in government departments by July 2009 - Tax reduction in corporate income tax and waiver of personal income tax for minimum wage earners - *Infrastructure projects* - Waiver of penalties on loans from social security Institutions	Jan 2009
Thailand		
Supplementary budget (THB 116.7 billion, USD 3.3 billion, 1.2% of GDP)	- One time living cost allowance of THB 2000 for those earning < THB 15,000 per month - Extension of 5 public service subsidies programme for 6 months - Support given to unemployed workers - Free education for students - "Sufficient Economy Fund for Improvement in Quality of Life" fund for rural villages - Old-age support payment of THB 500 per month - Infrastructure projects - Tax measures to boost real estate sector, SMEs and the tourism industry	Jan 2009

Source: Official government web-sites, EIU Country Reports, various news sources

With the experience of the 1997 financial crisis and reforms program, emerging Asia has improved economic policies and institutional frameworks. Their economies are now more resilient towards crisis with more stable prices and reduced output volatility. Overall, the economies are better prepared against any adjustment in international financial markets. Asia's banking and financial systems are now relatively robust, highlighting progress after years of restructuring. Bank asset quality, profitability, and capital adequacy have all improved remarkably over the past decade. After all, Asian banks had limited direct exposure to sub-prime and related securitized products. This factor, together with healthier balance sheets, has helped the region's financial systems weather the current financial storm. Better supervisory oversight

and risk management practices have also played a part. Loan-to-deposit ratios remain relatively low and the limited use of off-balance sheet financing implies that the region's banks will likely avoid the severe liquidity and funding stress suffered by their western counterparts (Lohani, 2009)

2.10 Conclusion

This chapter briefly discusses the unique background to each SEA country while facing financial crisis in mid 1997. The changes discussed earlier in this chapter reflect each affected country's authorities concerns in bringing back stability and growth to the region. We discuss the different policy focus and corresponding policy measures put into action by each country. Even though more than ten years have passed since the crisis much still needs to be done. The global financial crisis in mid 2008 provided a reminder of the need for a better understanding of contagious banking shocks and interlinkages in the global financial marketplace. It also raised major policy questions about the efficacy of current supervisory and prudential regulatory practices in the financial sector.

This thesis aims to contribute to the crisis literature by investigating the impact of policy changes on banking sector efficiency, concentration and competition in SE Asia over the 1997-8 crisis period. We attempt to answer the question as to whether external factors which include macroeconomic and regulatory factors have any impact on bank efficiency. In particular, this thesis uses a non-parametric approach to analyze the efficiency of banks in the selected countries using an additive model of DEA, namely, a slacks based measure of DEA combined with Tobit regression.

In addition, we examine banking sector concentration and competitiveness as some literature indicates that lower market concentration exposes banks to crisis. Another important issue is whether concentration in regional banking systems has increased as a result of the post-crisis restructurings and whether this adversely influences competition. While the closing down and/or merger of troubled banks with stronger institutions would be expected to increase concentration, the size of the effect will depend importantly on whether closures and mergers are mainly among small or medium- to large-sized banks, and on the structure of the new banking groups that

emerge. Economic theory and practice do not provide a clear guide as to the implications of any increase in banking-system concentration. On the one hand, concentration might lower unit costs and improve efficiency to the extent to which there are economies of scale and scope and this can feed through into greater competition. On the other, international experience suggests that highly concentrated banking systems tend to be riskier and less competitive than concentrated markets[47]. The remaining focus of the thesis is to investigate these questions for the SEA countries under study.

[47] Adam, 2008,pp. 8

CHAPTER 3

BANKING CRISIS AND EFFICIENCY: A REVIEW OF THE LITERATURE

3.1 Introduction

The Asian financial crisis started in mid July 1997 with devaluation of the Thai baht. This caused local currencies and bourses to plunge, burst real estate bubbles and led to serious recession, thus leading many banking institutions around the region to collapse as well as severely weakening others[48]. The crisis revealed weaknesses in the financial sectors[49] and ended by contributing greatly to the impetus for change. Much has been written on the causes of the crisis as well as the reforms and development of the region even a decade after the crisis.

Prior to the 2008 credit crises, the global financial system had witnessed three major crises, all of which occurred during the 1990s[50]: the European Monetary System (EMS) crisis of 1992-1993; Mexico 1994-1995 and Asian financial crisis 1997[51]. All of these seem to share important similarities, specifically, they were all preceded by:

1) A process of rapid financial deregulation and capital account opening without adequate regulation and supervision of the domestic financial system;
2) All countries exchange rates were pegged aiming to contain inflation and attract foreign capital;
3) Large interest rate differentials led to significant increases in capital flows; and an
4) Upsurge in net private capital inflows contributed to real currency appreciation and/or an over extension in bank lending.

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[48] See chapter 2 for further details on each affected country's weaknesses that led to crisis.
[49] Further discussion can be found in chapter 2.
[50] Since the late 1970s, 117 systemic banking crises have occurred in 93 countries: more than two-thirds were in developing countries (Caprio and Klingebiel, 2003). A banking crisis is considered as "systemic" if it involves widespread banking failures that affect more than 20 percent of a banking system's deposits (Sheng, 1996).
[51] EMS was hit by speculative attack which forced five countries; Finland, the United Kingdom, Italy, Sweden and Norway to float their currencies. Spain, Portugal and Ireland remain in the EMS by devaluating their currencies. In 1994 Mexico's government announced their decision to devalue their peso against the dollar. These steps caused speculative attacks against other Latin American currencies, which are also known as the tequila effect.

There is a wide range of literature on the causes and effects of the 1997 Asian financial crisis (such as Goldstein, 1998; Hunter et al., 1999 and Jao, 2001). There is also a long debate between two interpretations on the occurrence of the crisis: first, one set of literature focuses on fundamental weaknesses and policy inconsistencies (Corsetti, 1998; Corsetti et al., 1999a, b, c; and Lane et al., 1999) and a second school of thought emphasises the role of self-fulfilling expectations and financial 'panics' (Chang and Belasco, 1998; Sachs and Radelet, 1998; and Corsetti, 1998)[52]. There have also been a growing number of studies on cross-country banking crisis, for example Breuer (2004) provides a review of currency and banking crises, and Caprio and Klingebiel (2003) and Demirgüç-Kunt and Detragiache (2005) extensively survey systemic banking crises. Most of the existing studies aim to describe the causes, consequences, lessons, speed and shape of general recovery (for example, Demirgüç-Kunt and Detagiache, 1998 and Dell'Ariccia et al., 2005).

The Asian financial crisis seriously damaged the respective banking systems and revealed large amounts of non-performing loans which were caused by poor management, and excessive lending in various parts of the real sector. A large number of financial institutions became insolvent and subsequently had to be financially supported, merged or liquidated by the affected governments (Laeven, 1999). Some banks were recapitalised and stronger banks were forced to merge with distressed banks in order to avoid banks closure[53] (Hawkins and Turner, 1999; Hawkins and Mihaljek, 2001; Gelos and Roldós, 2004). There was still uncertainty as to whether the merging and consolidation process would help to sustain the banks weakness or make them stronger (Hawkins and Turner, 1999). The crisis also raised various issues regarding the efficiency and safety of local banking industries. This forced bank regulators to implement several measures to reform the banking system, with the aim of providing efficient banking services to the economy on a sustainable basis (Garcia,

[52] The first attributes the initial financial turmoil in some Asian countries in 1997 and its propagation over time, mainly to sudden shifts in market expectations and confidence followed by regional contagion (Radelet and Sachs, 1998; Marshall, 1998; Chang and Velasco, 1999). While admitting the worsening of the macroeconomic performance of some affected countries in the mid-1990s, this view suggests that the extent and depth of the crisis should not be attributed to deterioration in fundamentals, but rather to panic on the part of domestic and international investors. The second argues that the crisis occurred primarily as a result of structural and policy distortions (Corsetti et al., 1999a; Dooley, 1999). According to this view, fundamental imbalances triggered the currency and financial crisis in 1997 even as after the crisis started, market overreaction and herding caused the plunge in exchange rates, assets prices, and economic activity to be more severe than warranted by the initial weak economic and financial conditions (Zhuang J. and Dowling M., 2002, pp.1).

[53] Further discussion on the cause and effect can be referred to in chapter 2.

1997). It was then prudent for the Asian governments to implement international standards in the governance of banks, and to allow foreign investors to bring in international best practice in regulation and general oversight as well as to adopt new technologies (Choi and Clovutivat, 2004).

Changes in the regulatory framework, liberalization and restructuring - including new applications in computer and communications technology, together with the introduction of new financial instruments, altered the way banking is conducted. Such changes significantly modified the technology of bank production. Previous studies that have investigated those countries that were involved in the crisis, have primarily considered how banking systems operated throughout the turbulent period (Drake et al., 2008). To date only a few studies have investigated bank efficiency during and post banking crises in Asian countries.

There has been a great deal of concern about the resilience of the Asian countries during the 2008 crisis and the influence of the prevailing economic conditions. Many economists have argued that the crisis would have a limited impact on the region, as Asian countries have gone through many changes after being hit by the 1997 financial crisis. The Asians countries are said to be; (1) still far from incorporating highly complex financial innovations into their current banking models; (ii) more aware and cautious about decision making, especially involving investment decisions in high risk areas; and (iii) the banking institutions are now more prudent after past reforms and implement better risk management practices.

However as the 2008 global crisis prolongs, the situation is becoming more acute and its impact on the real sector in emerging and developing countries will have a substantial effect on the economy's growth (Fidrmuc and Kornohen, 2009). The IMF argues that the recent global crisis may have a greater impact on Asia's economy than the earlier financial crisis, because of more extensive trade and financial integrations between Asia and the US. A study by Hong et al., (2009) shows that historical analysis implies that worldwide crisis has always had an overwhelming impact on Asia's economic growth. He also suggested the existence of a close relationship between Asian economies via more integrated trade and financial channels. Severe financial downturns or recessions in advanced economies are often associated with

financial crisis or recession in Asia (Hong et al. (2009, pp.15). Similar conclusions are found in Reinhart and Rogoff (2008) where they argue that economic downturns in emerging markets are more severe when many countries simultaneously face domestic banking crises.

Several other studies have discussed the current global crisis and compared it with other past crises including the 1997 financial crisis. For example Claessens et al. (2008) made an extensive cross country empirical analysis of past recessions that coincided with a credit crunch, a house prices burst and equity price bubbler. They conclude by suggesting that globalisation factors will make the results of the 2008 crisis more costly than the recession created in the past. However the study also argues that each recession is different depending on the authorities' skills in managing the country's financial health, banks and households. Similar results can be found in the study by Lall et al. (2008). Their paper is based on historical data and investigates the impact of financial stress by focusing on banking, securities and foreign exchange activity.

Having said all this, however, there remains no systematic empirical research focusing on the stylized facts of economic and financial crises in developing Asian economies, and the links of these crises with global financial crises and recessions. There is also no empirical analysis that looks into whether the restructuring in the previous crisis in Asia has helped these countries to face-up to the current global crisis. The closest study is by the IMF (2008), an analysis of the impact of US spillovers on Asia - both a descriptive and quantitative analysis. The research found that the impact on Asia is increasing over time and this is due mainly to higher trade exposures, which also tends to have high financial exposure and historically large spillovers as well.

This discussion has brought us back to the question of how the changes and experiences following the 1997 financial crisis leave the Asian region better equipped to face the impact of the 2008 global crisis. The Asian Development Bank (ADB) forecast that Thailand, Malaysia and Singapore are among the Asian countries that will experience a further downturn of exports as global trade will remain weak. Developing Asia's recovery will be further affected by the performance of the global economy as the region relies heavily on external demand. ADB have proposed that

Asian countries should broaden their scope and extend their openness in order to reduce the risk of a more severe impact on their economy. Domestic demand, labour mobility and promoting more intra regional trade are vital for improving Asia's economies. The financial market needs to play its part by supporting the development and sustaining regional capital markets for the effective use of regional saving.

Building on this, the aim of this chapter is to review the theoretical and empirical evidence of these interrelated features and the impact of financial crisis on the efficiency of the banking sector. It also seeks to investigate the role of environmental variables on bank efficiency after the crisis period[54]. This chapter will start by offering a brief review of the main literature on bank efficiency, with a particular focus on studies examining the performance of banks in Asian countries. Further, it will review the issue of bank concentration and competition, and its relations to bank efficiency. It is important to highlight that most of the policies followed by the authorities post 1997 crisis brought about an increase in concentration, particularly via mergers and acquisitions. Also, in most Asian countries, policies have been enacted to foster competition in the banking and financial sector. It is important to understand how the crisis has shaped these responses and whether this had the expected positive impact on bank efficiency. Finally, we summarize and highlight the major caveats in the existing literature, which underpin our empirical design.

3.2 Bank Efficiency

The efficiency of financial institutions has long been the focus of banking research. Bank efficiency research has covered several aspects of bank performance. Inefficiency and poor overall banking sector performance have been claimed to be major causes of crisis in developing countries (Arif and Luc Can, 2009; Kaminsky and Reinhart, 1999; Bongini et al., 2001). While there have been several cross-country studies on the effects of bank restructuring, deregulation, consolidation and

[54] The study will look into the post-crisis period (1999-2005) since this is considered as the recovery period and a study of bank efficiency during post-crisis restructuring is significant for a number of reasons. First, Asian countries play an important role in the world economy; and second, banking inefficiency is claimed to be the main caused for the Asian banking crisis.

privatization on bank performance, these studies have mainly been conducted on European systems and much less is known about such features in emerging markets[55].

Banks roles as financial intermediaries are vital towards the growth and development of economic activity in a number of ways. Over the last two decades the banking sector has experienced major transformations worldwide in its operating environment (Delis et al., 2008). These changes have affected both external and internal (domestic) factors and have also had an impact on the structure, efficiency and performance of the economy. An efficient banking sector is better able to withstand negative shocks and contribute to the stability of the financial system (Delis et al., 2008).

3.2.1 The Measurement of Bank Efficiency[56]

The idea of efficiency in a production unit was first introduced by Farrell (1957), under the concept of "input oriented measures". According to Farrell, a technical efficiency measure is defined as one minus the maximum equi-proportionate reduction in all inputs that still allows continuous production of given outputs. Technical efficiency is linked to the possibility of avoiding waste by producing as much output as the use of input allows (output oriented measure), or by using less input than the production objective plans to (input oriented measure). This efficiency is measured by comparing observed and optimal values of production costs, revenue, profit or all that the production system can follow as an objective and which is under appropriate quantities and price constraints. Therefore, we can analyse technical efficiency in terms of deviations from an idealistic production frontier isoquant.

The literature proposes two approaches for measuring frontier production: the mathematical (non-parametric) programming approach and the (parametric) econometric approach (Kablan, 2007, pp.8). The concepts of both non-parametric and parametric techniques for measuring efficiency in banking have been considered widely in the literature (Drake et al., 2006 and Hall, 2001). The empirical research has advanced greatly over the past three decades. Berger and Humphrey (1997) surveyed

[55] Berger and Humphrey (1997) for an extensive review of bank efficiency literature; Berger et al. (1999) and Amel et al. (2004) for literature reviews of bank mergers and acquisitions, Megginson (2005) and Clarke et al. (2005) of bank privatization, and Detragiache et al. (2006) and Cull and Martinez-Peria (2007) of foreign bank entry.

[56] The methodological approach used in this study will be further discussed in Chapter 4.

financial institution efficiency. Their findings found that various methods[57] in measuring efficiency do not always yield consistent results and suggested some ways on how to improve the use of these methods to bring about conclusions that are more consistent, accurate, and useful. The methodological approached will be discussed in detail in Chapter 4. Below, we will give an intuitive introduction to the main parametric and non-parametric methods before reviewing the relevant literature.

a) The Non-Parametric Approach

The most commonly used non-parametric approach is a mathematical programming method known as Data Envelopment Analysis (DEA). The frontier is estimated using non-parametric mathematical linear programming. It offers an analysis based on the relative evaluation of the efficiency in an input/output of multiple situations, by taking into account each bank and measuring its relative efficiency to an envelopment surface made up of the best practice banks (Kablan, 2007, pp.8). Considering the immediate compatibility with multiple inputs and multiple outputs, DEA features major advantages especially in environmental applications[58].

The simplest method is based on the assumption of constant return to scale (CRS). However, in recent applications variable return to scale (VRS) assumptions are used as this hypothesis is more relevant in the environment of imperfect competition in which banks operate[59]. Many studies have attempted to analyse efficiency issues by using non-parametric techniques. The Data Envelopment Analysis (DEA) method is commonly used to evaluate bank efficiency, as it allows researchers to avoid specification of an ad hoc functional form or error structure. Many researchers have focused on estimating the cost efficiency, allocative efficiency, and technical efficiency of banks by utilizing this method, such as Aly et al. (1990), Grabowski et al. (1993), Favero and Papi (1995), Zaim (1995), Schaffnit et al. (1997), and Fukuyama et al. (1999).

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[57] The five major different econometric techniques for estimating efficiency frontiers are non- parametric which include (1) data envelopment analysis (DEA), (2) free disposal hull (FDH), and parametric frontiers which comprise three main approaches; (3) stochastic frontier approach (SFA), (4) distribution-free approach, and (5) thick frontier approach (TFA).

[58] *www.nomepre.net/review.htm.*

[59] Charnes Cooper and Rhods (1978) proposed a model that had an input orientation and assumed constant return to scale (CRS), while Färe et al. (1983) and Banker, Charnes and Cooper (1984) proposed a model that assumed variable return to scale (VRS).

Recent studies of research using this method include Sherman and Gold (1985), Parkan (1987), Ferrier and Lovell (1990), Charnes et al. (1990), Oral and Yolalan (1990), Berg et al. (1991), Berg et al. (1993), Drake and Weyman-Jones (1992), Fukuyama (1993), Grabowski et al. (1994), Zaim (1995), Grifell-Tatje and Lovell (1996); Grifell-Tatje and Lovell (1997) and Jackson et al. (1998).

b) The Parametric Approach

The parametric approach consists of an econometric estimation of the best practice frontier by its specification in a Cobb-Douglas, constant elasticity of substitution (CES) or translogarithmic (cost or production) functional form. The econometric method can be deterministic. In this case, every deviation from the frontier is attributed to inefficiency. It can also be stochastic; it is then possible to separate random errors from the production unit inefficiency. The stochastic frontier method has two principal advantages compared to the non-parametric DEA method. First, it allows random error to be separated from the production unit inefficiency and takes into account the existence of exogenous shocks. For this purpose, the error term is divided into two components: an inefficiency component and a random one (which is composed of the error measurement and the exogenous shocks) and second, the stochastic frontier analysis which is less sensitive to extreme values (Kablan, 2007, pp.9). Examples of these types of studies include Battese and Coelli (1995), Berger and Humphrey (1997), Bhattacharyya et al. (1997) and Coelli (1995).

3.3 Bank Efficiency: a summary of the literature

In recent years, a great deal of attention has been given to the measurement of the performance of financial institutions. Since the structure of financial service industries evolved very quickly, it is interesting to measure the efficiency changes surrounding these institutions, and to explain variation in the (in) efficiency measures (Jackson and Fethi, 2000). Berger and Humphrey (1997) surveyed 130 studies of financial institution efficiency in 21 countries, covering various types of depository institutions including commercial banks, savings and loans, and credit unions including insurance firms. The study aimed at summarizing and critically reviewing empirical estimation of financial institutions efficiency by analyzing five different estimation approaches. The aforementioned study mainly concentrated on frontier efficiency, in other words,

how close financial institutions are to a 'best-practice' frontier. Frontier analysis is a way to benchmark the relative performance of production units. Generally speaking, studies of frontier efficiency are based on accounting measures (of costs, outputs, inputs, revenues, profits, etc) to calculate efficiency relative to the best practice within the available sample since information on the technology of financial institutions is hard to obtain. The five main approaches for estimating efficiency frontiers include; *nonparametric approaches* (1) data envelopment analysis (DEA) and (2) free disposal hull (FDH), and *parametric approaches* that comprise the; (3) stochastic frontier approach (SFA), (4) distribution-free approach (DFA) and (5) thick frontier approach (TFA) [60]. Berger and Humphrey (1997) found that the various efficiency methods do not always yield consistent results.

Ferrier and Lovell, (1990), Bhattacharyya et al. (1997), Resti (1997), Chen and Yeh (2000), and Huang and Wang (2000) examined bank efficiency comparing both parametric and nonparametric approaches. In terms of the strength of DEA and SFA (parametric approach), Ferrier and Lovell (1990), Eisenbeis et al. (1997), Resti (1997) found that there is a close average efficiency generated by both approaches while Huang and Wang (2002) reported that the congruency between the results of two methodologies is rather limited. In a more recent study, Casu et al. (2004) compare parametric and non-parametric approaches by estimating the productivity change in European banking between 1994 and 2000. Productivity change has been decomposed into technological change, or change in best practice, and efficiency change. Their results show competing methodologies, sometimes identify conflicting findings for the sources of productivity for individual years, yet the two approaches do not yield different results in terms of identifying the components of productivity growth especially in European banking during the 1990s. Weill (2004) investigates the

[60] SFA specifies a functional form for the cost, profit, or production relationship among inputs, outputs, and environmental factors, and allows for random error. SFA suggests a composed error model where inefficiencies are assumed to follow an asymmetric distribution, normally the half-normal, whereas random errors follow a symmetric distribution, usually the standard normal. The inefficiencies must have a truncated distribution because inefficiencies cannot be negative. DFA specifies a functional form for the frontier but separates the inefficiencies from random in a different way. DFA assumes that the efficiency of each firm is stable over time whereas random error tends to average out to zero over time. Unlike SFA, DFA has no strong assumptions relating to the specific distributions of the inefficiencies or random errors. Based on DFA, inefficiencies can be of almost any form of distribution, even one that is relatively close to symmetric as long as the inefficiencies are nonnegative. The last approach is TFA. TFA specifies form and assumes that deviations from predicted performance values within the highest and lowest performance quartiles of observations classified by size class represent random error. At the same time, deviations in predicted performance between the highest and lowest quartiles represent inefficiencies and random error exists within these quartiles (Berger and Humphrey, 1997, pp. 7).

consistency of efficiency estimates by measuring the cost efficiency of selected European banks using three frontier techniques; (1) stochastic frontier approach (SFA), (2) distribution-free approach (DFA), and (3) data envelopment analysis (DEA). The efficiency scores computed by all three techniques are quite consistent with standard measures of performance. The results suggest a lack of robustness in findings between approaches, even if there are some similarities between parametric approaches. The results also show some correlation between all frontier approaches and standard measures of performance.

Changes in the economic environment and advances in technology are generally expected to improve bank efficiency but these factors can also lead to banks taking-on greater risk (Chiu and Chen, 2009). Altunbas et al. (2000) look into the impact of risk and quality factors on banks' costs by using the stochastic cost frontier in order to evaluate scale and X-efficiencies for commercial banks in Japan between 1993 and 1996. They use loan loss provisions to control for bank output quality, with financial capital and liquidity measures included to control for risk. This paper follows the approach suggested by Mester (1996) where risk and quality factors need to be taken into account in order to avoid optimal size banks to be overstated. Altunbas et al. (2000) find that the level of financial capital has a significant influence on scale efficiency, and appears less sensitive to risk and quality factors. Mester (1996), Hughes (1999), Hughes et al. (2000), Altunbas et al. (2000), Hughes et al. (2001) and Girardone et al. (2004) all emphasise the importance of incorporating internal risk into analysis of production and measure of bank efficiency[61]. Altunbas et al. (2000) and Drake and Hall (2003) also suggest that failure to adequately account for risk can have a significant impact on relative efficiency scores.

[61] Most studies of internal risk in the existing literature use credit risk indicators, including non-performing loans, allowance for loan losses, and risky assets, to explain bank efficiency scores, but do not consider market and operating risks associated with bank efficiency. However, loaning funds to the demand side is not the main business of banks anymore. In January 2001 the Basle Committee divided calculating bank risk into 3 parts - credit, market, and operating. These new types of complicated business mean that banks are exposed to enormous operating and market risks. Thus, the non-performing ratio is no longer a good index to evaluate the risks of banks (Chiu and Chen, 2009, pp. 456)

3.3.1 The Importance of the Environmental Variables in Evaluating Banking Efficiency and Performance

Bank efficiency scores have been shown to differ markedly across systems (and studies) (Berger et al., 1997 and Berger and Humphrey, 1997). According to Mester (1993), Mester (1997) and Berger and Humphrey (1997), the failure to account for differences in cross-country differences in banking efficiency estimates is likely to induce instability in efficiency findings. It is important to consider geographical and economic conditions while comparing banking efficiency cross countries. Differences between banks may not be the only reason for banking efficiency scores to differ among studies (Shen et al., 2008). The same recommendations can also be found in Bos et al. (2008), indicating that controlling for cross-country heterogeneity may result in efficiency scores that more accurately reflect management's ability to minimize costs and maximize profits.

Cross-country comparisons of bank efficiency levels can be considered somewhat paradoxical since banks were often compared to common efficiency frontiers, assuming that banks operating in different countries had access to the same technology (Radić and Fiordelisi, 2009, pp.9). In the 1990s, most literature on international comparisons of banking efficiency had been performed primarily on US and European systems. These studies involved measuring banking efficiency without considering environmental variables. They assumed that any differences in efficiency could be explained by country-specific banking technology without making any adjustment for country specific condition or norms (Chafai et al., 2001, pp.147). Berg et al. (1993) relied on Data Envelopment Analysis (DEA) in order to capture the differences in banking efficiency among Norway, Sweden, and Finland. Berg et al. (1995) did a follow up study by adding Denmark to the previous sample. The same four countries were then again investigated in Bergendahl (1995). Fecher and Pestieau (1993) and Pastor et al. (1997) applied the distribution free approach (DFA) and DEA analysis to 11 OECD countries and 8 developed countries, respectively. Allen and Rai (1996) used DFA and the Stochastic Frontier Approach (SFA) in order to undertake a systematic comparison of efficiency measures across 15 developed countries under different regulatory environments. Finally, Maudos et al. (2002) used DFA to compare efficiency measures across 11 European countries and showed that nation-wide efficiency frontiers understate cost and profit efficiency in comparison to

specific frontiers for each specialization. The above studies share two common limitations. First, differences between countries are measured without controlling for variations in technology and second, none of these studies account for differences in environmental conditions among countries.

Due to the introduction of new products such as derivatives in the financial markets and the rapid fluctuations/changes in the financial and economic environment, more researchers are now attempting to incorporate the impact of environmental, economic and regulatory factors on bank efficiencies, in both parametric and non-parametric approaches[62]. Among the researchers that have incorporated economic, environmental and regulatory effects to efficiency studies based on parametric approach are: Akhigbe and McNutty (2003), Berger and Mester (2003), Chaffai et al. (2001) and Dietsch and Lozano-Vivas (2000); whereas those applying a non-parametric approach include: Lozano-Vivas et al. (2002). Fried et al. (1999) introduced a four stage procedure which can be viewed as an extension of the two stage and frontier separation approach. They introduced a non-parametric, linear programming, frontier procedure for obtaining a measure of managerial efficiency that controls exogenous features of the operating environment. Using an example of a nursing home, this paper illustrates statistical tests of the effects of external conditions on the efficient use of each individual input/output. The results show that by controlling for the external environment, the average efficiency score increased.

The same interpretation also can be found in Dietch and Lozano-Vivas (2000). They investigate the influence of environmental conditions on the cost efficiency of French and Spanish banking. This paper is produced by following recommendation by Berger and Humphrey (1997) to address the condition of environmental variables and its impact in the international banking efficiency literature. Dietch and Lozano-Vivas (2000) suggest that in a cross country comparison it is essential to include any differences arising from some country specific aspects of bank technology, environmental and regulatory conditions. The differences are more likely to exist in the economic environmental conditions across countries and these differences may

[62] Parametric studies treated external variables as control variables to the functional form by assuming to have a direct effect on the production or cost structure, therefore, each bank would face a different frontier or cost frontier. Whereas non-parametric studies, external variable are used as non-discretionary inputs and/or outputs, and had a direct effect on the efficient production frontier (Drake et al., 2006).

induce differences in bank efficiency. Using cost frontier estimations for cross country comparisons of efficiency, their results demonstrate that environmental variables contribute significantly to differences in efficiency scores between the two countries and neglecting these variables could induce an important misspecification of the cost frontier and an overestimation of the bank cost inefficiency[63].

However, the literature addressing cross-country comparison of bank efficiency in developing countries is scarce and as far as we are aware there has not been any comprehensive work done on cross-country efficiency comparisons for banks in the developing countries. Therefore this study aims to extend the existing literature by controlling for environmental variables when investigating the efficiency of the banking sectors in Asian countries.

3.4 Efficiency in Asian Banking

The Asian financial crisis has spawned a large amount of literature although little work has been done investigating banking sector efficiency issues. As noted earlier, most of the past literature on banking efficiency was largely conducted on the U.S. and to a lesser extent on Europe and relatively little on Asian financial institutions (Chantapong, 2005; Kwan, 2003; Berger and Humphrey, 1997).

Kwan (2003) uses multiple regression analysis to look into the banking industry's per unit operating costs in seven East Asian economies, namely, Hong Kong, Indonesia, Malaysia, Philippines, Singapore, South Korea, and Thailand, from 1992 to 1999. Prior to the 1997 crisis period, the author finds that bank operating costs among these Asian countries were declining from 1992 to 1997, indicating that banks, on average, were improving their operating performance over time. Laeven (1999)[64] used DEA and introduced risk taking measurements to assess the overall performance of five Asian crisis countries (Korea, Indonesia, Malaysia, Thailand and the Philippines). Laeven suggested that both efficiency and risk factors are essentials in investigating overall bank efficiency performance. The findings argue that any rise on average

[63] Evanoff and Israilevich (1991), Berger and Humphrey (1991), Berger and Mester (1997), Mester (1997), and De Young (1998) also provide analysis by including environmental variables in their research with parametric approach. Results show significant effects of these environmental variables in their results.
[64] The only cross-country study found on Asian bank efficiency using DEA.

efficiency scores before the crisis were due to excessive risk-taking and do not reflect the true increase in efficiency. Looking at the different ownership structure, the author also indicates that foreign-owned banks only took a smaller risk compared to other banks in the region, and family-owned banks were among the highest risk takers. Karim (2001) used Stochastic Frontier Analysis (SFA) to analyse the efficiency of banking industries in Asia's most affected countries. The findings indicate different results from the above mentioned studies where efficiencies in Asian banks tend to decline over the year preceding the crisis and suggested that bank failure may be related to inefficiency.

Williams and Nguyen (2005) investigated the impact of changes in bank governance on bank performance. Similar to Laeven (1999), this paper also indentifies bank governance in terms of bank ownership. Their results tend to support bank privatization and the repeal of state ownership on economic grounds. Like Laeven (1999), Williams and Nguyen (2005) found that family-owned or company owned banks are the most risky – many of these banks ceased operations as a result of the crisis. Even though they use control for some country specific factors, these are only to control for limited cross-border differences as recommended in previous literature (Dietsch and Lozano-Vivas, 2000; Chaffai et al., 2001; Lozano-Vivas et al., 2001; Lozano-Vivas et al., 2002 and Weill, 2003).

3.4.1 Impact of Environment and Regulatory Variables on Asian Banks Efficiency

From the existing literature, each country is substantially different according to its own geographical and macroeconomic conditions. Dietsch and Lozano-Vivas (2002) suggested that in order to predict the effects of an expected increase in cross-border competition, knowledge of the differences or similarities in current banking costs and productive efficiencies between countries is essential. More recent studies such as Beccalli (2004) emphasises the importance of environmental variables in their cross-country study by comparing the cost efficiency of UK and Italian investment firms. Considering environmental variables together with banking variables whilst measuring banking efficiency differences, are vital and will influence the behaviour of a country's banking industry (Lozano-Vivas et al., 2002). Based on previous

discussion (in 3.4), no studies have incorporated both banking and environmental variables (with the exception of William and Nguyen) and they do not consider the effects of measurement/changes taking place during and after the crisis period.

Shen (2008) filled this gap in the literature by investigating cost efficiency in ten Asian countries through setting up a common frontier as a benchmark and including cross-country heterogeneous factors to measure relative efficiency scores. The findings show that when cross-country heterogeneity is considered, bank efficiency scores are higher than when they are not included. The results suggest that heterogeneity can explain part of the inefficiency and thus neglecting heterogeneity in cross-country studies will generate underestimated efficiency scores. Nakhun and Avkiran (2009) looked into the relationship between post-crisis bank restructuring, country-specific conditions and bank efficiencies in Asian from 1997 – 2001. The authors indicate that, although domestic mergers produce more efficient banks, overall, restructuring does not lead to more efficient baking systems. Banking system inefficiencies are mostly attributed to country-specific conditions, particularly, high interest rates, concentrated markets and economic development (Nakhun and Avkiran, 2009, pp.240). They also suggest that the region needs to focus more on introducing stabilizing macroeconomic policies, as this may help the local and international regulators in facing other potential crises in the near future. Among other recent literature, Amir and Luc Can (2008), Gurcharan et al. (2008), Amadou et al. (2008) and Chiu and Chen (2009) discuss and include country specific variables to account for their effects on bank efficiency.

3.5 Competition and Concentration on Banking Efficiency

As highlighted in Chapter 2, the 1997 financial crisis has led to regulatory improvements that helped to develop competitiveness in the Asian banking markets. The most definite changes in this regime are: increased consolidation through mergers and acquisition, nationalization of banks; closure of unviable banks; compulsory purchases and assumptions; transfer of assets to healthier banks, creating larger core banks, and providing capital injection to recapitalize banks (Williams and Nguyen 2005). International standards were introduced in managing banks for better supervision and more effort was taken in implementing stringent regulations on

capital adequacy, loan classification and loan loss provisions (Lindgren et al., 2000). This regulatory change is believed to have contributed to the improvement in the stability of the financial sector, as well as to improvements in the cost efficiency of the banking industry. It has also fostered an increase in concentration. On the one hand, increased concentration is expected to intensify market power and therefore hinder both competition and efficiency. Then again, it might be argued that if bank mergers and acquisitions are driven by economies of scale, then increased concentration may foster efficiency improvements and can enhance competition – as bank can post lower prices if they benefit from scale and other efficiency advantages (Casu and Girardone, 2005, pp.2).

Following the Asian crisis, substantial changes in the regulation of financial markets were anticipated in order to lessen any barriers to the development of competition among financial institutions. Affected countries have started to adopt international standards in providing better financial services and to enhance management. These changes were made with the intention of liberalizing the provision of services and to increase domestic market competition. Financial restructuring (in respect of Asian financial crisis countries) has improved bank services by lessening restrictions on reserve requirement and other restrictions which indirectly have reduced the cost of production. Banks are more motivated to implement new ideas, improve their services and are able to develop new opportunities and technological innovation (Zhao et al., 2010; Kumbhakar and Lozano-Vivas, 2005; Aghion and Howitt, 1996; Avkiran, 2000; and Berger and Mester, 2003). At the same time, bank efficiency may have increased and this could allow for the opening up of the market place to new entrants, bringing along technology transfer and skills advantages (Glass and Saggi, 1998).

Although there is overwhelming empirical literature on the 1997 Asian crisis, the existing literature does not address the cross-country relationships linking bank competition, concentration, and efficiency. Most literature is country specific and the empirical work on bank competition and concentration also typically focuses on the US and European banking sectors: such as Shaffer (1989); Berger et al. (2004); Casu et al. (2004); Casu et al. (2005); Jansen and De Haan (2003); Bikker and Groeneveld (2000); Weill (2004); Bikker (2004); De Bandt et al. (2000); and Molyneux et al.

(1994). Even though this literature is useful it may not be directly applicable to developing countries (Demirgüç-Kunt and Levine, 2000).

3.5.1 The Role of Competition and Concentration in Banking

Competition is argued to have a positive impact on industry efficiency, quality of provision and innovation (Casu and Girardone, 2007). The financial sector plays a vital role in economic development, especially in a developing economy where a competitive and efficient financial sector is needed to help with economic growth. The progress of developing countries in economic policy reforms and financial institutions liberalization has enhanced competition in the financial sector; increased savings mobilization and allocative efficiency for achieving better economic growth. According to Claessens and Laeven (2004, pp. 563), the degree of competition in the financial sector can be significant in the efficiency of the production of financial services, the quality of financial products, and the degree of innovation in the sector.

While some relationships between competition and banking system performance and stability have been analyzed in the theoretical literature, empirical research on the issue of competition, particularly cross-country research, is still at an early stage (Claessens and Laeven, 2004, pp.564). However, a number of papers have investigated competitive conditions in banking systems and the relationship between competition and efficiency (most of them regressing cost efficiency on a set of variables for market structure) for example Berger (1995) and Berger and Hannan (1997; 1989) on US banks, Lang and Welzel (1996) on Western German banks, and Goldberg and Rai (1996) and Punt and Van Rooij (2003) on European banks find some positive link. Bikker and Haaf (2002) examine competitive conditions and market structure in 23 banking systems over the 1990s and find evidence of monopolistic competition in all countries as do Yanelle (1997); Gilbert (1994); and Padoa-Schoppa (2001) in other related literature.

Recent research on the impact of competition and banking efficiency has been conducted by Casu and Girardone (2009): using panel data on EU countries they found positive causality between market power and efficiency, whereas a weak relationship between competition and efficiency has been revealed. Casu and

Girardone (2007) looked into the relationships in European countries and suggest a negative causation between efficiency and competition, whereas the causality from competition to efficiency is positive and relatively weak. Weill et al. (2008) and Weill (2004) also found negative relationships between competition and efficiency in the Czech Republic and again in EU countries. Despite the abundance of literature existing on banking competition, there is a scarcity of studies analysing specific cases of cross-country studies for developing countries and the impact of environmental variables.

Competition and concentration are an important element in measuring the welfare-related public policy towards market structure and conduct in the banking industry. Recent literature shows scarcity in the analysis of competition and concentration and most of the existing literature too date appears to focus on the European Union banking market. Berger et al. (2003) suggested that more research is needed on the topic of bank concentration and competition.

The inclusion of developing nations is highly encouraged as it will provide additional evidence on the effect of concentration and competition. For the past ten years, the Asian crisis has given impetus towards the regional economic development, regulatory reform, large-scale consolidation and the improvement in information technology. The restructuring has changed the banking environment, with potentially offsetting effects on the overall degree of competitiveness. A recent wave of consolidation through mergers in most of the affected country (Indonesia, Malaysia, Thailand and the Philippines) is expected to have substantial implications on competition and concentration.

Recent studies on competition and concentration do not explicitly incorporate the effect of regulation and other environmental changes in their analysis. Gilbert (1984) mentioned that regulation is one of the important determinant elements in banking competitive performance. However many studies appear to neglect this point. The same argument found in Canoy et al. (2001, pp.27) suggests that there is no hard evidence yet on how regulatory changes in the late 1990s have affected structure, conduct and performance relationships in the financial sector.

3.5.2 Measurement of Competition and Concentration

The research on bank competition has evolved mainly in two directions: structural and non-structural approaches. The structural approach to the measurement of competition includes the Structure-Conduct-Performance paradigm (SCP) and the efficiency hypothesis. The former states that the higher the concentration in a market, the lower the competition and the higher the profits that the firms receive. The latter takes efficiency into account and states that firms with superior efficiency improve their market shares and become more profitable[65]. The SCP paradigm is used to investigate whether a highly concentrated market causes collusive behaviour among the larger banks, resulting in superior performance, whereas the Efficient Structure (Efficiency) Hypothesis (ES) investigates whether it is the efficiency of larger banks that enhances their performance and results in a more concentrated market (Clark, 1988; Berger, 1995; and Casu and Girardone, 2005). The SCP approach has been the most commonly used assessment of competition in banking since the early 1950s (such as Bain, 1951 and Bain, 1954) up to the late 1990s. The approach infers competition from observable market structure and links banks' market power with market structure. Market structure is reflected by concentration ratios (CR ratios) for the largest firms and the Hirschman Herfindahl Index (HHI) (Casu and Girardone, 2005). Under the SCP approach, higher concentration is said to encourage firms to collude with the assumption that the degree of the market concentration is inversely related to the degree of concentration.

The efficiency structure (ES) hypothesis emerges from the criticism of SCP hypothesis (Demsetz, 1974; Peltzman, 1977; Al-Muharrami and Mathews, 2009). Under ES hypothesis, the efficiency of the firm will determine the link between market structure and performance of any firm. The most efficient companies will reduce costs, leading to a higher profit, thus increasing in the market share and leading higher market concentration. Firms may be exploiting greater x-efficiency (the so-called "efficiency hypothesis") or greater scale efficiency (the so-called "scale efficiency hypothesis"). If higher market concentration lowers competition, according to the efficiency hypothesis there should be an inverse relationship between

[65] Both approaches will be further discussed in Chapter 5 methodology.

competition and efficiency, thus reversing the causality running from efficiency to competition in the SCP paradigm (Casu and Girardone, 2007, pp.16).

Another alternative assessment is put forward by the New Empirical Industrial Organisation (NEIO) literature. This approach indicates that several other factors may also determine competition, other than market structure and concentration, such as contestability in the banking market and exit/entry barriers (Casu and Girardone, 2005, Baumol et al., 1982; Bresnahan, 1989; Rosse and Panzar, 1977; Rosse and Panzar, 1987). These latter approaches were developed under the new Empirical Industrial Organisation (NEIO) literature. NEIO came after several studies elaborated on the limitations of using market concentration as a proxy for competition[66]. The theory of a contestable market argued that, perfect competition can be found even in a highly concentrated market and that collusive agreement can still be achieved in a market with large numbers of firms (Maudos and Guevara, 2006). This indicates that the degree of competition should not only be related to the number of competitors or/and concentration of the market, but also related to the conditions of entry/exit in the sector (Maudos and Guevara, 2006).

3.5.3 Literature on Banking Competition and Concentration

The existing literature on the relationship between competition and concentration in banking markets is rather large and focuses on the EU and the US banking markets (Molyneux et al., 1994; Hempell, 2002; Bikker and Groeneveld, 2000). Most studies in this strand of the literature utilize either the Bresnahan or the Panzar Rosse (P-R) non-structural methodology to evaluate competition in the financial sector. More recently, a number of studies have employed these methodologies to quantitatively assess the degree of competition and market structure of the banking industry in developing and transition countries. Generally, none of the studies have investigated the competitive behaviour and concentration issues in the Asian banking sector in a cross country setting and in the aftermath of the 1997 crisis (Sufian and Abdul Majid, 2007, pp.10-11).

[66] Recent studies have also shown the inadequacy of using market concentration as an indicator of competition (such as Berger et al., 2004; Guevara et al., 2005; Claessens and Laeven, 2004), pointing to the necessity of using alternative indicators and introducing NEIO.

Work by Abbasoğlu et al. (2007) found that no relations existed between concentration and competition, and no robust relationship was present between efficiency and profitability. Similar to Jansen and De Haan (2003), no evidence was found to show that concentration indicators are linked to profitability and they added that concentration and competition are not related. Smirlock (1985) and Yeyati and Micco (2007) also state that there is no discernable positive relationship between concentration and profitability. Using Granger-causality tests, Casu and Girardone (2007) suggest that concentration is negatively associated with competition and that there is a weak positive causality between efficiency and competition. Weill (2004) investigates the relationship between competition and X-efficiency using Stochastic Frontier Approach and non-structural Panzar and Rosse (P-R) model and found a negative relationship between competition and efficiency. Bikker and Bos (2005) looked into the nature and degree of competition in the European Union (EU) banking market and the level of efficiency of the banks, they also found that the effectiveness in European banking had improved significantly, which gained through an increase in the competition level and profitability. Their findings also suggest that deregulation and monetary integration does give a positive impact on competitive improvements and efficiency gains.

Claessens and Laeven (2004) associate competitiveness measurements with indicators of countries banking system structural and regulatory regimes. The study found that banking systems are more competitive if there are fewer regulations on foreign entry and activity restrictions. These findings can be related to fragility, Beck et al. (2003), found that more competitive banking systems with fewer entry regulations and activity restrictions tend to be more stable. Laeven (2005) study's the effect of competition, ownership, diversity of activities, and government policy on the performance of banks in East Asia. His findings suggest that banks that operated in more concentrated banking systems generated greater income, resulting in less intervention by the government. Consolidation does positively affect the performance and stability of the selected countries bank operations. Using the Panzar and Rosse (P-R) approach, the results suggest that existing banks could grow by improving the quality of their services rather than concentrating on further consolidation. The entry of foreign banks was suggested as one way of applying pressure on the country to increase competition in local banking markets, together with improvements in the

areas of fiscal and monetary policy. Sufian and Abdul Majid (2007) used data from Malaysia and found that the competitive behaviour of banks is not necessarily related to the number of banks in a market or to concentration, because other factors are also at work. However the authors argue that the results need to be treated with caution since the process of liberalisation (referring to Malaysia) was still not fully completed.

Recent research has also highlighted that the relationships between competition and banking system performance are complex (Vives, 2001). It is important to have a well developed financial system because there is always the possibility that banks can face competition from different financial firms and imposing few restrictions on bank activity will encourage contestable behaviour (Boot and Thakor, 2000; Sufian and Abdul Majid, 2007).

Table 3.1: Competition and Concentration in Emerging Markets

Author	Period	Countries	Method	Findings
Bikker and Haaf (2002)	1988-98	23 EU and non-EU countries	P-R	MC (all countries, competition weaker in small markets and stronger in international market)
Gelos and Roldós (2002)	1994-99	8 European and Latin American countries	P-R	MC (all countries except for Argentina and Hungary near PC)
Yildrim and Philappatos (2002)	1992-99	14 Central and Southeast European and the Russian Federation	P-R	MC (Lithuana, Macedonia); PC (Latvia); Neither MC nor PC (other countries)
Murjan and Ruza (2002)	1993-97	Middle Eastern countries	P-R	MC (oil-producing countries are less competitive than non-oil producing countries)
Claessens and Laeven (2004)	1994-2001	50 Industrialised and developing countries	P-R	MC (largest countries tend to have lower competition)
Mamatzakis et al. (2005)	1998-2002	7 Southern Eastern European countries	P-R	MC
Drakos and Konstantinou (2005)	1992-2000	Central Eastern European and former Soviet Union Countries	P-R	MC
Mkrtchyan (2005)	1998-2002	Armenia	P-R	MC

Cont'd

Al-Muharrami et al. (2006)	1995-2003	Gulf Cooperation Council's Countries	P-R	MC (Bahrain, Qatar); PC (Kuwait, Saudi Arabia, UAE); Neither MC nor PC (Oman)
Perera et al. (2006)	1995-2003	4 South Asian Countries	P-R	MC
Gunalp and Celik (2006)	1990-2000	Turkey	P-R	MC
Yuan (2006)	1996-2000	China	P-R	PC (nearly perfect competition)
Belaisch (2003)	1993-2000	Brazil	P-R	MC (except large banks: PC)
Levy-Yeyati and Micco (2003)	1993-2002	Argentina, Brazil, Chile, Colombia, Costa Rica, El Salvador and Peru	P-R	MC
Abbasoğlu et al. (2007)	2001-2005	Turkey	P-R	MC

Source: Compiled by the author from referred studies; P-R is Panzar and Rosse; MC is Monopolistic Competition; MO is Monopolistic Market; PC is Perfect Competition.

Table 3.1 presents a summary of the recent literature on the issue of concentration and competition in the banking sectors of emerging markets. All studies reviewed employ the Panzar-Rosse H-Statistic[67] as a measure of competition and find that banking markets are mostly operating under monopolistic competition. This thesis aims to add to the existing literature by analysing the evolution of concentration and competition in the banking markets of South East Asian countries in the aftermath of the 1997 crisis.

3.6 Conclusion

Asian countries experienced a severe financial crisis which erupted in the mid-1990s and culminated in a 1997 crisis. The crisis was followed by deep economic downturns that lead to changes in economic policies and most importantly the restructuring of their financial institutions. Despite the severity and deep influence on both the real and financial sectors, studies on the impact of the crisis on banking sector efficiency and competitive behaviour remains rather rather limited, particularly in a cross country setting.

[67] Methodological details will be discussed in Chapter 4.

This Chapter reviews the theoretical and empirical evidence of two interrelated aspects of banking efficiency in the Asian countries most affected by the crisis, namely (1) how the environmental variables affect the degree of efficiency across countries and (2) the relationship between competition, concentration and efficiency when taking into account country specific variables.

One important point that has not been adequately recognised in the literature also relates to the impact of regulatory changes and the role of external variables on the degree of banking sector efficiency over the crisis period. To understand the process of financial reform and convergence in Asian financial institutions it is important to investigate the degree of competitiveness and the efficiency of banks across-country taking into account environmental and regulatory factors. To date regulatory changes have encouraged consolidation and as a result, most Asian countries have experienced widespread mergers and acquisition leading to a more concentrated system. From a policy perspective it is important to gauge whether the crisis has resulted in a more efficient and competitive system post crisis and this is what the empirical evidence provided in the following chapters seeks to address.

Appendix 3.1: Cross Country Study

Authors	Period	Data Source	Countries	Method	Competition Results
COUNTRIES WORLDWIDE					
Cetorelli & Gambera, 2001	1989 to 1996	Bankscope, Demirgüc-Kunt & Huizinga (1998)	41 countries	Conc. ratios, int. margins & OH costs	No optimal market structure re competition in banking. Concentration positive effect on financing young firms – hence can impact technological progress.
Demirgüc-Kunt & Levine, 2000	1990 to 1997	Beck, Demirgüc-Kunt & Levine (1999)	99 countries	CR3	Bank concentration not closely associated with bank efficiency, financial development, industrial competition or stability banking system.
DEVELOPED COUNTRIES					
Bikker & Haaf, 2002	1988 to 1998	Bankscope	23 countries – European and non-European	Panzar Rosse	All countries: monopolistic competition Small banks in local markets: weaker competition Large banks in int. markets: stronger competition Europe comp. stronger than US, Canada & Japan
Buch & Golder, 2001	1986 to 1999	Deutsche Bundesbank & Federal Reserve Board (2001)	Germany, US	Cournot model & Stackel-berg	Domestic banks tend to dominate the market segment of domestic customers. New York & California have s *much higher level of foreign* banks than other US states.
Cerasi, Chizzolini & Ivaldi, 2002	1990 to 1996	Bankscope, Bankers Almanac, Bank Base, OECD, IFS, ERE	9 EEC countries	Cerasi (1995); 2-stage game	High competition: Belgium, Netherlands, Spain & Denmark. Similar level: Germany, France, Portugal & Italy. Low level: Greece. Scope for new branches: Spain, Portugal, Italy & Greece
Corvoisier & Gropp, 2002	1993 to 1999	Bankscope, OECD, ECB, Central Banks	10 European countries	Cournot model; Herfindahl Index	Banks' margins/demand deposits: increasing concentration increases banks margin by 100-200 basis points. Tests competition wave mergers Euro. Savings/time deposits: higher concentration results in margins 100-200 basis points lower in more concentrated market. Reject SCP.
De Bandt & Davis, 2000	1992 to 1996	Bankscope	France, Germany, Italy	Panzar and Rosse	Large banks: monopolistic competition in all countries. Small banks: *monopolistic* competition in Italy, monopoly in France
Gischer & Juttner, 2001	1993 to 1997	OECD Bank Profitability	25 OECD	Lerner; monopoly index/reg.	Generally, 1% incr. Lerner index leads to > 3% incr. interest rate margin & 1% increase in ROA. On average, every 1% incr. fee-to-interest-income decreases NIM by approx. 1.25%

Cont'd

Authors	Period	Data Source	Countries	Method	Competition Results
Gual, 1999	1985 to 1995	European Commission and Barth, Nolle & Rice (1997)	15 European Countries	Klein-Monti variation	3.4% decline in concentration ratio over period 5-firm concentration ratio increase 0.86% points
Molyneux, Lloyd-Williams & Thornton, 1994	1986 to 1989	Bankscope and Central Banks	12 European countries	Panzar and Rosse	Germany, UK, France & Spain: monopolistic competition; Italy: monopoly or conjectural variations short-run oligopoly
Shaffer, 2001	1979 to 1991	OECD, Shaffer (1993), FDIC	15 industrialized countries in North America, Asia, Europe	Bresnahan-Lau	All: markets imperfectly integrated. Belgium, Denmark, France, Japan & US: market power. Finland: slight excess capacity. Most markets contestable or Cournot oligopoly, 5 countries significantly competitive.
Staikouras & Wood, 2000	1975 to 1985	OECD & Bankscope	Greece, Spain	Panzar and Rosse	Spain: profitability higher and less variable. Deregulation promoted competition in efficient system. Greece: larger role of state – deregulation promoted efficiency
DEVELOPING COUNTRIES					
Gelos & Roldós, 2002	1994 to 1999	Bankscope, OECD, Central Banks	4 Asian, 5 Latin American & 4 Cent. East European	CR3, CR10, H index, Panzar and Rosse	Consolidation in emerging markets not resulting in less competitive pressure. Turkey: competition less. Argentina: competition increased in later years.
Yildirim & Philappatos, 2002a	1992 to 1999	Bankscope & IMF	14 countries Central Europe, South Eastern Europe, Russian Federation	CR3, Panzar and Rosse	Large banks in transition countries: more competitive environment than small local banks Lithuania, Macedonia: monopolistic competition Latvia: perfect competition Other countries: neither monopolistic nor perfect

Appendix 3.2: Criteria for Categorizing Banks within the Restructured Group

Sub-group Criteria	
Merger	Merger of two or more domestic banks, while maintaining majority domestic ownership during the period of 1998–2001, either voluntary or mandatory.
Foreign takeover	A bank which was taken over by foreign banks or holding companies during the period of 1998–2001, either voluntary or mandatory. Contains majority foreign ownership after the event.
State intervention	A state or government agency intervention during the period of 1998–2001 including nationalization, temporary control, and recapitalization by using public funds.

Source: Nakhun Avkiran, (2009), pp. 243.

CHAPTER 4

BANK EFFICIENCY IN SELECTED SOUTH EAST ASIAN COUNTRIES: A NON-PARAMETRIC ANALYSIS OF THE IMPACT OF ENVIRONMENTAL FACTORS

4.1 Introduction

Studies on the efficiency of financial institutions have significantly increased in number since the 1990s (Berger and Humphrey, 1997). Efficiency indicators produce information on the success of the management of both individual banks and the industry as a whole. Improving the efficiency levels may create a chain reaction leading to a better operating environment, improvement in the ability to utilise inputs, upgrading financial products and services, higher shareholder value, a higher volume of funds intermediated and, ultimately, foster economic growth by channelling funds into productive investments (Molyneux et al., 1996). Berger and Humphrey (1997, pp.175) noted that the information obtained from efficiency studies would be useful in: (1) informing the regulators/government on their policy through evaluations made on the effects of deregulations, mergers or market structure on efficiency; (2) addressing research issues by describing the efficiency of an industry, ranking firms, or even checking efficiency, it may help to employ different efficiency techniques; and (3) improving managerial performance through identifying 'best practices' and 'worst practices'.

The objective of this chapter is to discuss the conceptual framework that underpins the analysis of bank efficiency as well as to carry out an empirical analysis of the efficiency of South East Asian (SEA) banking sector in the post-crisis and recovery period (1999 - 2005). The methodology involved focuses on non-parametric techniques (DEA) for the measurement of efficiency and the measurement. Section 4.1, discusses the concept and the measurement of efficiency. Section 4.2 explains the mathematical approaches to measure efficiency; Section 4.3 discusses the development of Data Envelopment Analysis. This section also explains the concept of radial and non-radial slacks, as we followed this approach to measure the impact of environmental variables on efficiency and the multistage analysis involved. Section

4.4 presents the empirical application of the methodological approached discussed. Specifically, we measure bank efficiency in selected South East Asian Section 4.5 discusses the results of the empirical analysis whereas section 4.6 draws some conclusions.

4.2 Efficiency: Concept and Measurement

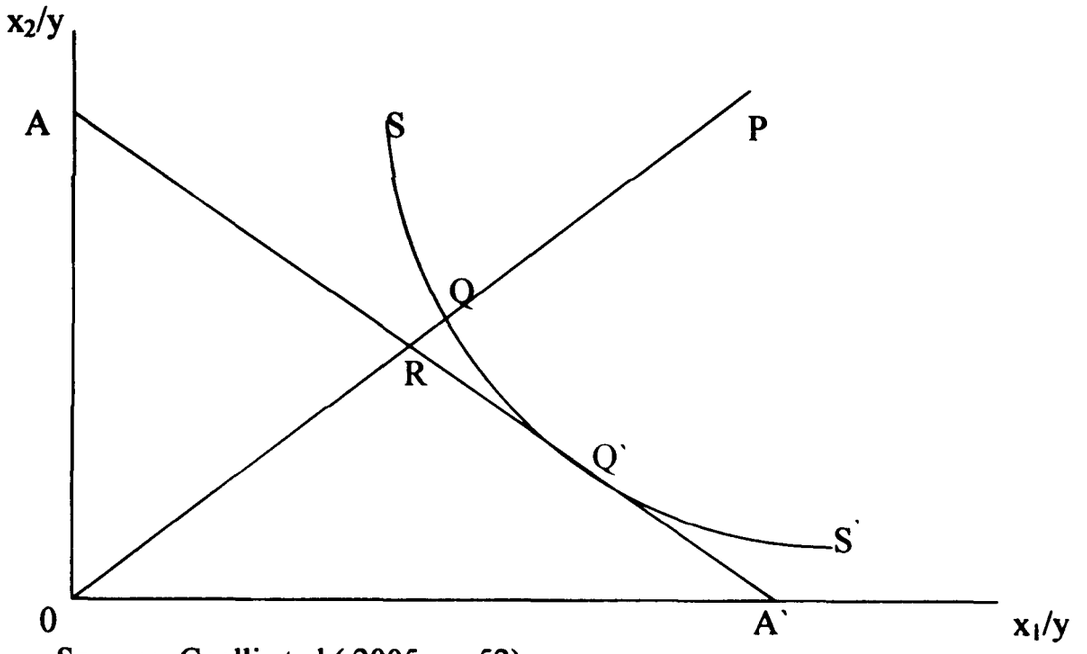
The main objective of financial restructuring and reforms is to improve the efficiency of the banking industry (Berger and Humphrey, 1997). When Asia was struck by the financial crisis, each affected country started implementing new policies in order to set the economy towards recovery. The flexibility of more liberal regulations, together with the competitive environment was expected to give more freedom over the utilisation of resources. Bank performance studies have become of great interest in many different fields.

Efficiency for a firm is defined as producing the maximum output from a given set of inputs. Efficiency can be seen as part of a firm's performance, either as a measure of the maximisation of output, maximisation of profit or minimisation of costs. Efficiency measurement began with a study by Farrell (1957) who drew upon the work of Debreu (1951) and Koopmans (1951). Debreu (1951) and Koopmans (1951) highlighted the frontier nature of production functions in economics. Debreu (1951) proposed the first measure of technical efficiency using 'coefficient of resource utilisation' which uses the smallest amount of input resources needed in order to produce a certain output. Koopmans (1951, pp. 60) defines a producer as technical efficient when an increase in any output requires a reduction in at least one other output or an increase in at least one input, and if a reduction in any input requires an increase in at least other input or a reduction in at least one output.

Farrell's (1957) work was the first to define efficiency measures at micro level. His work brought forward two issues that needed to be highlighted; (1) how to define efficiency and (2) how to benchmark technology and efficiency measures. Farrell's study also brought about the proposition of empirical treatment of production functions as 'frontier' and proposed that efficiency consists of two components: technical efficiency (TE) and allocative efficiency (AE). TE reflects the ability of a

firm to minimize input (maximize output) used to produce (to gain) for a given set of output (inputs). AE represents the aptitude of a firm to use the inputs in optimal proportions at a given price and its production technology. Together, these two measures represent total efficiency[68] (OE) measurement (Coelli et al., 2005). Efficiency ratios take on a value between zero and one, where one indicates that the firm is fully efficient.

Figure: 4.1: Overall, Technical and Allocative Efficiency



Sources: Coelli et al.(2005, pp.52)

The concept of efficiency is illustrated in Figure 4.1. Assuming a firm is using two inputs, x_1 and x_2 to produce a single output (y) at point P. SS` (isoquant) slope shows the possible combinations of input and output that the firm can produce if it is perfectly efficient. The slope AA` (isocost) represents the input price ratio and it shows the various combination of inputs that require the same level of expenditure. If the firm's production is efficient it will occur at Q`, the cost minimisation point, and when SS` and AA` slopes intersect and at this intersection point the combination of input output at Q` is considered achieving TE and AE or OE. In both technical and allocative efficiency, a value less than unity represent inefficiency.

[68] Some of Farrell's terminology differs. He used price efficiency instead of allocative efficiency, and overall efficiency (OE) instead of economic efficiency (EE).

Technical efficiency of P is measured by OQ/OP or $1-QP/OP$[69], which indicates the proportion of inputs that could be reduced without any reduction in outputs. The more the firm moves away from the frontier, the more the performance of the firm deteriorates and consequently the TE ratio declines towards zero. Furthermore moving closer to the frontier indicates the improvement of firm's efficiency where the efficiency ratio is now closer to unity. In general the TE ratio is $[0 \leq TechnicalEfficiency \leq 1]$.

Allocative efficiency is defined by the ratio of OR/OQ. Producing at point P shows that the firm made an incorrect choice as to the combination of inputs at the given prices, therefore incurring more cost than if it had produced at point Q'. Point Q' implies that the firm achieved full efficiency where technical and allocative efficiency were attained simultaneously. According to Farrell's seminal work OE is equal to TE multiplied by AE or OR/OP = OQ/OP x OR/OQ.

Farrell's work was originally under the assumption of constant return to scale (CRS) and strong disposability of inputs. The latter implies that any increased utilisation of input cannot reduce output, keeping the others constant. Constant return to scale (CRS) only holds if the production frontier, as showed in Figure 4.1, is characterised by the unit isoquant; or explained by $1 = f(x_1/y, x_2/y)$. Farrell's work was also illustrated in input-oriented measures under the CRS assumption. The input oriented measure referred to a question of "by how much can input quantities be proportionally reduced without changing the output quantities produced?" The question can also be asked, "by how much can output quantities be proportionally expanded without altering the input quantities used?" This gives an output oriented measurement as opposed to an input oriented measure discussed by Farrell (Coelli et al., 2005). The output and input oriented measures are equivalent measures of technical efficiency only when constant return to scale exists (Färe and Lovell, 1978; Coelli et al., 2005).

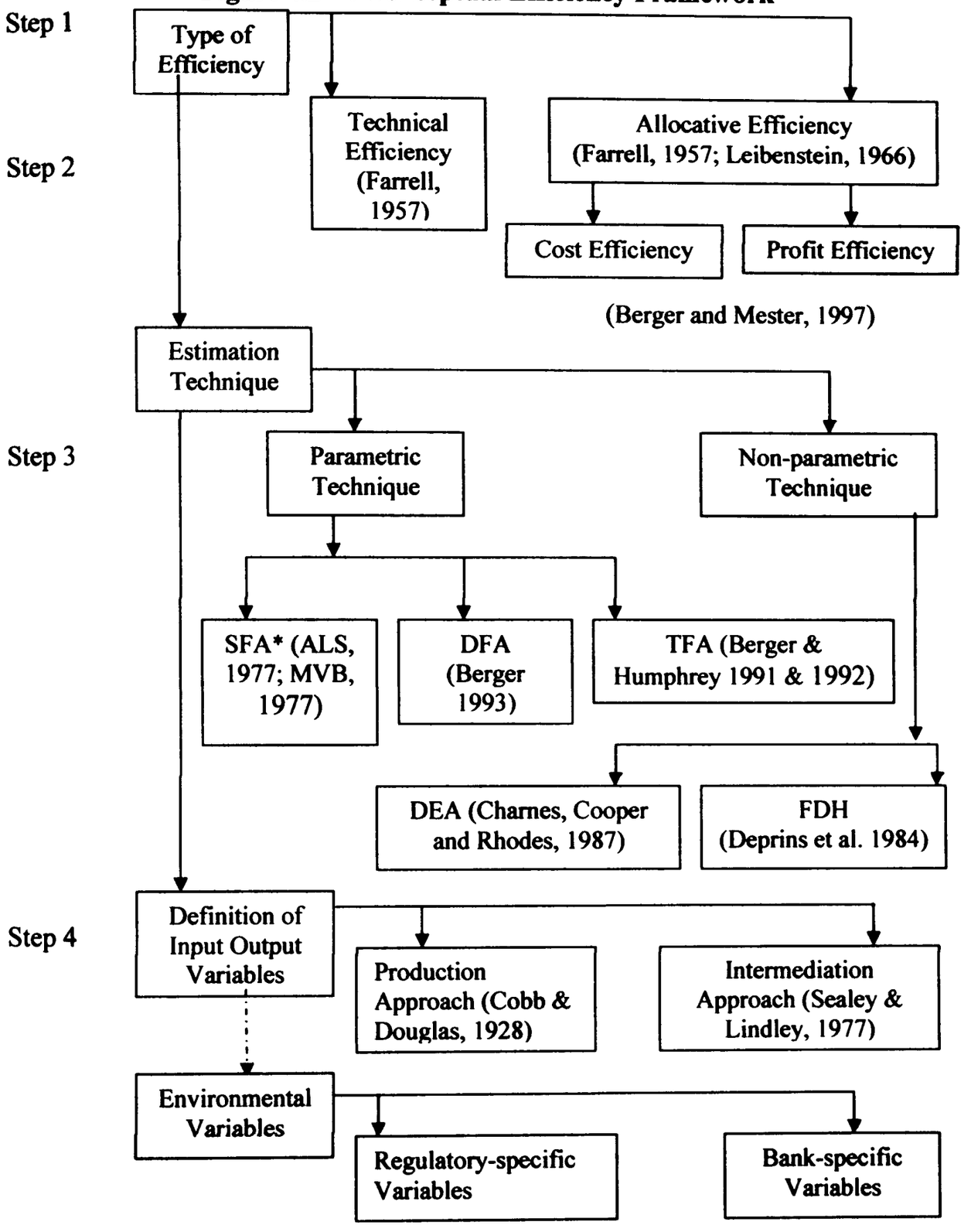
Farrell is generally acknowledged for his influential work that has been motivation for the development of two methodological approaches to the construction of production frontiers: parametric and non-parametric or linear programming approaches. These

[69] It is technically inefficient, since by moving to point Q, it could produce the same output with fewer inputs.

approaches differ in terms of assumptions made on the shape of the efficiency frontier and the existence of random error. The random term defines the uncontrollable events that occur outside the firm's authority. Parametric techniques estimate the frontier from statistical methods and impose an explicit functional form for both the frontier and its deviation from it, which is inefficiency. A non-parametric approach is defined by Farrell as a piece-wise-linear convex isoquant constructed as such that no observed point lies to the left or below. Under non-parametric approaches, no assumptions are made about the functional form of the frontier or any distributional assumptions about efficiency.

Inspired by Farrell's work, Charnes Cooper and Rhodes 1978 (CCR) extended the approach and introduced the linear programming technique known as Data Envelopment Analysis (DEA). An alternative method in measuring efficiency is the parametric approach Stochastic Frontier Analysis (SFA). Figure 4.2 below illustrates the different approaches to frontier measurement.

Figure 4.2[70] : Conceptual Efficiency Framework



[70] Adapted from Ahmad Mokhtar H.S.et al., Figure 3 (2006, pp.5)

* ALS: Aigner, Lovell, and Schmidt (1977); MVB: Meusen and Van Den Broeck (1977).

4.3 Mathematical Approaches to Measure Efficiency

Several methods have been used in recent years to measure the performance of financial institutions with frontier methods having become the preferred approach. Bauer et al. (1997) noted that the main advantage of frontier efficiency over other performance indicators is that it is an objectively determined quantitative measure that removes the effects of market prices and other exogenous factors that influence observed performance. However, after many years of research surrounding the frontier method, there is still no consensus on the best method or set of methods for measuring frontier efficiency.

After more than 20 years, researchers have recognized several frontier approaches developed to assess firm performance and two of the most commonly used are: the nonparametric linear programming approach, often referred as Data Envelopment Analysis (DEA), and the parametric econometric approach – the Stochastic Frontier Approach (SFA). These approaches differ in the assumptions they make regarding the shape of the efficient frontier, the existence of random error, and (if random error is allowed) the distributional assumptions imposed on the inefficiencies and random error in order to disentangle one from the other (Bauer et al.,1998). Below we briefly review the main characteristics of Stochastic Frontier Analysis. We will provide more detail on Data Envelopment Analysis as it is the methodology employed in the empirical analysis.

4.3.1 Stochastic Frontier Analysis (SFA)

Stochastic Frontier Analysis (SFA) is widely used by many researchers in search of bank efficiencies. SFA is based on the pioneering work of Aigner et al. (1977) and Meusen and Vande Broeck (1977), while Kumbhakar and Lovell (2003) provide a comprehensive overview on SFA. The advantages of using SFA is that it allows for random error that may reduce any misidentified measurement errors, transitory differences in cost, or specification errors in inefficiency. SFA employs a composed error model in which inefficiencies are assumed to follow an asymmetric distribution, usually the half-normal, while random errors are assumed to follow a symmetric distribution, usually the standard normal (Aigner et al., 1977). That is, the error term from the cost function is given by $\varepsilon = \mu + v$, where μ represents inefficiency and

follows a half-normal distribution. The reasoning is that inefficiencies cannot subtract from costs, and so must be drawn from a truncated distribution, whereas random error can both add and subtract costs, and so may be drawn from a symmetric distribution. Both the inefficiencies μ and the random errors are assumed to be orthogonal to the input prices, output quantities, and any other cost function regressors specified. The efficiency of each firm is based on the conditional mean (or mode) of inefficiency term μ, given the residual which is an estimate of the composed error (Bauer et al., 1998, pp.93-94). SFA is bound to the requirement of a specific functional form for the technology and of distributional assumptions for the efficiency terms in order to be able to deal with statistical random errors. This may lead to a misspecification for a production function and a wrong assumption for distributional of efficiency.

4.3.2 Data Envelopment Analysis (DEA)

As mentioned previously, DEA is a non-parametric approach to efficiency measurement which is based upon the work originally developed by Farrell (1957) and referred to as Data Envelopment Analysis (DEA) by Charnes, Cooper and Rhoades, CCR (1978). It was originally intended as a tool of performance measurement for non-profit and government organizations. Charnes, Cooper and Rhoades, CCR (1978) proposed a model that had an input orientation and assumed constant return to scale (CRS). Later studies considered alternative sets of assumptions, such as variable return to scale (VRS) as introduced by Banker, Charnes and Cooper, BCC (1984).

DEA offers three possible orientations in efficiency analysis (Charnes et al 1994):

- Input-oriented models: are models where DMUs[71] are deemed to produce a given amount of outputs with the smallest possible amount of inputs (inputs are controllable);
- Output-oriented models: are models where DMUs are deemed to produce with given amounts of inputs the highest possible of outputs (outputs are controllable);

[71] DMUs were introduced to enclose each entity to be evaluated (i.e. business firm, government and non-profit agencies, schools, hospitals, military units, police forces, countries, region etc - these are among a wide range of different entities that use DEA) that use similar inputs to produce similar outputs.

- Base-oriented models are models where DMUs are deemed to produce the optimal mix of inputs and outputs (both inputs and outputs are controllable).

DEA has a number of advantages compared to parametric techniques, as summarised by Charnes et al. (1994):

- DEA has the ability to handle multiple inputs and outputs;
- DEA does not require a functional form that relates inputs to outputs;
- DEA optimizes each individual observation and compares them against the "best-practice" observations;
- DEA can handle inputs and outputs without the need for price information;
- DEA produces a single measure for every DMU, so they can be easily compared.

There are also several disadvantages to be considered, as summarised by Athanasspoulis (1991):

- Limitations in aggregating different aspects of efficiency, especially in cases where DMUs perform multiple activities;
- Insensitivity to intangible and categorical components (for instance, the service quality in a bank branch setting).

In a DEA analysis, DMUs are assumed to be homogeneous and repeatedly perform the same function by utilising similar inputs in order to produce similar outputs. Assuming there are N firms (DMUs) using a vector of inputs (k) to produce a vector of outputs (m), based on the input oriented CCR model, the measure of efficiency of a particular firm is calculated as:

$$\begin{aligned} &\min_{\theta,\lambda} \theta_i \\ &s.t. \quad \sum_{r=1}^{N} y'_{mr}\lambda'_r \geq y'_{mi} \\ &\sum_{r=1}^{N} x'_{kr}\lambda'_r \leq \theta_i x'_{ki} \\ &\lambda'_r \geq 0 \end{aligned} \tag{4.1}$$

Where,

θ = is a scalar,

λ = N*1 vector of constant,

y = the amount of output m for DMU r at time t, and

x = the vector output k of DMU r which ranges in r = 1... n, at time t.

Equation (4.1) evaluates the efficiency score for each production unit in sample (θ) and search for the weights used by the identified efficient production units to construct the same output level as the ith production unit (λ). The calculation is repeated for n times, once for each unit in the sample. The value obtained from θ, will be the efficiency score for the r DMU where $0 \leq \theta \leq 1$. In case of θ_1 has the value equal to 1 the DMU lies on the frontier and is fully efficient. If $\theta_i < 1$, the firm is inefficient and needs a (1- θ_i) reduction in the input levels to reach the frontier.

The CRS assumption in the previous model (CCR) suggests that all firms are operating at an optimal scale. Such an assumption is likely to be invalid if the firms under scrutiny operate in an imperfect competition environment, in a regulated industry, or are subject to financial constraints. These factors independently or collectively might force the firms not to operate at its optimal scale. Färe and Grosskopf (1983) suggest the importance of adjusting the CRS and DEA models to count for variable return to scale (VRS). Banker, Charnes and Cooper (1984) argue that not all firms are operating at optimal scale. Hence, the use of the CRS model in such a situation would result in biased measures of technical efficiencies that are confounded by scale efficiency. Banker, Charnes and Cooper, BCC (1984) developed the VRS model by considering the existence of variable returns to scale in the production and measures the pure technical efficiency. BCC (1984) imposed the VRS on the formulation in equation (1) by adding an extra constraint, $\sum_{r=1}^{N} \lambda_r = 1$. This is achieved if $\sum_{r=1}^{N} \lambda_r = 1$, alternatively if $\sum_{r=1}^{N} \lambda_r \neq 1$ then if $\sum_{r=1}^{N} \lambda_r < 1$ implies an increasing return to scale and if $\sum_{r=1}^{N} \lambda_r > 1$ Implies a decreasing return to scale.

Running equation (4.1) with VRS, the BCC efficiency scores are obtained (with similar interpretation of its value as in the CCR mode). These scores are called "pure technical efficiency scores" since they are obtained from the model that allows VRS and hence eliminate the "scale part" of the efficiency from the analysis. Overall, for each unit of CCR, efficiency scores will not exceed the BCC efficiency scores.

The BCC model is used in this thesis to comply with the imperfect competition and regulatory requirements that may cause a unit not to operate at its optimal scale. In this Chapter, we accommodate the BCC-efficiency measure of technical efficiency plus additional non-radial input savings (slacks) and output expansion (surpluses) to accommodate VRS situations. We chose to accommodate slacks in order to gain "strong efficiency" estimations also known as "Pareto-Koopmans" efficiency. Farrell's radial measure of technical efficiency is referred to as "weak efficiency" or "Farrell Efficiency" because of non-zero slack

DEA was also chosen based on its ability to account for small sample size (as the number of banks in selected countries is decreasing due to the impact from the Asian crisis. Input minimisation orientation was applied to accommodate the regulatory changes, the increasing competitiveness among firms/bank, and the focus to reduce costs in the selected countries, which has change the input utilisation, as it is closely associated with the changes in the market structure. The DEA application in this thesis was extended using four stage procedures (Fried et al., 1999, pp.252) which include radial and non radial input slack (explained in 4.3.2.2).

The estimation carried out in this chapter also incorporates environmental variables into a measure of technical efficiency (TE)[72]. Following work by Fried et al. (1999), we employ empirical technique to separate an external factor that influences the performance of a bank using Data Envelopment Analysis (DEA) and utilizes the input slacks or output surpluses and re-calculates a measure of technical efficiency which adjusts for differences in the operating environment (the specific four-stages methodology employed in the empirical analysis is detailed in Section 4.4.4).

[72] Technical Efficiency measures the ability of a bank to produce a given set of output with minimal inputs under the assumption of variable return to scale.

4.3.2.1 Multistage Analysis DEA

According to Fried et al (2002) the characteristics of the environment that surrounds the producer's activities are among the main phenomena that influence the evaluation of the producer performance. Several alternative models can be found to have incorporated the impact of environmental variables. The unique features of multi-stage DEA make it very practical in measuring efficiency. Coelli (1998, pp.198) noted that the multi-stage DEA method is able to avoid the problems inherent in the two-stage method. The method is able to identify efficient projected points, which have inputs and outputs mixes as similar as possible to those of the inefficient points, and that it is invariant to units of measurement. Dietch (2000) categorised the environmental variable into three main points: (1) Main Conditions which describes the operational conditions such as, population density, per capita income and density of demand deposits; (2) Bank Structure and Regulations which consist of the degree of concentration, regulatory conditions and density of demand; and finally (3) accessibility of banking services for customers measured by branch density.

There are a number of other ways in which environmental variables can be accommodated in a DEA analysis. *One-Stage Model*, for example: Banker and Morey (1986); Pastor et al. (1997); Ray (1988); Golany and Roll (1993); Cooper and Pastor (1996), *Two-Stage Model*, is the most common method used in evaluating efficiency and performance. It consists of regressed indices of efficiency obtained in the first stage, against the environmental variable in the second stage. There are several different two-stage models in terms of how it is applied with DEA[73] and among the first to apply it in this manner was Timmer (1971) followed by other research, for example; McCarty and Yaisawarng (1993); Pastor (1995); Chen and Zhu (2004); Wang et al. (1997); Jackson and Fehti (2009); Daley and Mathews (2009). *Three-Stage Model* uses DEA in the first stage and includes slacks (obtained from the first stage) and the environmental variable in the second stage. In the third stage, they run DEA with the adjusted inputs (and/or outputs) to obtain the definitive indices of

[73] Some studies use ordinary least squares (OLS) to estimate the second stage equation, others use a Tobit model. An advantage of the two-stage approach is that the influence of the external variables on the production process can be tested in terms of both sign and significance. However, a disadvantage is that the second stage regression ignores the information contained in the slacks and surpluses. This may bias the parameter estimates and give misleading conclusions regarding the impact of each external variable on efficiency. The two-stage procedure does not provide a separate measure of managerial efficiency (Fried et al. 1999, pp.251).

efficiency filtered for the environmental variables. Studies based on this model are getting more attention from researchers including Fried and Lovell (1996); Rouse (1996); Fried (2001); Estelle et al. (2010); García-Sánchez (2007); Pastor (2002); Blank and Valdmanis (2005).

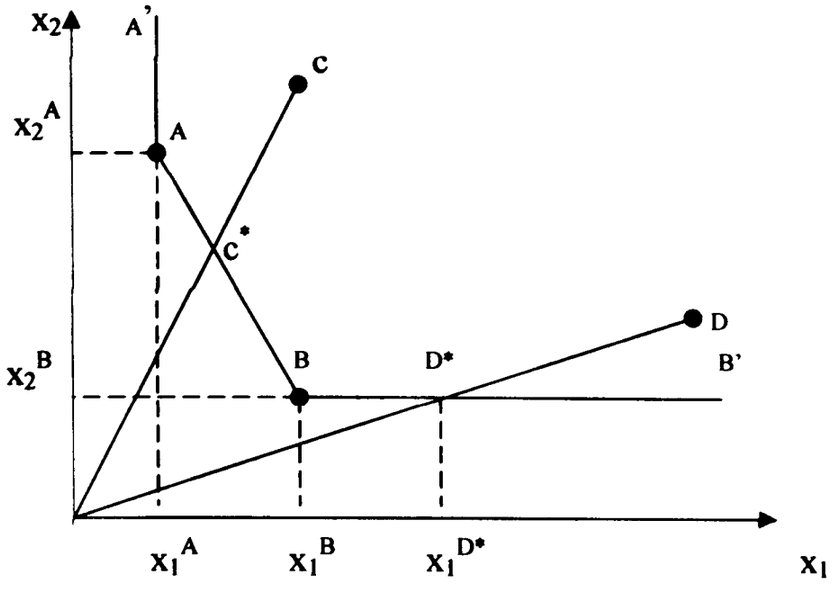
4.3.2.2 Radial and Non-radial input slacks

DEA calculates efficiency scores of DMUs by measuring the maximum radial (proportional) reduction in all inputs (increment in all outputs) which would lead to the highest efficiency level that a DMU may achieve within the study set (Taluri, 2000). However, increase (reduction) in efficiency still leaves some slack in inputs and outputs, which illustrates that some DMUs still remain inefficient. The vast majority of DEA studies on banking however do not explicitly account for slacks in the relative efficiency analysis. Recently researchers have developed a set of non-radial models where together with a DEA approach they account for the existing slacks (for example Fried. et al., 1999; Tone, 2001; and Färe et al., 1994). The radial approach is presented by CCR and BBC. Both of these approaches appear to have limitations, where both neglect the non-radial input slacks and output surpluses. Therefore, if these slacks have an important role in evaluating managerial efficiency, the radial approaches may mislead the decision as to when we utilize the efficiency score θ as the only index for evaluating performance of DMUs (Avkiran et al., 2008, pp.130).

Figure 4.3 illustrates the concept of radial and non-radial input slacks (Fried et al., 1999, pp.253). Assuming there are four units: A, B, C and D, with each unit using two inputs, x_1 and x_2 to produce the same amount of output y. Point A and B is the efficient frontier which is created by linear combination input vectors A and B. It represents the trade off between inputs x_1 and x_2 that is feasible to produce output y.

The vertical extension AA' is the result of free disposability of input x_2 (inequality on the constraint of x_2). The same situations exist for the horizontal extension BB'. This range reflects the free disposability between x_1 and x_2 with x_2 being held constant at x_2^B. Farrell radial Technical Efficiency (TE) was achieved at isoquant point AA'BB'. TE were attained at A and B, but not at C and D.

Figure 4.3: Radial and Non-radial Input Slacks



The radial technical efficiency for C (TE^c) is OC*/OC whereas OD*/OD is radial technical efficiency for D. By reducing the production to C* to its current level of x_1 and x_2 to produce output y, unit C may have operated at an efficient level. The amount $(1\text{-}TE^c)x^c$ is radial input slack, which is the same proportion for all inputs by definition. Once reduced to C* no further reduction is possible without losing more output. Unit D can reduce its production by $(1\text{-}TE^D)$ to x_1^{D*}, but to be radially efficient unit D needs further reduction of input x_1 to x_1^B. This is referred to as non-radial slack in input x_1. The amount of non-radial input slack is varied across inputs.

4.4 Bank Efficiency in selected Southeast Asian Countries: An Empirical Application

The objective of this chapter is to assess the relative technical efficiency of institutions in a market that has been significantly affected by a severe financial crisis, in the period between 1999 and 2005, by taking into account the impact of environmental variables. We constructed a dataset of commercial banks from five South East Asian (SEA) countries: Indonesia, Korea, Malaysia, the Philippines and Thailand. This chapter explores the relative impact of country specific factors and environmental variables on bank efficiency measures. Different policy measures may have diverse impacts on a country and often opposite effects on operational efficiency and technology improvements of banking operations (Grigorian and Manole, 2006).

Following work by Fried et al. (1999), this paper extends on these findings to explore the reasons for efficiency differences across countries by relating measures of inefficiency to features of the external variables (environmental variables). Identifying the nature of inefficiency will assist policy makers to identify policy instruments that are effective in bringing about changes in efficiency and generate the best policy response (Grigorian and Manole, 2006). This is particularly important for the SEA economy which has gone through financial restructuring after experiencing the Asian crisis.

4.4.1 Data and Descriptive Statistic

The dataset used in this study contains observations relative to commercial banks operating in the five SEA countries (Indonesia, Korea, Malaysia, Philippines and Thailand), worse hit by the 1997 financial crisis. To ensure sample homogeneity and comparability with previous studies, we have excluded savings bank, development banks, investment banks, regional rural banks, joint- venture banks and any wholly-owned and subsidiaries banks. The primary source of data is the Bankscope database provided by Fitch-IBCA (International Bank Credit Analysis Ltd). This dataset was however integrated while several additional sources including: individual banks annual reports, World Bank data, International Monetary Fund data, Asian Development Bank. Using cross sectional time series data, the final sample consists of 976 bank-year observations over the period of 1999 to 2005 (Table 4.1).

As shown in Table 4.1, the number of banks for each country have changed dramatically due to government intervention in response to the 1997 crisis, including nationalizing banks; closing unviable banks; carrying out compulsory purchases and assumptions and transferring assets to healthier banks; creating larger core banks; and providing capital injection to recapitalize banks (Williams and Nguyen, 2005).

Table 4.1: Numbers of Banks by Country and Year: 1999 – 2005

	Indonesia	Korea	Malaysia	Philippine	Thailand	Total
1999	67	16	32	32	16	163
2000	56	17	27	28	17	145
2001	50	16	26	24	17	133
2002	48	16	27	31	17	139
2003	49	17	27	32	17	142
2004	49	17	26	27	16	135
2005	44	13	26	21	15	119
Total	**363**	**112**	**191**	**196**	**115**	**976**

Source: Yearly banks annual reports.

4.4.2 Input and Output Variables

In banking literature there have been considerable disagreements regarding the appropriate definition of inputs and outputs. We have adopted the intermediation approach proposed by Sealey and Lindley (1977) assuming that banks collect deposits, to transform them, using loans and capital, into loans as opposed to production approach, which views banks as using labour and capital to produce deposits and loans[74]. Following the intermediation approach, we specify two inputs: x_1 = interest expense, x_2 = non-interest expense (personnel expenses and other administration expenses) and two outputs, y_1 = interest income, y_2 = non-interest income (non-interest income + net fee/income). Interest expenses serve as the proxy for deposits, non-interest expense for expenses incurred in conducting the financial intermediation process and, in addition, interest income for loans and non-interest income for fees revenues generated from the non-traditional and off balance sheet activities (Avkiran 1999a and 1999b). Presented in Table 4.2 are each country's average values of bank outputs and inputs over the period of 1999-2005

[74] This approach is also applied to other similar banking efficiency studies (for example, Casu and Molyneux, 2003 and Casu et al., 2004).

Table 4.2: Mean Descriptive Statistics of Inputs and Outputs, 1999-2005[75]

	Indonesia	Korea	Malaysia	Philippines	Thailand
Outputs					
y_1 = interest income	245.16	2947.37	362.48	109.083	469.618
	(596.07)	*(2817.96)*	*(480.93)*	*(146.138)*	*(485.735)*
y_2 = non-interest income	20.22	1005.94	68.06	12.925	31.430
	(44.98)	*(1535.54)*	*(104.15)*	*(22.783)*	*(55.086)*
Inputs					
x_1 = interest expense	170.24	1828.58	179.39	113.438	472.202
	(458.66)	*(1631.31)*	*(243.22)*	*(145.409)*	*(480.334)*
x_2 = non-interest expense	56.36	547.92	74.36	14.347	172.862
	(121.40)	*(548.58)*	*(97.90)*	*(27.412)*	*(374.668)*

Source: Bankscope; Standard deviation is in brackets.

4.4.3 Environmental Variables

The environmental variables used in this chapter are variables that take into account external environmental variables' ability to influence the capability of management in transforming inputs into outputs. These features include macroeconomic and regulatory variables, which are measured on a country-by-country basis. Theory offers few guidelines as to which determinants are important for explaining the particular features of each country's banking industry and for the selection of variables where theoretical studies do not exist, it is therefore prudent to rely on previous empirical findings.

The variables used were grouped accordingly into two main[76] categories (following Dietch and Lozano-Vivas, 2000) and presented in the descriptive analysis in Table 4.3. The first group is called "main conditions" this includes a measure of per-capita income, Gross Domestic Product (GDP per inhabitant). Per-capita income affects numerous factors related to the demand and supply of banking services especially deposits and loans. Countries with higher per capita income have a banking system that operates in a mature environment, resulting in more competitive interest rates and profit margins.

[75] All variables are in US$ million and inflation adjusted. We applied broad variable definitions as presented by IBCA Bankscope, in order to minimise any possible bias arising from different accounting practices. Similar approaches were also employed by previous literature (for example, Casu et al., 2004 and Pastor et al., 1997).

[76] Dietch and Lozano-Vivas (2000) categorized their environmental variables in three categories; main conditions, bank structure and regulations and finally, accessibility of banking services.

The second category is named "bank structure and regulations" which consists of Loans over Total Deposits (LTD) and Equity over Total Assets (ETA) of banking in each country. The intermediation ratio presented by Loans over Total Deposits (LTD), captures differences between the selected banking industries in term of their ability to convert deposits into loans. This relates to bank holdings of government securities and crowding out of private borrowing by public sector or inadequate institutions to support lending to the private sector[77] (Fried et al., 2004). A higher intermediation ratio may lower the banking industry cost (Casu and Molyneux, 2003; Dietch et al., 2000; Pastor, 2002; Fried et al., 2004). This may reflect developments in the legal and regulatory framework that support both the financial intermediation process and lower costs to banks. This includes the development of effective secured transaction laws and bankruptcy procedures that had taken place in the process of crisis recovery in the selected countries.

The average capital ratio is measured as Equity over Total Assets (ETA) this provides a proxy to regulatory conditions. It also accommodates bank management and risk preferences. There is a theoretical argument to support the signs of both negative and positive influences on the relationship existing between capital ratio and efficiency. Berger and DeYoung (1997) assert that the higher the solvency and prudence (capital ratio) of the banks, the lower the bad loans are, meaning less cost incurred to recover these loans, and therefore appear more efficient, i.e., banks with higher capital ratio will show higher efficiency levels. Pastor (2002) asserts that lower capital ratios may cause moral hazard behaviour and banks close to regulatory minimums may take-on excessive risk – gambling for resurrection.. Based on the above argument we will not make any prior assumptions about the sign of influence of the capital ratio.

To further account for risk and to act as a proxy for output quality we employ Loan Loss Provision normalized to total Loans (LLPL). The inclusion of LLPL is also to act as a control variable in order to correct any possible discrimination by regulators of banks in imposing provisioning rules (Laeven, 1999). Studies by Altunbas et al. (2000) and Drake and Hall (2003) found that bank efficiency scores might be biased

[77] This explains the situation in Indonesia, Thailand and the Philippines with outdated bankruptcy laws compared to Korea and Malaysia. Another structural weakness that may be reflected by using intermediation ratio is the failure in transaction law with massive misallocation of funding.

as failure to incorporate risk in their results may have a significant impact on relative efficiency scores.

Laeven and Majnoni (2003, pp.181) suggest that risk should be incorporated into efficiency studies via the inclusion of loan loss provisions (as a risk proxy)[78]; following the general consensus among risk agent analysis and practitioners, that economic capital should be tailored to cope with unexpected losses, and loan loss reserves should instead buffer the expected component of the loss distribution. Coherently with this interpretation, loan loss provisions required to build up loan loss reserves should be considered and treated as a cost; a cost that will be faced with certainty over time, but with uncertainty as to when it will materialize.

Table 4.3: Mean Environmental Variables, 1999-2005.

	INDONESIA		KOREA		MALAYSIA		PHILIPPINES		THAILAND	
	1999	2005	1999	2005	1999	2005	1999	2005	1999	2005
GDP	745.79	1280	9549.54	15840	3984	4970	1018.88	1320	1984.94	2490
ETA	5.899	13.06	4.64	6.05	9.58	10.82	19.00	12.35	8.07	13.41
	29.75	*10.20*	*1.72*	*1.24*	*4.48*	*8.49*	*9.42*	*4.25*	*7.91*	*9.96*
LTD	58.82	72.92	64.07	84.64	69.92	61.55	67.53	60.58	83.73	90.19
	50.21	*40.90*	*11.43*	*11.78*	*18.87*	*26.72*	*16.93*	*18.31*	*28.33*	*26.68*
LLPL	22.179	4.10	6.39	1.51	6.24	4.58	6.21	10.04	15.49	7.44
	15.92	*3.20*	*3.02*	*0.23*	*4.58*	*1.75*	*2.86*	*6.13*	*12.60*	*4.95*

Source: Bankscope, Asian Development Report Periodical/ Annual Report in $mill.
GDP = gross domestic product, ETA = equity over total assets; LTD= loans over total deposits; LLPL =loan loss provision over total loans. Italic shows the standard deviation.

Interestingly every country has improved their per capita income over the period. Despite differences in action taken by each country along with several disruptions along the recovery process[79], SEA counties continue to grow stronger. Furthermore, during the period studied, the solvency, restructuring and liberalization constraints imposed by banking authorities' each countries banks are obliged to maintain a higher capital ratio and intermediation ratio.

[78] In contrast, Akhigbe and McNulty (2003, pp.312) utilised a profit function approach, which included equity capital "to control, in a very rough fashion, for the potential increased cost of funds due to financial risk."
[79] Such as terrorism threats, for example the 9/11 attack in America; bombing in Bali, Indonesia; SARS pandemic and earthquakes.

4.4.4 The Four-Stage Methodology

Our approach is based on the four-stage methodology proposed by Fried et al. (1999), whereby we account for the impact of environmental variables in a DEA- based study. The aim is to incorporate the influences of the external variables on South East Asian banking efficiency measurements. In doing so, we allowed slack or surpluses due to the environment variables and used it to calculate adjusted values for the primary inputs. In other words, the new radial efficiency measures incorporate the environmental variables.

The following section explains the four-stage formal procedure for intermediation DEA approach with input oriented models.

First Stage

In the first stage, we calculated a DEA frontier using the traditional inputs and outputs according to standard production theory. Specifically, we followed the non-parametric DEA approach to measure inefficiency with an input minimization orientation. The choice of a DEA can be based on several considerations; first, DEA works well with a small sample. The sample chosen in this study involved five SE Asian crisis-affected countries and those experiencing retrieval from the 1997 financial crisis. The restructuring process has caused the numbers of these countries commercial banks to decrease significantly due to consolidation and closing down of some insolvent banks[80]. Second, DEA does not require any assumption about the functional form of the frontier or of the inefficiency component. The recovery period, which involved regulatory changes have increased the market competition, therefore cutting costs becomes the firm's main focus (Casu and Girardone, 2006). Based on changes that were expected on input levels, the input oriented is chosen to reflect the differences in the market structures.

We employed the intermediation approach as we view banks as intermediaries with loans and other earning assets as output, and capital, labour and deposits as inputs (Sealey and Lindley, 1977). The same approach is also applied in similar banking efficiency studies such as Altunbas et al. (2001), Casu et al. (2004), and Drake et al. (2006).

[80] Table 4.1 shows the number of banks for each of the selected years that have decreased since 1999.

In this stage, we exclude the external variables[81], while computing for Farrell Technical Efficiency (TE) score, as well as input slacks and output surpluses for each observation. The DEA model employed to compute Farrell TE in the first stage, for unit k, k = 1...., K, is formulated based on Banker, Charnes and Cooper[82] (BCC; 1984), variable returns to scale envelopment problems, expressed as the following Linear Programming (LP):

$$\begin{aligned} &\min_{\theta,\lambda} \quad \theta \\ &\text{subject to} \quad \theta x^k \geq X\lambda \\ &\qquad\qquad Y\lambda \geq y^k \\ &\qquad\qquad e\lambda = 1 \\ &\qquad\qquad \lambda \in R_+^K \end{aligned} \tag{4.2}$$

where $x \geq 0$ is producer's (N x 1) vector of inputs; $y \geq 0$ is producer's (M x 1) vector of outputs; $X = [x_1,\ldots,x_I]$ is an (N x K) matrix of input vectors in the comparison set; $Y = [y_1,\ldots, y_I]$ is an (M x K) matrix of output vectors in the comparison set; $\lambda = [\lambda_1,\ldots,\lambda_I]$ is an (K x 1) vector of weights or activities variable; $e = [1,\ldots,1]$ is an (1 x K) vector, and there are producers in the comparison set. The data of the producer being evaluated are superscripted "k". The optimal solution of the above problem in terms of non-negative and bounded to one optimal values θ allows for the evaluation of total slack (radial plus non-radial) for each input as the non-negative scalar $s_{nk} = x_{nk} - X_n\lambda$; where $n = 1,\ldots,N$ and $k = 1,\ldots,K$.

Second Stage

We focus on estimating N input equations using an appropriate econometric technique. The dependent variables are total (radial plus non-radial) Stage 1 slack $[x - X\lambda] \geq 0$ and $[Y\lambda - y] \geq 0$; the dependent variables are measures of external variable applicable to the particular input. The objective of Stage 2 analysis is to quantify the effect of external conditions on the excessive use of inputs.

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[81] There are other variables which influence the ability of a firm to transform inputs into outputs, but they are uncontrollable. These variables are the external environment such as ownership, location, or regulatory regime. There are two possibilities, first a firm with favorable external environmental variables, and second unfavorable external conditions. Due to fact that external environmental variable are inconsistence/unpredictable, the radial efficiency score generated by the initial model may have (under)overstated the efficiency of producers operating under (un)favorable conditions (Fried et al., 1999).

[82] The use of the CRS specification when not all firms are operating at optimal scale, results on measure of Technical Efficiency (TE) that are confounded by Scale Efficiencies (SE). The use of VRS specification permits the calculation of TE devoid of these SE effects" (Coelli et al., 2005)

The N equations are specified as:

$$E_j^k = f_j(Z_j^k, \beta_j, u_j^k), \quad j=1,....N \quad k=1,....K \tag{4.3}$$

where E_j^k is unit k's total input slack (radial plus non-radial) for input j based on the DEA results from Stage 1, Z_j^k is a vector of variables characterizing the environmental variables for unit k that may affect the utilization of input j, β_j is a vector of coefficients, and u_j^k is a disturbance term. Since the total slack for each input is censored at zero, we estimate E_j^k using Tobit regressions[83].

Following Fried et al. (1999), using the efficiency measures derived from the DEA estimations as the dependent variables, we then estimate the following Tobit regression model[84]:

$$\hat{E}_j^k = \beta_0 + \beta_1 ETA_{jt}^k + \beta_2 LTD_{jt}^k + \beta_3 LLPL_{jt}^k + \beta_4 GDP_{jt}^k + \varepsilon_{jt}^k \tag{4.4}$$

Where,

$\hat{E}_j^k$ = Efficiency scores of banks (dependent variable); subscript k denote individual banks, j countries and t time horizon;

B_0 = constant;

ETA = Equity over total assets;

LTD = Loan over total deposits;

LLPL= Loan Loss Provision over loans

GDP = Gross Domestic Product ($mill)

ε = error term

In previous studies, Tobit was used due to its ability to deal with the characteristics of the distribution of efficiency measures and thus provides results that can guide policies to improve performance. DEA efficiency measures obtained in the first stage are the dependent variables in the second stage Tobit model (equation 4.4). The Tobit

[83] If the total slack for each input is influenced by the same measures of external conditions, each equation can be estimated separately using Tobit regression.

[84] Tobit is used as it can take the censored nature of dependent variables, which is the efficiency estimations scores ranging from zero to one, thus reportedly yielding consistent estimations.

model was first suggested in econometrics literature by Tobin (1958) which is also known as truncated or censored regression models[85] where expected errors are not equal to zero. Therefore, estimation with an Ordinary Least Squares (OLS) regression would lead to a biased parameter estimate since OLS assumes a normal and homoscedastic distribution of the disturbance and the dependent variable (Maddala, 1983).

Third Stage

In this stage we will use the estimated coefficients from the regression in (4.3) to predict total input slack for each input and for each unit based on its external variables;

$$\hat{E}_j^k = f_j\left(Z_j^k, \hat{\beta}_j\right), \qquad \begin{matrix} j = 1,....,N \\ k = 1,....,K \end{matrix} \tag{4.5}$$

where $\hat{E}_j^k$ is predicted total input slack for input j based on Tobit regression results from Second Stage, Z_j^k is a vector of variables characterizing the environmental variables for unit k that may affect the utilization of input j, and $\hat{\beta}_j$ is predicted coefficients. Predictions on total input slacks are then used to adjust the primary input data for each unit according to the differences between maximum predicted input slack, $\hat{E}_j^{k\,Maximum}$ and predicted slack, $\hat{E}_j^k$;

$$\Delta\zeta = Max^k\left\{\hat{E}_j^k\right\} - \hat{E}_j^k \qquad \begin{matrix} j=1,....,N \\ k=1,....,K \end{matrix} \tag{4.6}$$

Using the differences in (4.6), adjust the primary input unit data for each unit,

$$x_j^{kadj} = x_k^k + \Delta\zeta \qquad \begin{matrix} j = 1,...., N \\ k = 1,...., K \\ \Delta\zeta = Max^k\left\{\hat{E}_j^k\right\} - \hat{E}_j^k \end{matrix} \tag{4.7}$$

Adjusting the input using equation (4.7) creates an equal base for all DMUs in regards to all their non-controllable factor surroundings. Adjusting generates an identical pseudo environment which is the least favourable for all DMUs.

[85] The model is *truncated* if the observations outside a specified range are totally lost and *censored* if one can at least observe the exogenous variables (Amemiya, 1984, pp.3).

Once the primary input unit data has been adjusted, we re-run the DEA model under the initial input-output and generate new radial measures of inefficiency. These radial measure scores measure the inefficiency that is attributable to external variables.

4.5 Analysis and Findings

This chapter discusses the results obtained from the analysis of efficiency for the selected developing countries in the SEA region from years 1999 to 2005. The results show a significant relative impact of country specific factors and environmental variables on bank efficiency measures, which have particularly important policy implications.

4.5.1 *DEA Empirical Results*

In this study, we focus on the ability of firms to obtain maximal output from a given set of inputs, in other words, technical efficiency using the input orientation. The DEA efficiency scores can then be interpreted to show how much each bank could reduce its input usage to, without reducing output, if it were as technical efficient as the best practice banks. As shown in Table 4.4, the selected Asian commercial banks faced technical inefficiency. On average the technical efficiency is 35 percent over the full sample collected for the period of 1999 to 2005. This clearly shows the impact of the 1997 financial crisis on the capability of the financial sector, commercial bank in particular, when facing the biggest downturn in their performances, in terms of providing services and generating income.

Table 4.4: Estimation on Data Envelopment Analysis (DEA) for full sample

Data Envelopment Analysis			
Output Variables: y_1 y_2 Input Variables : x_1 x_2 Underlying Technology assumes variable returns to scale (VRS)			
Estimated Efficiencies:	**Mean**	**Std. Deviation**	**Min**
Technical Efficiency; Input Oriented	0.354	0.130	0.072

where:
y_1 = interest income in USD million
y_2 = non-interest income in USD million
x_1 = interest expenses in USD million
x_2 = non-interest expenses in USD million

Table 4.5 reports the average efficiency scores for each country using the basic model, without taking into account the specific environmental conditions of each country. From 1999 to 2005, each country experienced several changes in their economic policies were involved in aggressive financial sector restructuring. As explained (Chapter 2) there were two different actions taken in order to overcome the financial turmoil, first accepting support from the IMF (Indonesia, Korea, the Philippines and Thailand) and second, capital control (Malaysia). Both methods have improved the efficiency of the countries at a different pace and in addition some were left imbalanced, due to other economic and political disruptions, for example Indonesia.

The results of Stage 1, which are based on traditional DEA, are estimated against a national efficient frontier comprised of all the observations for each of the selected countries for the post crisis period, 1999 to 2005. The estimations produced mixed results, showing that the effects of the crisis on each country differed, with some of the countries experiencing severe economic contractions, while others saw a more modest effect on their domestic economies.

Table 4.5: Stage 1 Mean Efficiency, 1999-2005

National Frontier Technical Efficiency Categorised by Country, Year							
	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Indonesia	0.610	0.783	0.732	0.708	0.764	0.809	0.862
Korea	0.969	0.954	0.929	0.972	0.962	0.964	0.938
Malaysia	0.885	0.899	0.894	0.903	0.902	0.908	0.915
Philippines	0.920	0.777[86]	0.927	0.858	0.865	0.899	0.966
Thailand	0.821	0.820	0.890	0.914	0.939	0.946	0.937

National frontier estimations indicate a lower mean efficiency for Indonesia, while the others (Korea, Malaysia, Philippines and Thailand) show an average of more than 80 per cent during the period of study. Each country has shown how they have responded to their recovery plan, either following an IMF restructuring programme (Indonesia, Korea, the Philippines and Thailand) or capital control (Malaysia).

[86] The Philippines experienced a political crisis in the year 2000 which may imply why the efficiency is low in this particular year. The political crisis arising from allegations of corruption made against President Ramos Estrada further damaged investor confidence, triggering intensified downward pressure on the Peso, a 400 basis point hike in policy interest rates and a significant slowdown in growth (IMF Concludes Article IV Consultation with the Philippines. Public Information Notice (PIN) No. 01/21, March 13, 2001)

Malaysia differed substantially to the other countries, the banks held more liquidity and the country had lower foreign debts to GDP and a lower short term debt ratio (Seok Yoon, 2005). Malaysia showed that they it was more resilient, but this may be due to the conditions experienced during the crisis. Korea accepted an IMF bailout in November 1997, with an agreement on a US$55 billion rescue package with the IMF, The World Bank and The Asian Development Bank (ADB) contributing US$21 billion, US$10 billion and US$4 billion respectively. The increase in average efficiency in Korea proved the success of the rescue package and restructuring programme implemented. For Thailand, the estimation is similar to other studies conducted on Thai bank efficiency (for example Charnsan, 2008).

Looking at the national frontier categorised by year, the average efficiency increased steadily between the periods of study. The results reflect the plan announced by Thailand's Financial Sector Master Plan where the country enhanced competition which led to an increase in efficiency of the banking sector. The Philippines has been receiving IMF guidance towards crisis recovery since the debt crisis in 1980. However, despite the prolonged plan the Philippines still put in a poor economic performance due to its macroeconomic instability and low domestic savings. Reform efforts contributed to political instability and macroeconomic instability stifled investment. Nevertheless, the results reveal that the Philippines are among the least affected countries to be hit by the crisis. The average efficiency shows fast recovery for the country that may due to an ongoing stability process which came about even before the crisis erupted. Indonesia reached the lowest average technical efficiency score (Tables 4.5), and this result is consistent with Kwan's (2003).

However, due to each country's different common frontier, these results are unable to be used to compare the differences in efficiency between the aforementioned selected countries- Indonesia, Korea, Malaysia, Philippines and Thailand. Therefore it is more appropriate to measure efficiency relative to common frontiers in order to enable the comparison of banking efficiency score across countries. For the purpose of international comparison, we must first define the common frontier based on the traditional approach, in which we exclude the specific environmental conditions for each country. That is to say, the common frontier is built by pooling data sets and estimating the technical efficiency with two inputs and two outputs. Estimating such a

common efficient frontier may be controversial, since one can argue that bank technology may vary across countries. Yet, during the period of study we believe that the bank technology in the sample countries were neither similar nor were the changes as the recovery took place actively. More importantly, common frontier is commonly employed in current studies as a way to compare bank efficiency scores over time (Drake et al., 2006; Nakhun and Avkiran, 2009, pp.240).

The common frontier results in Stage 1 suggest a lower mean efficiency (similar results to study done by Nakhun and Avkiran, 2009). Overall, the results show that average efficiency levels for each country are lower than the results obtained from the national frontiers (Table 4.5). So far the results agree with the presumption that the country specific variable is important in explaining efficiency differences and neglecting this factor may generate too much inefficiency (for example Dietch and Lozano-Vivas, 1998; Drake et al., 2006; Chiu and Chen , 2009; Nakhun and Avkiran, 2009).

Table 4.6: Stage 1 Mean Efficiency

Common Frontier Technical Efficiency Categorised by Country, Year							
	1999	2000	2001	2002	2003	2004	2005
Indonesia	0.578	0.630	0.583	0.561	0.571	0.572	0.631
Korea	0.844	0.873	0.839	0.864	0.885	0.884	0.933
Malaysia	0.683	0.781	0.801	0.760	0.718	0.714	0.668
Philippines	0.639	0.646	0.692	0.682	0.638	0.755	0.730
Thailand	0.663	0.656	0.771	0.804	0.869	0.912	0.878

On average the results show similar outcomes for all the countries and reflect the crisis's impact on their performances. The possible explanation for this low efficiency estimation in the initial stage (with exception to Korea) is probably due to the influence of environmental factors. For example, all the selected countries experienced a quiet growth in GDP at the beginning of the crisis and the first few years of the recovery period. This was followed by a fluctuation of interest rates during the year of study and changes in bank regulations that affected the banks as a whole, during the post crisis period. However, the impact of environmental variables is tested in the following section.

4.5.2 Quantifying the Effect of Environmental Variables

In order to quantify the effects of the environmental variable's impact on the efficiency results, we estimate the Tobit regression described in Equation (4.4). There are two regression equations, and one for each input. The dependent variables are selected environmental variables (ETA = Equity over total assets; LTD = Loan over total deposits; and GDP = Gross Domestic Product). In the second stage, these variables are chosen to investigate the impact of environmental factors that may distort the validity of the initial efficiency analysis. However, theory offers few guidelines to which determinants are important and this analysis relies on previous empirical studies for the selection of these variables (Drake et al., 2006; Amadou et al., 2008; Lozano-Vivas, 1998; Dietch and Lozano-Vivas, 2000; Nakhun and Avkiran, 2009).

Table 4.7: Tobit Censored Regression, 1999-2005

Independent Variable	Dependent Variables			
	TSE1		TSE2	
	Coef.	Std. Err.	Coef.	Std. Err.
ETA	-2.466***	-7.86	-0.592***	-4.03
LTD	-0.492***	-4.32	-0.181***	-3.37
LLPL	1.212***	3.87	0.082	0.53
GDP	0.005***	5.14	0.002***	5.53
CONS	71.27***	7.43	24.63***	5.46
SE	103.3***	111.13	48.88***	144.23

Notes:
Dependent variables are total radial plus non- radial slacks
TSE1= interest expense (USD million)
TSE2 = non-interest expense (USD million)
ETA = equity over total assets (USD million)
LTD = loan over total deposits (USD million)
LLPL= loan loss provision over total loans (USD million)
GNP = gross domestic product (USD million)
*, ** and *** indicate the significant level of s 10%, 5% and 1%.

The Tobit regression results are summarized in Table 4.7. In general, the influence of the environmental variables is in line with our expectations. The results demonstrate the role of "main conditions" represented here by per capita income, as per expectation has a positive sign. This signifies that the development in per capita income affects the operating and financial costs which are incurred when supplying a given level of services. The results signify that a change in economic policy does have an impact on the overall structure of a macroeconomic cycle. The same results can be found in a previous study (William and Nguyen, 2005). The paper found strong

effects of macroeconomic variable measured by GDP per capita. The same results can also be found in Lozano-Vivas et al. (1998) and Hahn (2007) where both papers considered income per capita as influential variables in determining local banking market conditions. Nakhun and Avkiran (2009, pp.247) found that the level of economic development is positively associated with bank inefficiency. They argued that the result contradicts what is expected in a free market economy. However, since the Asian banking systems are highly regulated, this would suggest that more GDP per capita is not necessarily going to lead to more competition and less inefficiency in search of profits.

Second, the variables that describe the solvency of the domestic banking system, represented by capital ratio, have a negative sign. The ratio of equity over total assets (ETA) is used to capture the bank solvency by looking into bank management and risk preferences. Kwan (2003) states that this ratio is expected to have a negative sign, since well capitalized banks reflect both high quality management and an aversion to risk taking, these bank are likely to be more cost efficient in producing banking outputs. The intermediation ratio which is represented by a proportion of total loans over total deposits (LTD) of selected banking sectors, are used to reflect the ability of different banks in converting deposits into loans. A negative relationship is anticipated since the higher the intermediation ratio, the greater the efficiency in the financial service provision as it also has significantly lower costs (Carvallo and Kasman, 2005). This may reflect development in the legal and regulatory framework that supports both the financial intermediation process and lowers the costs to banks. In the meantime this regime has incurred vital changes in the development of effective secured transaction laws and bankruptcy procedures that are necessary to support lending to customers.

The control variable, ratio of loan loss provision over total loans (LLPL) shows a positive sign. This may occur since within the period of recovery, LLPL were implemented gradually, but transparently, in order to allow banks time to restructure and mobilize new capital and to avoid aggravating credit supply problems. The results also found that LLPL and ETA variables are significant in suggesting that banking production costs are significant on loan quality and capitalization of the bank as both variables capture managerial quality.

Overall, the regression suggested that most of the efficiency differences found across the selected SEA countries banking systems are due to country-specific variables as found in previous studies (Dietch et al., 2000, Lozano-Vivas et al., 1998; Pastor et al., 1997; and Casu and Molyneux, 2003). The results also show that most of the variables are statistically significant, which confirms that the differences in economic conditions are affecting the efficiency. The parameter estimates presented in Table 4.7 are then used to adjust the initial data set according to equation (4.7)[87].

4.5.3 Re-computed DEA Results

The final stage is to re-run the initial DEA outputs with the adjusted inputs. The results comprise of the composite efficiency index (the radial score) which incorporates the effects of environment variables. Table 4.8 represents the descriptive statistics of the efficiency scores from stage four. Mean efficiency from stage four DEA analyses shown in Table 4.8 suggests that after adjusting for the variations on the environmental variable's influences, mean efficiency score has improved dramatically. As revealed, the efficiency scores show significant changes in all the selected country.

Table 4.8: Stage 4 Mean Efficiency

National Frontier Technical Efficiency Categorised by Country, Year							
	1999	2000	2001	2002	2003	2004	2005
Indonesia	0.866	0.880	0.821	0.776	0.774	0.765	0.911
Korea	0.967	0.944	0.946	0.936	0.926	0.946	0.960
Malaysia	0.818	0.888	0.924	0.875	0.896	0.914	0.926
Philippines	0.881	0.725	0.869	0.784	0.748	0.86	0.956
Thailand	0.869	0.829	0.816	0.918	0.826	0.865	0.987

This result indicates a significant impact after introducing the environmental variable to the relative efficiency scores, as it is consistent with previous studies (mostly in European countries) where the efficiency increased markedly (Drake et al., 2006; Dietch and Lozano-Vivas, 2000; Lozano-Vivas, 1998; Pastor et al., 1997; Casu and Molyneux, 2003). Compared to the previous cross country studies, besides concentrating on European countries, SEA efficiency scores vary during the selected

[87].This data adjustment is considered as Stage 3 of the 4 stage analysis. The third stage is to use the estimated coefficients from the regression to predict total input slack for each input and for each unit based on its external variables. These predictions are used to adjust the primary input data for each unit according to the difference between maximum predicted slack and predicted slack. This creates a new pseudo data set where the inputs are adjusted for the influence of external conditions (Fried et al. 1999, pp. 255)

period. This result was expected since during the study period, all five countries experienced different threats towards their economic and political stabilization, which indirectly impacted on the whole process of recovery. Bauer et al. (1998) concluded that efficiency scores differ considerably, as shown in his study on comprehensive comparisons across five different measurement methodologies.

Table 4.9: Stage 4 Mean Efficiency

Common Frontier Characterising by Country and by Year							
	1999	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Indonesia	0.183	0.630	0.467	0.583	0.445	0.621	0.548
Korea	0.872	0.873	0.881	0.900	0.905	0.895	0.937
Malaysia	0.626	0.780	0.826	0.708	0.636	0.682	0.647
Philippines	0.599	0.646	0.732	0.679	0.657	0.747	0.748
Thailand	0.711	0.656	0.750	0.756	0.755	0.873	0.788

Characterising the national frontier results by country and looking into the common frontier results in Table 4.9, both show that the efficiency mean on average have increased, even for Indonesia (with a slower pace at the beginning of 1999). With descriptive statistics explained in Table 4.3, this seems to comply with the assumption that country specific variables are an important factor in explaining average efficiency differences. Given these findings, it is believed that environmental variables have an important role in explaining the differences in banking efficiency. Variations in the countries backgrounds give us an uneven increase in efficiency results, compared to previous studies. This result corresponds with arguments found in Dietch and Lozano-Vivas (2000) and Lozano-Vivas (1998), where changes in the average mean efficiency scores very much depend on the average country-specific conditions. The year 1999 saw the beginning of new policies towards recovery by all the countries. Korea, Indonesia, the Philippines and Thailand progressed towards their commitment with the IMF financial program, while Malaysia struggled to overcome the downturn by implementing new capital controls. These economies were also soon hit by a second shock, the severe recession in the global high tech industry in 2001, which led to further sharp downturns in exports and output growth in most of East Asia.

In the selected period of study (1999 – 2005), per capita growth in this nation has enjoyed an income growth of 8.2 percent and through IMF assistance and implementation of capital controls; they have fulfilled the need to work towards a new

economy and country development after the crisis[88]. Indonesia seems to have improved their performance at a slower pace compared to other effected countries[89]. Restructuring measures were implemented in Indonesia in the year 2000. However, the banks still struggled in the aftermath of the crisis and in 2002 bank credit resumed expansion. Therefore, Indonesia remains the country slowest to recover and 10 years after the meltdown Indonesia's recovery is still among the slowest in the Asian crisis affected countries (Azis, 2008, pp. 79).

During the last few years, the relatively rapid growth of the financial sector (inadequately restructured) reflects the presence of excess liquidity and the sector's vulnerability. The slow growth of investment explains the economy-wide effects on the real sector and the stagnancy or deterioration of some social indicators. The investment climate surveys of the World Bank (World Bank, 2007, pp. 31) cite the following examples:

"*Even though macroeconomic conditions have greatly improved since the 1997-98 financial crises, some 42 per cent of Indonesian firms in 2005 still cite concerns about macroeconomic instability as a major concern, although this proportion is down from 50 per cent in 2003. These continued concerns may relate to firms' long memories of the crisis and also to occasional episodes of renewed volatility in exchange rates, interest rates and inflation in the post crisis period, in particular in 2000/01 and in 2005.*"

"*Firms concerns have also been high in the Philippines, where the government's efforts to reduce a large fiscal deficit and huge public debt have been at the centre of attention.*"
"*Firms were concerned about this sort of policy uncertainty in Indonesia, the Philippines and Thailand.*"

"*IMF (2006) also notes some deterioration in the World Bank's indicators of governance for East Asia over the last decade (Kaufman, Kraay and Mastruzzi 2006), which may also suggest an increase in policy uncertainty.*"

Efficiency scores are relatively high for Korea compared to the other selected countries. Korea's efficiency has substantially changed after the inclusion of

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[88] Yellen (2007), The Asian Financial Crisis Ten Years Later: Assessing the Past and Looking to the Future, Speech to the Asia Society of Southern California.
[89] Even though the results shows that Philippines and Indonesia are low in their recovery performances, Athukorala (2008,pp. 4) states that Indonesia and the Philippines are not an appropriate comparator. Indonesia's political instability and social upheaval, interrupted crisis management in the country during most of the study period. As for the Philippines, the impact from the 1997 crisis was relatively small and by mid 1998 their economy had already returned to the pre-crisis growth path.

environmental variables. This could be partly explained by the observed differences in the data of the environmental variables in Table 4.3. This reveals the fact that Korean banking has undergone substantial structural reforms since the 1997 financial crisis. The recovery in the economy is reflected by the increase in GDP which has helped to restore confidence in the financial sector and has brought the restructuring and mergers plans into reality.

Malaysia experienced a banking crisis in the 1980s and implemented a reform programme to lead them into the recovery of the 1980s downturn. The experience contributed towards better institutional and regulatory structures compared to others, such as Indonesia, the Philippines and Thailand. The Malaysian experience of capital controls appear to have had a salutary effect, mainly because controls were supported by a sound macroeconomic policy framework, bank and corporate restructuring, an undervalued currency, credit supervision and time-bound measures. A favourable external environment has also undoubtedly helped Malaysia to recover from the crisis. Furthermore, Malaysian controls on short-term capitals have been justified in the transition period as financial safeguards, the introduction of these measures was very timely, with them being implemented just, before the crisis erupted fully (Chirathivat, 2007; Kawai and Takagi, 2003).

Even though the Philippines exhibited similar characteristics to the other countries in the Asian region, which suffered tremendous effects on their economy and social consequences, the Philippines was considered the least affected by the crisis with only four distressed financial firms, two of which were banks and the other two non-bank financial institutions, which were eventually closed (Bongini et al., 2001). The analysis show an increased of mean efficiency after the inclusion of environmental variables which implies that the Philippines were recovering swiftly and steadily from the crisis. The growth rates were positive out of the recovery, besides the downturn in global information technology cycle in 2001; the economy maintained its momentum from 2002 onwards. The Philippines have implemented reforms in their financial sector since the economy downturn in 1980s and then proceeded with reforms in the 1990s which enabled the systems to withstand shocks. The embarkment of general Banking law in 2000 and Special Purpose Vehicle Acts (SPVs) in 2002 modernised

the legal framework governing the banking system and gave incentives for the disposal of bank's non-performing loans.

The stability of the Thai commercial banks has improved greatly. Thailand's banks efficiency levels are higher relatively to the other countries with the exception of Korea. Looking at the Thai banks performances, the average efficiency increases at a constant pace. The results in Table 4.8 and Table 4.9 reveal the indication of the environmental variables in Table 4.3 during the period of study. Financial liberalisation in Thailand began during the late 1980s and accelerated in the early 1990s. Charnsan (2005) investigated the efficiency of the Thai financial sector after the financial crisis (1999-2004) by using Total Factor Productivity (TFP). Its findings indicate that the efficiency in the Thai financial sector, the commercial bank sector, and in finance and security companies diminished over the period of 1998-2004, while the efficiency in the insurance company sector remained unchanged over the period of study. However, a sharp decrease in efficiency in these three sectors occurred in the period of 1998-2004. Charnsan (2008) looked into the relative efficiency of Thailand's commercial banks during 2003-2006 by using Data Envelopment Analysis (DEA). The analysis indicates that Thai commercial banks were efficient during the period of study.

4.6 Conclusion

During the 1997 financial crisis, the region was led into financial turmoil which lasted until early 2000. This caused an enormous contagion, which started in Thailand and then spread into Indonesia, Malaysia, and Philippines. The impact was even large enough to spread outside the region, which brought the world's eleventh largest economy, Korea, to the brink of bankruptcy and led to defaults by Russia and Brazil. The affected countries introduced corrective measures, to try and contain the economic damage caused by the crisis.

These three counties and Malaysia implemented comprehensive bank restructuring strategies which included (1) restoration of the viability of the financial system as soon as possible so that it can efficiently mobilize and allocate funds (a core banking system must be in place to preserve the integrity of payment systems, capture

financial savings, and ensure essential credit flows to the economy); (2) throughout the process, provision of an appropriate incentive structure to ensure effectiveness and, as far as possible, avoid moral hazards for all market participants, including bank owners and managers, borrowers, depositors and creditors, asset managers, and government agents involved in bank restructuring and supervision; and (3) minimization of the cost to the government by managing the process efficiently and ensuring appropriate burden sharing (by distributing losses to existing shareholders)[90]. The IMF provided financial support and reform programmes in three worst hit countries- Indonesia, Korea and Thailand. However initial hesitation from the authorities of these countries created difficulties in the restoration of confidence in both the corporate and financial sectors. Meanwhile, for Malaysia, the government implemented capital control policies and rejected any financial support programmes from the IMF. However, these crisis-resolution measures remain highly controversial and despite all of the arguments, the countries have recovered from the crisis and are finding their way back into economy and financial sector stability. Lim's (1999) account is worth quoting at length, as it is representative[91]:

'*Following the imposition of capital controls, economic indicators in Malaysia did indeed start improving. But they also improved at the same time in the other crisis-hit countries which did not impose such controls but maintained open capital accounts. All the crisis hit countries' currencies stabilized and strengthened, their inflation and interest rates fell, their current accounts moved from deficit into substantial surplus and private capital inflows increased, contributing to the replenishment of previously depleted foreign exchange reserves. Their stock markets started climbing, and the decline in their GDP growth rates moderated sharply and have now reversed with positive growth predicted for 1999 as a whole everywhere except Indonesia.*

Until very recently, the recovery in Malaysia actually lagged behind that of its neighbours who were IMF patients, particularly in inflows of foreign direct investment which fell in 1998 whereas they increased in the other countries (except Indonesia). My own opinion is that capital controls in Malaysia were neither necessary nor sufficient for economic recovery, just as they have obviously not been necessary in the equally if not more impressive recovery of the other crisis-hit Asian countries which followed the more conventional IMF policy prescriptions. Indeed, given Malaysia's much stronger macroeconomic fundamentals and financial institutions before the crisis, one would have expected its recovery to be faster and stronger than that of the other countries. That this has not happened suggests that capital controls—or the heightened political risk which accompanied their imposition--may be exerting a drag on recovery through the discouragement of some foreign capital inflow'.

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[90] IMF Occasional Paper, (1999, pp.29).
[91] Kaplan and Rodrik, (2001, pp.12.)

The aim of this chapter was to provide an empirical analysis of the technical efficiency of the selected SEA countries in the recovery period, 1999-2005 of the 1997 Asian financial crisis, by taking into account the environmental variables that are associated in effecting the mean efficiency levels of these countries. Following Fried et al. (1999) we used the four stage procedure, to estimate the impact of environmental factors in Southeast Asian (SEA) banking six years after the crisis.

The analysis started by assessing technical efficiency using traditional DEA without considering environmental effects, followed by Tobit regression in stage 2 and 3 for the adjustment of slacks. Finally, in stage 4 we repeated stage 1 using the new adjusted inputs. Our results show that when the common frontier is defined without environmental variables, the mean efficiency scores are quite low in comparison. Looking at specific-environmental conditions, we found that this result is mainly due to the differences in the environmental conditions in which banks perform services. So, when environmental variables are included in the common frontier, the differences in mean efficiency scores significantly increased (except for Indonesia which initially started with a lower mean efficiency). The results quite clearly indicate that the failure to incorporate slacks formally and directly into the efficiency analysis (as in the BCC approach) can sometimes produce inflated and misleading indications of relative efficiency (Drake et al., 2005, pp.16).

CHAPTER 5

BANKING SECTOR PERFORMANCE IN SOUTH EAST ASIA: MARKET POWER, CONCENTRATION AND EFFICIENCY

5.1 Introduction

Since experiencing the financial crisis in mid-July 1997, Asia's banking sector has undergone many dramatic changes. Significant changes can be seen in the banking industry through banking operational transformation, the number of branches and banks operating in the area, technological development, changes to the institutional structure of banking the industry and improvements of the quality of human resources. These changes are important in pursuing the goal of improved productivity. The Asian financial reforms were undertaken to improve the performance of the banking sector, through enhancing competitiveness and efficiency. Structural changes were aimed at fostering competition, anticipating productivity and efficiency improvements in banks. These changes however, have led to concern about the degree of concentration in the banking markets. Although it is important for the policy makers to accommodate these changes, it is paramount to find the right policy drivers that allow the banking industry to compete efficiently in more competitive markets.

Banks are the main source of financing in Southeast Asia (SEA). The banking industries in the region exhibit similarities in market openness, regulatory stance, extent of government intervention, lending policies and the influence of macroeconomic policy. Some of these shared similarities became vulnerabilities, which caused a systemic crisis in 1997 and this undermined the solvency of this region's banking systems. Even though profound changes occurred after the crisis and are indeed continually evolving, weaknesses still persist in the area of financial reporting, regulation and government interference (Gochoco-Bautista, 1999; Kane, 2000; Dobson, 2001; Beja, 2010). The transformation that took place in the region has conclusively demonstrated the importance to further investigate the market structure in the crisis affected countries of Southeast Asia (SEA).

This Chapter contributes to the structure and performance literature; in line with recent developments, it will expand on the analysis of concentration, competition and performance, by investigating the post financial crisis period, 1999 to 2005. The models used in the analysis will concentrate on the five countries that were most affected by the Asian financial crisis, Indonesia, Korea, Malaysia, Philippines and Thailand, within the aforementioned recovery period. The analysis incorporates measures of concentration, market share, technical efficiency and scale efficiency. The main objective is to test the structure-conduct-performance (SCP) hypothesis and the efficient structure (ES) hypothesis. In the presence of panel data, the fixed and random effects (GLS) estimating procedure is employed, although results using a traditional OLS method are also reported.

5.2 Literature Review

Previous literature has concentrated on the two major approaches in analysing the performance of the banking industry: structural and non-structural approaches. Structural approaches are based on the traditional industrial organisation (IO) theory which focuses on both the structure-conduct-performance (SCP) paradigm and the efficient structure (ES) paradigm. Non-structural approaches are developed under New Empirical Industrial Organisation (NEIO) literature. In this chapter we will focus on the structural approaches to investigate the market structure and its relationship with concentration and efficiency whereas as application of a non-structural approach is presented in Chapter 6. The following sections present a review of the relevant literature on market power theory and the efficient structure (ES) hypothesis.

5.2.1 Structure-Conduct-Performance (SCP)

The traditional industrial organisation (IO) approach proposes structural tests to assess banking competition, based on the Structure-Conduct-Performance (SCP) model suggested by Bain (1951, 1956). Recent developments have shown that market structure analysis has been extensively addressed since Bain's (1951) seminal paper, who investigated the relationship between market structure (using market concentration and firm's market share) and the exercise of market power. To evaluate market structure, the prominent tool used in the structural approach is the structure-

conduct-performance (SCP) paradigm. The SCP paradigm advocates that market concentration fosters collusion among large firms which creates large abnormal profits. According to the SCP hypothesis, there is a direct link between market concentration and the degree of competition where a higher market concentration allows banks to exploit their market power and thus earn higher profits. In many previous studies, a positive and statistically significant relationship has been found between market share and bank profitability, while a positive relationship between market concentration and bank performance has not been conclusively established.

The SCP paradigm posits a specific causal relationship between market structure, conduct and performance. In particular, market structure determines conduct and conduct in turn determines performance. SCP can be characterized accordingly using these three major elements (Lee, 2007):

Structure - This refers to market structure. Variables that can be used to describe market structure include seller concentration, degree of product differentiation and barriers to entry.

These variables can be further classified into two groups, namely:

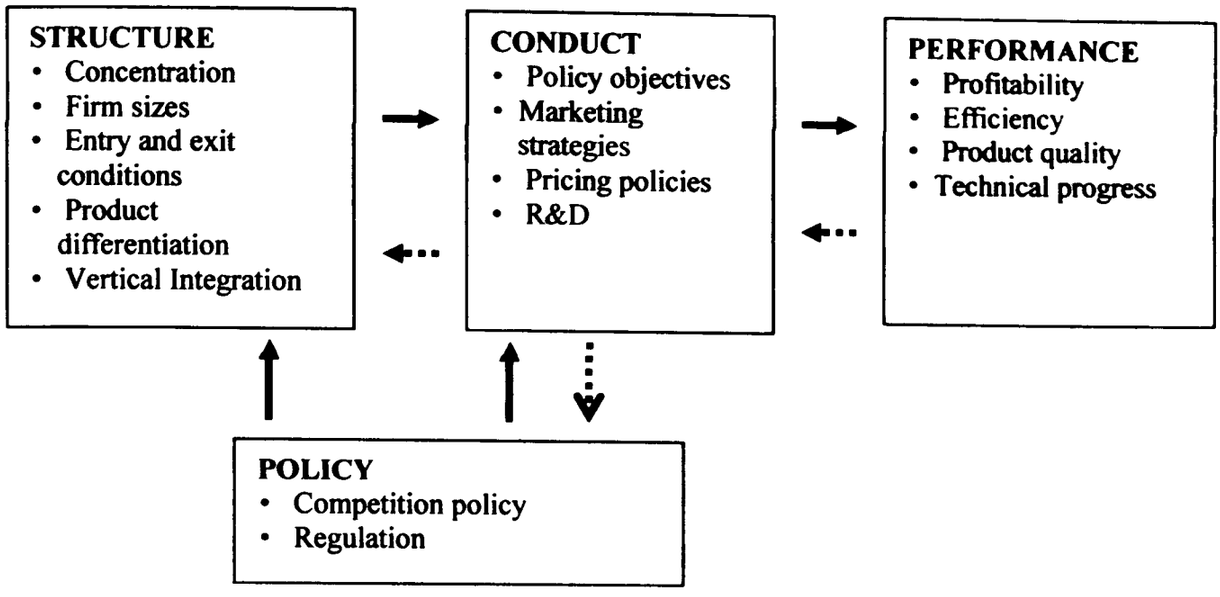
(a) ***Intrinsic structural variables*** - those determined by the nature of products and available production and marketing technologies.
(b) ***Derived structural variables*** - those determined by firms and government such as barriers to entry, seller and buyer concentration and product differentiation.

This distinction may be important if intrinsic structural variables are exogenously determined, thus making them suitable candidates as instrumental variables.

Conduct - This refers to a firm's behaviour. The variables used to capture firm behaviour include pricing strategies, collusion, advertising, research and development and capacity investment. Some have interpreted conduct as whether firms collude or compete.

Performance - This refers to outcome or equilibrium assessed in terms of allocative efficiency. The variables mostly used to measure performance are profitability and price-cost margin.

Figure 5.1: The Structure-Conduct-Performance Paradigm



The SCP paradigm argues that concentration is said to have lowered competition by fostering collusive behaviour amongst large banks in the market (Chortareas et al., 2009). The argument also contends that a highly concentrated market will lead to higher loan rates and decreased deposit rates because of lessened competition, which then leads to greater profitability (meaning lower performance in terms of social welfare). Analysis of SCP relationships in banking is often used as a way to evaluate which type of banking structure best serves the public in terms of both cost and the availability of banking services. In general two main objectives have been sought; firstly, the attainment of an efficient banking system; secondly, to minimise the likelihood of bank failure (Molyneux et al., 1996).

The empirical analysis of the SCP hypothesis is normally carried out by regressing banks' performance (measured by either profit or price) on a measure of concentration (such as a *n*-bank concentration ratio or a Herfindahl-Hirschman Index, HHI) and by further controlling for other explanatory variables. The theoretical underpinning of this model is commonly known as the collusion hypothesis and goes back to the work of Bain (1950, 1951) which was applied to the manufacturing sector. The same model was then introduced into the banking industry by Schweiger and Mcgee (1961) and

has since been used widely for empirical tests of the impact of market concentration on profitability.

The SCP hypothesis suggests a positive relationship between changes in market concentration and firm's financial performances, however, empirical evidence has yield mixed results. Among studies whose results are supportive of the SCP hypothesis are Ruthenberg (1994), who, using survey data from 1984-88, found that concentration increases profitability, especially if barriers to entry are high. Molyneux and Teppet (1993) examined the SCP hypothesis for five European Free Trade Association (EFTA) countries (Sweden, Norway, Finland, Austria and Switzerland) and found support for the SCP hypothesis. Molyneux and Teppet (1993) also found similar results for banks located in Portugal, Spain, Sweden, Turkey and the UK. Lloyd-Williams et al. (1994) also established support for the SCP hypothesis for Spanish banks in the period 1986-88. Similar results can be found in Burke and Rhodes (1985) and their results are consistent with the traditional SCP hypothesis. None of the above papers incorporate efficiency measures directly in the model. Vander Vennet's (1993) results indicate that in some European countries (Belgium, Ireland, Portugal and Spain) collusion appears to be predominant. Despite the commonly accepted SCP argument favouring a positive relationship, empirical literature supporting a negative link does exist. In their analysis, which included 11 European countries over a four year period (1988 to 1991), Goldberg and Rai (1995) were among those that found neither a positive or significant relationship between concentration and profitability.

The efficient structure (ES) hypothesis provides a potential explanation of the failure to find evidence of a consistent positive relationship between concentration and profitability in banking. Smirlock (1985) did not support the notion that concentration in banking markets results in monopoly profits being earned, but suggested that any effect of concentration reported in previous studies is spurious and probably due to a correlation between profitability and the omitted market share variables. According to the ES hypothesis, some firms will earn supernormal profit because of superior efficiency. This efficiency is reflected in high market share and markets that contain such firms will tend to exhibit higher concentration. It is possible that spurious

relationship between concentration and profit will be observed when efficiency is not properly considered.

5.2.2 Efficient Structure (ES) Hypothesis and Relative Market Power (RMP) Hypothesis

A challenge to the SCP hypothesis interpretation is the efficient structure (ES) hypothesis (Gilbert, 1984) which explains the relationship between bank performances and concentration in terms of efficiency. The efficient structure (ES) hypothesis emerged from the criticism of the SCP (Demsetz, 1973; Peltzman, 1977). Demsetz (1973) proposed the (ES) hypothesis and suggested that correlation between concentration and banking profit is the results of the relationship between the firm's profit and the firm's efficiency. In this case the positive relationship between profit and concentration is spurious because efficiency is the variable that actually explains profitability and motivates larger market shares (Chortareas et al., 2005).

The ES hypothesis suggests that some banks may be more efficient than others, thus earning higher profits which may lead to a higher market share, therefore making the market more concentrated, this would show that concentration leads to higher profits, when in fact both are caused by greater efficiency (Demsetz, 1974; Smirlock, 1985; Bresnahan, 1989). Thus, under ES hypothesis, the degree of concentration is not considered a reflection of collusive behaviour of banks, but rather a consequence of the superior efficiency of banks' firms (Al-Obaidan, 2008).

The ES hypothesis is usually discussed in two forms, the X-efficiency (ESX) and the scale-efficiency (SE) hypotheses. In the X-efficiency hypothesis more efficient banks have lower costs, higher profits and a larger market share, because they are able to minimise costs to produce any given outputs. In the scale-efficiency (SE) hypothesis, some banks achieve better scales of operation and thus lower costs, higher profits due to the fact that more scale efficient firms produce closer to the minimum average-cost profit.

A number of studies find evidence to support the efficient structure (ES) hypothesis, including: Shepherd (1986), Schmalensee (1987), Timme and Yang (1991), Berger

(1995), Sathye (2005), Park and Weber (2006), Byeongyong (2002). Byeongyong and Weiss (2008), Chortareas et al., (2009), Seelanatha, (2010). This literature strongly contests the use of employing market share variables to proxy for efficiency and strongly recommends the use of direct measure of efficiency (Mensi and Zouari, 2010).

However, Shepherd (1986) criticizes the ES hypothesis by considering that the direct source of market power is the domination of participants over the individual market, independently of the ultimate sources of such domination; hence the emergence of the Relative Market Power (RMP) hypothesis. The Relative Market Power (RMP) theory suggests that only large banks with some 'brand differentiation' can influence prices and increase profitability. The RMP theory argues that only large banks and well differentiated products are able to exercise market power in order to gain profit on non-competitive price setting behaviour (Berger, 1995; Shepherd, 1982). Berger and Hannan (1997) used US bank data from 1985 and their findings support the SCP hypothesis rather than RMP theory.

In 1995, Berger asserted the need to include measures of estimated productive efficiency in the market power models of bank performance and distinguished between X-efficiency and scale-efficiency (SE) hypotheses. Berger tested competing hypotheses [SCP, RPM, X-efficiencies (ESX) and scale-efficiencies (ESS)] in the US banking sector and found the only variables positively related to profit are the market share and X-efficiency.

To summarise, the SCP approach was largely favoured by researchers in banking literature in the 1990s and their findings generate mixed empirical results. The analysis of the SCP hypothesis mainly focused on fostering the understanding of market structure to help evaluate which type of banking structure best serves the public in terms of both cost and the availability of banking services. The early literature focused mainly on developed countries, such as the United States (US) and the European Union (EU). The next Section reviews the literature that investigated the SCP relationship in emerging markets.

5.2.3 Literature on Developing Countries

Al-Muharrami and Mathews (2010) analysed the relationship between market structure and bank performance in the Gulf Cooperation Council (GCC) banking industry over the period 1993-2002. Al-Obaidan (2008) studied the market structure concentration and performance of six oil rich Arab countries that were involved in the Gulf Cooperation Council (GCC): Bahrain, Kuwait, Oman, Qatar, Saudi Arabia and United Arab Emirates. Jahangir et al. (2007), using the example of Bangladesh, proposed a framework incorporating bank's market concentration, bank's market size, bank's risk, and identified the relationships of these variables with bank's return on equity. They found that market concentration and bank risk do little to explain bank return on equity, whereas bank's market size is the only variable which provides an explanation for banks return on equity.

On studies of performance and market structure include Choy and Kanbur (1991) who utilized prices as measures of performance in Malaysian banking; Haron (1996) who focused on the profitability of Islamic banks in Malaysia; Balachandher and Shanmugam (1997) and Balachandher et al. (1999) who analysed the determinants of commercial bank's profitability in Malaysia; and Khatib (2005) who tested the validity of the SCP framework and ES hypothesis using a robust estimation approach in the Malaysian banking market.

Fu and Heffernan (2009) focused on the relationship between market structure and performance in China's banking system from 1985 to 2002. Using panel data estimation techniques, they tested both the market-power and efficient-structure hypotheses. Park and Weber (2006) identified the major determinants of profitability in the Korean banking sector for the period of 1992–2002, by testing the market structure hypothesis against the efficient structure hypothesis. The results indicate that bank efficiency has a significant effect on bank profitability and supports the efficient structure hypothesis. There are also a number of cross country studies, among which those of Demirguc-Kunt and Levine (200), Shen (2003), Levine (2001) and Chortareas et al. (2008).

As previously mentioned, past literature on Asia has failed to consider the SEA region's experience of the crisis or investigate the impact of the crisis on market structure. The remainder of this Chapter therefore investigates impact of the Asian financial crisis and of the reforms that followed it on the relationship between market structure and performance in South East Asia in the post crisis period (1999 – 2005).

5.3 Indicators of Market Structure

Concentration has been referred to, in previous studies as the degree of controlling the economic activity by large firms (Sathye, 2002). The literature on determinants of market concentration in the Industrial Organization (IO) can be dated back as early as Lerner's (1934) seminal work to Stigler (1964). Hannah and Kay (1997) and Hay and Morris (1991) are among those who have narrowed this field down to the theoretical aspects of the issues. The concepts of the Industrial Organization have been extensively debated in economic literature. The significance of the concentration ratio is basically due to its ability to capture structural features of the market. Concentration ratios are also able to reflect changes in concentration as a result of banks' exit or entry into the market (Tushaj, 2010).

Despite there being several approaches relating to the measurement of concentration, the main elements in measuring them are the number of banks and the distribution of bank size in a given market. There are several indicators of market concentration: amongst of them are the *k*-bank Concentration Ratio (CR_k), Herfindahl-Hirschman Index (*HHI*), the Hall-Tideman Index (*HTI*), the Rosenbluth Index (*RI*), the Comprehensive Industrial Concentration Index (*CCI*), the Hannah and Kay Index (*HKI*), the U index (*U*), the multiplikativ Hause Index (H_m), the additive Hause Index (H_a) and the entropy measure (*E*).

The most common measure used in the literature on market concentration is the number of banks in each country, the *k*-bank concentration ratios (CR_k) and the Herfindahl-Hirschman index (*HHI*). It is not theoretically clear whether a *k*-bank Concentration Ratio (CR_k) or the *HHI* is the most appropriate measure for market concentration (Sander and Kleimeier, 2004). The importance of these two concentration ratios arises from their ability to capture structural features of a market.

Concentration ratios for *k*-bank are simply called *k*-bank Concentration Ratios (CR_k). There are no rules for choosing an appropriate value for *k*, so, the number of firms included in the concentration index is *ad hoc* and an arbitrary decision. The index ranges from zero to unity. The index approaches zero for an infinite number of equally sized banks and it equals unity, if the firms included in the calculation of the concentration ratio make up the entire industry. It takes the form:

$$CR_k = \sum_{i=1}^{n} s_i \qquad (5.1)$$

Where *n* is the number of firms[92], s_i is the market share of i_{th} firm and s is the total market share. This measure is the most commonly used due to its simplicity and limited data requirements; it sums up the market shares of *k* largest banks allocating equal weighting to each bank. The argument that supports this measurement is that the behavior of the market, dominated by a smaller number of banks, is unlikely to be influenced by the total number of firms operating in the market. However, this argument has been criticized by Phillips (1976) and many others because it ignores size inequalities within the leading group, plus all other firms (which itself is arbitrarily defined) and emphasizes only the leading group. However, the competitive behavior of the smaller market players might force the larger players to act competitively as well. Thus, the simple concentration ration may fail to reflect the impact of shifts in the positions of market leader banks (as it attaches equal weighting to the *k* largest banks) and completely ignores smaller ones. Moreover, there are no rules for defining the appropriate value of *k*; accordingly, such values are arbitrarily established (Staikouras and Koutsomanoli-Fillipaki, 2006).

Another popular measure is the Herfindahl-Hirschman Index (*HHI*)[93]. It also known as the full-information index because it captures features of the whole distribution of bank sizes. For *n* firms in an industry with a market of shares s_i (i=1, 2, ..., n), the *HHI* is defined as:

[92] in this thesis refer as banks
[93] Hirschman, 1945 and Herfindahl, 1950

$$HHI = \sum_{i=1}^{n} s_i^2 \qquad (5.2)$$

HHI can be defined as $(1/n) < HHI < 1$, where n is the number of banks in the banking industry. The maximum concentration of unity occurs in the case of monopoly. Minimum concentration of $(1/n)$ occurs in the case where banks have equal shares of $(1/n)$.

There have been several arguments on the measurement of concentration using *HHI*. Davies (1979) analyzed the sensitivity of *HHI* in two compound parts: the number of banks in the market and the inequality of market shares among the different banks. The analysis concluded that the index is less sensitive to changes in the number of banks, due to the large number of banks in the industry[94]. Rhodes (1995) argued that at least two different sized bank's distribution can generate the same *HHI*[95].

Referring to past and even current studies on concentration, *HHI*, deposits, or total assets are generally used. Rose (1999) states "*the degree of concentration in a market is measured by the proportion of assets or deposits controlled by the largest banks serving that market. .... The new Justice Department guidelines require the calculation of the Herfindahl-Hirschman Index (HHI) as a summary measure of market concentration. HHI reflects the proportion of total assets, deposits or sales accounted for by each firm serving a given market*". In this study, we have used both deposits and assets for calculating *HHI*. In our analysis we present the indicators of the market structure for five of Southeast Asia's most crisis affected banking systems.

Since the 1997 financial crisis, the Asian region has experienced bank consolidation: from 1999 to 2005, the number of banks in the selected countries reduced by about 14 per cent, from 139 banks in 1997 to 119 banks in 2005 (Table 5.1). This broad decline

[94] There have been several studies which proposed to link *HHI* with other distributional theories by presenting it in the terms of moments of the underlying banks size distribution (Adelman, 1969; Kwoka, 1985).

[95] In the context of hypothetical market analysis, Rhodes (1995) argues that the inequality of banks' market shares might differ substantially between markets yielding the same *HHI* value. He provided evidence that at least two different sized banks distributions can generate the same HHI by forming the possibility to calculate the *HHI* as $n_e = 1/HHI$ for every value of *HHI*.

in the number of banks operating in the selected Asian countries is due to bank restructuring programmes. The decline in the number of banks reflects mergers and closures of smaller and failing banks worst hit by the 1997 financial crisis. The authorities' immediate action of crisis resolution in Korea and Malaysia led to some degree of consolidation, but both countries were forced into the second stage of reforms, where consolidation plays a central role. However in Thailand and the Philippines consolidation proceeded at a slower pace as the combination programmes between the government and the IMF left the resolution of the crisis to market forces. In Indonesia sixty-eight banks were closed, thirty three were nationalised, twenty seven were re-capitalized, four state-owned banks were merged into one new state-owned bank and several private banks were also merged (Hamada and Konishi, 2010).

Table 5.1: Changes in Number of Banks

Country	1999	2005	Change
Indonesia	55	44	-0.20
Korea	16	14	-0.13
Malaysia	33	26	-0.21
Philippines	27	20	-0.26
Thailand	8	15	+0.88
Total	139	119	-0.14

However, a reduction in the number of banks does not directly translate into an increase or decrease in concentration, as illustrated in Table 5.2. While the number of banks fell substantially in the Asian crises affected countries, the level of concentration in their banking industry doesn't seems to have changed much. Almost all the countries either experienced a decline in concentration ratio or a small increase. In Korea, the active consolidation process reduced the number of banks to 16 in 1999 (Table 5.1) compared to 27 banks before the crisis. This resulted in HHI_d increasing to 1177 in 2005 (909 in 1999) and HHI_a to 1143 in 2005 from 895 in 1999. The increase in concentration is also reflected in the increase of the share of total deposits and total assets held by the five (5) largest banks in each market (Table 5.2). The market concentration ratio in the Malaysian banking industry shows an increasing trend when the first phase merger programmes was implemented (1999 to 2002). The HHI_d estimates, based on total deposits, increased from 967 in 1999 to 1004 in 2002. The same can be seen in terms of total assets, as the mergers and acquisitions took place

with greater support from government to help stabilize the banking market at the early stage of the crisis restructuring programme.

During the second phase (2002-2005), it is possible to detect a decrease in the trend of HHI_a, HHI_d and $CR5_d$. Increased concentration does not seem to lead to expansion in the market share, even after changes in the market structure and distribution of market shares, following the merger and acquisition programmes.

In the Indonesian banking system, the changes in total assets and deposits do not lead to the market to becoming more concentrated, as the HHI_a, HHI_d and *CR5* levels continuously fall over the period studied (1999-2005). The same results can also be seen in Thailand. In contrast, in the Philippines concentration levels increased to just above the 1000 mark, compared to only 939 in 1999. The HHI_a was 992 for deposits and 939 in terms of assets in 1999. The *HHI* increased to just above 1000 in 2005, showing the banking industry still has enough room for more mergers and consolidation without necessarily inhibiting effective competition.

Overall, banking concentration ratios seems to decrease in aggregate in most of the countries during the period of study, 1999-2005. The HHI_d and HHI_a stands at 408 and 432 compared to 446 and 435 in 1999. The market share (in terms of deposit) of the five largest banks also fell from 36.84 in 1999 to 35.28 in 2005. The results show that mergers and acquisitions reduced the number of banks in operation, but have yet to increase the overall concentration.

Table 5.2: Concentration Measures

Country	Year	$CR5_d$ (deposits)	HHI_d (deposits)	HHI_a (Assets)	Avg. (Assets)	Avg. (deposits)
Indonesia	1999	70.81	1651.15	1185.48	634.09	413.64
	2000	78.59	1744.79	1785.33	2424.35	1702.98
	2001	73.85	1486.48	1477.83	2713.54	2129.85
	2002	73.23	1420.97	1398.73	2557.31	2037.39
	2003	67.94	1369.74	1378.01	2402.19	1916.17
	2004	63.32	1026.27	1020.71	2798.52	2207.14
	2005	60.68	962.55	939.66	3051.97	2450.32
Korea	1999	55.83	909.18	895.85	35742.93	27463.97
	2000	53.81	877.07	905.19	38854.99	29724.64
	2001	64.26	1223.28	1234.86	46048.28	34486.80
	2002	65.91	1216.24	1230.46	50257.63	36631.31
	2003	64.34	1184.03	1176.73	49064.89	35233.46
	2004	64.27	1160.12	1130.18	49110.56	33875.25
	2005	65.37	1177.52	1143.44	62132.21	41819.51
Malaysia	1999	58.24	967.08	979.91	4681.46	3662.79
	2000	58.89	1001.02	998.52	6016.88	4749.23
	2001	59.84	1055.51	1014.44	6681.23	5232.94
	2002	58.75	1004.49	999.78	6858.82	5278.50
	2003	55.23	905.72	916.37	7779.37	5968.29
	2004	56.49	937.87	950.59	9025.60	6684.48
	2005	57.03	956.37	927.07	9687.91	7069.04
Philippines	1999	63.47	992.97	939.43	2011.74	1440.56
	2000	64.85	1985.95	1032.66	1904.39	1345.09
	2001	67.36	1207.20	1112.79	2205.86	1603.53
	2002	63.11	1063.00	995.97	1985.88	1434.09
	2003	60.19	962.87	910.72	2068.18	1477.09
	2004	58.77	966.83	919.86	2379.67	1727.77
	2005	64.21	1109.44	1055.49	3031.67	2197.89
Thailand	1999	94.39	2424.25	2281.45	9112.56	9529.77
	2000	85.00	1948.87	1665.79	12155.06	8908.67
	2001	74.04	1319.52	1287.79	10619.28	9245.19
	2002	70.51	1244.94	1207.91	11220.87	9726.08
	2003	70.34	1247.72	1220.71	11127.44	9484.92
	2004	69.18	1233.98	1200.07	12201.22	10428.94
	2005	67.87	1187.16	1146.07	13031.33	10902.13
All	1999	36.84	446.00	435.34	6636.47	5089.86
	2000	31.27	370.73	373.08	8586.52	6539.32
	2001	36.49	463.67	484.55	9897.37	7650.99
	2002	38.03	467.80	497.48	10218.90	7754.56
	2003	37.31	452.69	475.68	10467.26	7842.56
	2004	34.66	404.46	425.30	10987.85	8029.20
	2005	35.28	408.92	432.36	12706.95	9114.05

Source: FitchIBCA's Bankscope database and own estimations. Based on the current screening guideline in the U.S, the banking industry is regarded as a competitive market if the *HHI* is less than 1000, a somewhat concentrated market if it lies between 1000 and 1800 and a very concentrated market if more than 1800.

At country level however, most of the countries experienced an increase in concentration levels in the first few years of the restructuring (1999-2002) and a decrease in the second phase of the restructuring process (2002-2005), with the exception of Korea and the Philippines[96]. One explanation for this may be that consolidation has only recently begun to fully function in this crisis-effected region. Since then the banking industry has mostly been driven by stronger banks being forced to absorb weaker ones to ensure continuity in stability, and by mergers of the parent companies of foreign banks present in the region (Gelos and Roldós, 2002).

Claessens and Laeven (2005) suggested that concentration ratios are not highly correlated to measures of market contestability, and therefore capture other aspects beyond competition. Nevertheless, with this caveat in mind, the figures suggest that competitive pressure may be low in some of the banking markets of East Asia because of high concentration of bank assets and deposits (Laeven, 2005). Overall, the effects of recent changes in the structure of banking systems on market structure are unclear.

5.4 Methodology and Data

5.4.1 Methodology

To empirically test the Structure-Conduct-Performance (SCP), Relative Market Power (RMP) and Efficiency Structure (ES) hypotheses, we use the following equation by Berger (1995):

$$P_{it} = \alpha + \beta_1 CONC_{it} + \beta_2 MS_{it} + \beta_3 TE_{it} + \beta_4 SE_{it} + X_{it} + \varepsilon_{it} \qquad (5.3)$$

where P_{it} is a measure of bank performance. Specifically, in this study we use two measures of performance (P_{it}): the return of assets (ROA) and the net interest margin

[96] Quoted from studies by Alberto Reyes, Deputy Governor, Central Bank of the Philippines (2001): "*Despite the generally difficult regional conditions which prevailed as a result of the onset of the Asian financial crisis in 199*", *the Philippines has emerged as among the most resilient economies in the region. The lesser impact on the Philippine economy of the financial turmoil which hit Asia owes much to the country's sound macroeconomic fundamentals, as well as to the financial reform initiatives implemented by the Central Bank of the Philippines (BSP) even before the Asian crisis struck. Already in the 1980s, measures were being pursued to encourage greater competition and strengthen supervisory and regulatory systems. In the 1990s, the reform efforts were intensified. A new and more independent central bank was created in 1993. Restrictions on the establishment of new banks, as well as of new branches, were eased. Foreign bank entry was liberalized in 1994, which led to the establishment of 10 new foreign bank branches in 1995. Meanwhile, tighter prudential measures continued to be introduced such as a higher set of minimum capital requirements, liquidity cover on foreign currency liabilities, a cap on loans to real estate and regulations on derivatives trading. Thus, the Philippine banks entered the crisis period in a relatively well capitalized and robust condition*".

(NIM). ROA is ratio computed by dividing the net income over total assets and the NIM variable is defined as the net interest income divided by total assets. The ROA measures the profit earned per dollar of assets and reflects how well bank management use the bank's real investment resources to generate profits, while NIM is focused on the profit earned on interest bearing activities. ROA as a profitability ratio and has been used extensively in past literature (Goldberg and Rai 1996; Yu and Neus, 2005; Molyneux and Thornton, 1992; Molyneux and Forbes, 1995; Berger 1995)[97].

The level of the NIM is considered an important policy variable for indicating how efficiently banks perform their intermediary function of collecting savings and allocating funds (Aysan et al., 2010). The NIM is generally defined as the spread between interest rates on credits and interest rates on deposits. The margin is a broad indicator of price levels that banks offer to their customers. The determination of a single price for financial products is not possible, since the banks provide various types of services with different prices.

Broader concepts like net interest rate margins calculated from balance sheet items are frequently used to identify price levels in the market. The most common NIM measure is the net interest revenue as a percentage of total assets (Ho and Saunders, 1981; Maudos and Guavera, 2004; Demirgüc-Kunt and Huizinga, 1999). The specific definition of this variable covers the interest rate revenues from all interest earning activities like credits, bonds and interbank loans in addition to the aggregate interest rate expenses like deposits and credits from other financial institutions and markets. However, in many studies it has been observed that the choice of profitability performance measures does not significantly affect the empirical results (Okumus, 2002).

MS_{it} is the market share (in terms of assets) of bank i at time t. $CONC_{it}$ measures the degree of concentration using the k-bank concentration ratio (CR_k) or the Herfindahl-

[97] Evanoff and Fortier (1988) gave an argument for the ROA as more preferable than other profit measures. Firstly, although some banks have used product prices as independent variables, banking is a multi product business and individual prices may be misleading. Prices can only be used if costs directly associated with these prices are explicitly accounted for as explanatory variables. Secondly the potential for cross subsidization between products obviously exists and pricing strategy will differ across markets. The use of profit measures will eliminate most of these problems (Al-Muharrami and Matthews, 2010).

Hirschman Index (*HHI*). In this analysis we included five-bank Concentration Ratio ($CR5_d$) in terms of deposits, HHI_d in terms of deposits and HHI_a in terms of assets. Past literature has extensively used the *HHI* as a proxy for market power in a given market (for example Bikker and Haaf, 2002; Byeongyong et al., 2005; Goldberg and Rai, 1996; Molyneux, 1999; Yu and Neus, 2005; Chotareas et al., 2009; Seelanatha, 2009; Park and Weber, 2006; Al-Muharrami and Matthews, 2010).

TE_{it} is a measure of technical efficiency and SE_{it} is a measure of scale efficiency, reflecting the ability of banks to produce at optimal output levels (economies of scale), given similar production and management technology[98]. To further clarify , if $SE > 1$ means that banks are operating below optimal scale levels and have the ability to lower costs by increasing output further, $SE < 1$ means that banks are operating over optimal scale levels and are required to downsize in order to achieve optimal input combinations (Fu and Heffernan, 2009). The relationship between scale efficiency and profitability is expected to be positive.

Hence, a significant positive relationship between *TE* with both ROA and NIM would support the suggestion that some banks are more technically efficient than others; as a result, these banks earn higher profits and consequently gain higher *MS* (which supports the ES hypothesis). Furthermore, a significant negative relationship between technical efficiency and concentration ratio would support the notion that the degree of concentration results in anti-competitive bank performance (the SCP hypothesis). Alternatively, a significant positive relationship between technical efficiency and both ROA and concentration ratios would suggest that the degree of concentration need not result in anti-competitive bank performance, but should be considered as a consequence of the superior efficiency of bank firms, thus supporting the ES hypothesis (Al-Obaidan, 2008).

We include a vector of control variables (X_{it}) which includes equity over total assets (ETA) and gross domestic product (GDP). The degree of capitalisation is captured here as ETA or the ratio of equity to total assets is used to represent bank specific characteristics. The relationship between ETA and profitability is expected to be

[98] See Chapter 3.

negative since greater capital means banks are less likely to be involved in risky activities, which leads to lower profits. On the other hand, ETA may raise bank profitability if higher capital ratio can also reflect lower expected bankruptcy risks leading to lower funding costs. In this case, higher capital ratios maybe associated with more profitable institutions.

Dermirgüc-Kunt and Huizinga (1999) and Demirgüc-Kunt et al. (2004) used GDP as a general indicator of economic development due to its capability to reflect differences in banking technologies and the mix of banking opportunities. GDP is expected to have a positive relationship with bank profitability as GDP growth supports financial sector performance[99]. An increase in GDP would increase banks income, in turn this would allow banks to increase lending and lower defaults rates (Brock and Suarez, 2000; Claeys and Vander Vennet, 2007). On the other hand, low GDP would affect the debt servicing capacity of domestic borrowers and increase credit risk.

The SCP hypothesis predicts that collusive behaviour of dominant firms influences the price setting process in the industry, which allows those firms to gain abnormal profit. The SCP also suggests a positive relationship between concentration and firm performance and uses concentration ratios as a proxy for collusive market power of dominant firms. The traditional SCP hypothesis can be verified by finding $\beta_1 > 0$ and $\beta_2 = 0$; and the efficiency hypothesis by a finding that $\beta_1 = 0$ and $\beta_2 > 0$. Recall that under the efficient structure (ES) hypothesis, causation is assumed to run from efficiency to profits, and to market structure. More efficient banks should have higher profits, so signs of the coefficient of *TE* and *SE* should be significantly positive, that is $\beta_3 > 0$ and $\beta_4 > 0$. Under the market power hypothesis (RPM) a significant positive β_1 confirms the SCP performance, where β_2 should be positive if the RPM hypothesis holds.

[99] The positive relationship found in studies by Hassan and Bashir (2003) and Kosmidou and Pasiouras (2005).

5.4.2 Testing for Efficiency Structure (ES) Hypothesis

The efficient structure (ES) hypothesis states that cost advantage, enjoyed by efficient firms, leads them to have higher profits than inefficient firms. Efficient firms pass cost advantages to their customers through adjusting prices, which leads to a higher market share (Seelanatha, 2010). Therefore, it is expected to have the following signs for the estimated coefficient of equation (5.3) if ES hypothesis holds: $TE>0$, $SE>0$, $CONC=0$ and $MS=0$.

Following Fu and Heffernan (2009), to test the hypothesis more formally, the following functional forms are estimated:

$$MS_{it} = \alpha + \beta_1 TE_{it} + \beta_2 SE_{it} + X_{it} + \varepsilon_{it} \quad (5.4)$$

$$HHI_{it} = \alpha + \beta_1 TE_{it} + \beta_2 SE_{it} + X_{it} + \varepsilon_{it} \quad (5.5)$$

where TE measures technical efficiency and SE measures scale efficiency. Under technical efficiency (TE), higher profits and a larger market share are determined by superior skills in transforming input quantities into output quantities. In the scale efficiency (SE), market share and profit come from lower costs determined by an optimal scale. These refer to firms that have equally good management skills and technologies, but produce at a more efficient scale than others[100]. Since efficient firms are expected to have relative cost advantages leading to higher profit, a statistically significant positive relationship between firm performance and efficiency is assumed. The necessary conditions for the efficient structure (ES) hypothesis to hold are that the signs on the coefficient TE and SE are significantly positive in equation (5.4) and (5.5)[101]. In other words, the validity of the ES hypothesis holds only if more efficient banks are more profitable, with larger market shares and/or higher levels of market concentration (Heffernan and Fu, 2005).

For the purpose of this analysis, we first ran the equation (5.3) with pooled ordinary least squares (OLS) method. All the equations are then estimated using both the fixed

[100] We estimated TE and SE using Data Envelopment Analysis as explained in Chapter 4.

[101] To ensure the absence of a spurious relationship between profitability and market structure, both profits and the market structure variables must be positively related to efficiency. Thus, a necessary condition for the efficient-structure hypothesis to hold is that efficiency has a positive effect on market structure.

and random effects (GLS[102]) approaches for panel data in equation (5.3). Hsiao (1986) showed that pooled OLS yield biased and inconsistent coefficient estimates because omitted cross-section specific variables may be correlated with the explanatory variables. Use of either a fixed-effects model or a random-effects model can solve this problem. In our analysis we run both fixed and random effects model[103]. Greene (2003) indicates the fundamental advantage of panel data set over a cross-section or time-series is that the researcher can allow for differences in behaviour across individuals and/or time periods.

5.4.3 Data and Descriptive Analysis

The data for this study is taken from the BankScope database maintained by FitchIBCA and Bureau Van Dijk. The observations, which start from 1999 until 2005, consist of 915 commercial banks in Indonesia, Korea, Malaysia, the Philippines and Thailand. Data is also collected from several other sources; IMF annual reports, World Bank Reports, central banks reports from each country and past literature.

Table 5.3 reports the observations used in the study. The statistics show that Indonesia is the country with the highest number of commercial banks followed by Malaysia, Philippines, Korea, and Thailand. The structure of each banking industry has changed due to the implementation of new regulations and government interventions in order to maintain and protect the banking industry after the financial crisis in 1997 (a detailed discussion is presented in Chapter 2). In terms of the number of banks over time, the statistics show a significant reduction in the number of banks, particularly for Thailand (Bowlin, 1998; Nunamaker, 1985). These changes were due to forced mergers and acquisitions implemented as part of the recovery plan. The banking market with the largest number of banks is Indonesia (48 banks on average), while Philippines has the smallest number (14 banks on average).

[102] Generalised Least Squares

[103] The Hausman test is used to identify the optimal model. The results suggest that the random effects model is the optimal one.

Table 5.3: Sample Used For Empirical Analysis (1999-2005)

	Indonesia	Korea	Malaysia	Philippine	Thailand	Total
1999	55	16	33	27	8	139
2000	51	17	27	26	12	133
2001	48	16	26	21	16	127
2002	47	16	27	25	16	131
2003	46	17	27	27	16	133
2004	49	17	26	25	16	133
2005	44	14	26	20	15	119
Commercial Banks	340	113	192	171	99	915
Average number of banks	48	16	27	24	14	26

Our Indonesian sample accounted the largest number of banks in the sample country and the highest proportion of banking sector assets (averaging 94% over the period). In contrast, the country samples that had the lowest number of observations per year, Korea (an average of 16) and Thailand (in average of 14), also represented smaller shares of banking sector assets (73% and 51%, respectively). Table 5.5 describes the descriptive statistics on the variables used in the analysis.

Table 5.4: Bank Year Institution 1999 to 2005

	Commercial Banks (1999-2005)	All banks	Commercial Banks/All Banks (%)	Average size of banks (USD millions)
Indonesia	340	363	93.664	2326.08
Korea	113	154	73.377	47311.07
Malaysia	192	207	92.754	7148.12
Philippines	171	196	87.245	2197.47
Thailand	99	195	50.769	11520.72
Total	915	1115	82.063	

Source : BankScope, Annual report from Bank of Indonesia, Bank of Korea, Bank of Thailand, Bank Negara Malaysia and Bangko Sentral ng Pilipinas.

Table 5.5: Descriptive Statistics of the Variables, 1999-2005

Variable	Mean	Std. Dev.	Min	Max
ROA	0.99	4.21	-30.44	66.96
NIM	247.54	606.75	-19.38	7047.6
MS	0.04	0.05	0.0001	0.33
HHIa	0.12	0.03	0.09	0.18
$CR5_d$*	0.65	0.06	0.54	0.78
HHI_d*	0.12	0.03	0.08	0.19
ETA	11.57	9.55	-37.03	99.72
GDP	3140.91	3653.03	745.79	15840
TE	0.56	0.34	0.01	1
SE	0.85	0.16	0.14	1
LOGGDP	7.57	0.91	6.611	9.67
ROA_**	1.99	4.21	-29.44	67.96
NIM**	0.03	0.02	-0.06	0.46

Note: HHI_a in terms of assets; $CR5_d$ * and HHI_d* are based on deposits; ROA_** return on assets where (1+ROA); following Claessens and Laeven (2004); NIM_** is net interest margin based on NIM over total assets; ETA is the ratio of total equity to total assets measure the degree of capitalisation; GDP is gross domestic products; *TE* is the technical efficiency using DEA estimation; *SE* is the DEA scale efficiency.

As illustrated Table 5.6, on average, the ROA for the selected countries banking systems have recovered from the low points experienced during the crisis. The region's banking industry suffered from losses and turned some banks ROA to negative. In 1999, Korea and Thailand suffered losses and show a negative average value for the ROA.

Table 5.6: Descriptive Statistics (1999 and 2005)

	ROA		NIM		MS		ETA		GDP	
	1999	2005	1999	2005	1999	2005	1999	2005	1999	2005
Indonesia	1.37	2.00	34.06	39.41	0.005	0.008	10.98	16.08	950.54	950.35
Korea	-1.10	1.08	716.04	1719.50	0.07	0.06	4.56	6.00	9549.54	15840
Malaysia	1.06	0.76	119.50	214.67	0.03	0.04	9.55	10.89	3984.00	4970.0
Philippines	0.29	1.61	60.96	105.24	0.04	0.05	17.54	12.40	1018.88	1320.0
Thailand	-3.89	1.60	175.17	367.99	0.07	0.07	7.74	11.39	1984.94	2490.0

Source: Bankscope database and yearly annual reports.

However, as the economy grew (indicated by the change in GDP) the level of ROA, recovered as did the efficiency in almost all of the countries (see Chapter 2 and Chapter 4 for further discussion). These changes reflected a lower provisioning of non-performing loans and indicated that impaired assets had either been resolved or taken off bank balance sheet (Adams, 2008). Malaysia and Korea remained the countries with the lowest ROA, whereas Indonesia had the highest ROA on average followed by Thailand and the Philippines. Indonesia's average high ROAs are related

to the wide spreads between deposits and lending rates, and a relatively high return on government securities holdings. Net interest margins (NIM) have shown increasing changes. For the same period of study, Korea, Malaysia and Thailand experienced the highest changes in their NIM, while Indonesia and the Philippines experienced changes at a slower pace. The NIM may have been lower due to extensive borrower defaults on both principal and interest payments that caused net interest income to be negative, thus driving NIM lower (Doliente, 2005). Another explanation could be high volatility in the business cycle, especially in regions affected by crisis. This illustrates how economic uncertainty and asymmetric information may keep margins low.

5.5 Analysis and Results

5.5.1 Preliminary Analysis

Prior to estimating the equations, tests were conducted for the presence of multicollinearity between the market structure and efficiency variables, concentration and market share. The estimated Pearson correlation coefficient is presented in Table 5.7, which shows the relationship between the different variables used in this study. Generally, a correlation matrix shows how these variables move in relation to each other and presents such differences as correlations ranging between -1.0 to +1.0. From the estimation, almost all of the correlations were lower than 0.85, meaning there is no serious multicollinearity related to this model[104]. Table 5.7 shows that the concentration ratio (CONC) does not have a significant relationship with ROA or NIM. It also reveals that both ROA and NIM are negatively correlated with the variable's technical efficiency (*TE*) and scale efficiency (*SE*).

[104] The results show very little correlation among variables included in the model. Gujerati (2003) explained that if the pair wise correlation between two regresses exceeds 0.8, a multicollinearity problem existed. We also ran a variance inflation test (VIF) and the results show very low values, which is less than 10.

Table: 5.7 Pearson Correlation Coefficient

	ROA_	NIM_	*MS*	HHI_a	HHI_d	$CR5_d$	*TE*	*SE*	ETA	LOG GDP
ROA_	1									
NIM_	0.0858*	1								
MS	-0.052	-0.1338*	1							
HHI_a	-0.0265	0.1569*	-0.1462*	1						
HHI_d	-0.0312	0.1331*	-0.1002*	0.8032*	1					
$CR5_d$	-0.0082	0.1638*	-0.0960*	-0.4224*	0.8013*	1				
TE	-0.0359	-0.1589*	0.5696*	-0.4224*	-0.3838*	-0.4082*	1			
SE	-0.0654*	-0.0934*	-0.0761*	-0.0844*	-0.0104	-0.1049*	-0.0125	1		
ETA	0.2905*	0.2167*	-0.2649*	-0.0487	0.0552	0.016	-0.3044*	-0.0491	1	
LOG GDP	-0.0532	-0.2481*	0.2266*	-0.4079*	-0.4531*	-0.5309*	0.4829*	0.2892*	-0.2653*	1

Note: * at 5 percent significance level

A Hausman test is then carried out to test for the optimal model and the results favour random effects.

Table 5.8: Hausman Test

Country	Probability (Prob>chi2); ROA_	Decision	Probability (Prob>chi2)NIM	Decision
All	0.0007	fe	0.0315	fe
Indonesia	0.1260	re	0.9255	re
Korea	0.6994	re	0.4307	re
Malaysia	0.6276	re	0.0836	re
Philippines	0.9943	re	0.0090	fe
Thailand	0.9500	re	0.0955	re

5.5.2 Regression Results

The empirical analysis proceeds as follows: we started by estimating an OLS model of equation (5.3) using the net interest margin (NIM) and return on assets (ROA) as dependent variables, then estimated the same equation with both random effects (RE) and fixed effects (FE) models by panel data. To ensure the absence of any spurious relationship between profitability and market structure, both profits and market structure need to be positively related to efficiency. Equations (5.4) and (5.5) are then used to further investigate the presence of this relationship. A necessary condition for the efficient structure (ES) hypothesis to hold is if the sign on *TE* and *SE* is significantly positive. The results obtained from the OLS estimation of equation (5.3) are presented in Table 5.9, where NIM and ROA are the dependent variables and concentration (CONC) measures are $CR5_d$ (in terms of deposits) and Herfindahl-Hirschman Index (*HHI*) in terms of deposits (HHI_d) and in terms of assets (HHI_a).

Table 5.11 shows the results from the RE and FE models and summarised the above results in Table 5.12 to 5.14. Tables 5.15 report the outcome from the estimating equations (5.4) and (5.5) by employing concentration variables (HHI_a, HHI_d) and market share (*MS*) as the dependent variables.

The estimations by country are reported in Tables 5.16 with ROA as dependent variable and 5.17 with NIM as dependent variable. The estimation on the necessary condition for ES hypothesis by country was show in Table 5.18 to 5.22.

i) OLS Regression

Table 5.9 shows the results of the OLS estimations on the pooled sample, 1999-2005. The results from OLS estimations reveal weak evidence of a negative relationship between market share (*MS*) and profitability (ROA) and net interest margin (NIM). Both report a negative relationship but only significant when NIM is the dependent variables. These results indicate that banks with higher market share, gain higher profits with lower interest margins. Molyneux and Forbes (1995) argued that firms with efficient cost structures can increase their market share (*MS*) by charging lower prices, which explains the expected negative relationship between *MS* and the net interest margin (NIM)[105]. The results seem to reject the RMP hypothesis as the signs for *MS* are negative. The impact of concentration (both in terms of asset (HHI_a) and ($CR5_d$) in terms of deposits) is positively correlated with ROA and significantly positive when NIM is the dependent variable. In contrast, for concentration in terms of deposits (HHI_d), the results are negatively correlated to ROA and positively correlated to NIM.

These preliminary results, where the ROA and NIM were positively correlated with market concentration and negatively correlated with market share, suggest support for the SCP hypothesis[106]. Indeed, our preliminary results seem to reject the traditional ES hypothesis since they indicate that concentration (CONC) or market share (MS) have significant associations with banks' profitability (ROA) and (NIM).

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[105] Alternatively, if the dominant banks with large market shares exert market power in price setting decisions, a positive relationship should exist between the market share (*MS*) and interest margins (Berger et al., 2004).

[106] The results are similar to a recent study by Rodriguez (2003) who investigates both market power and efficiency hypotheses for the Mexican banking industry.

Table 5.9: Profitability and Market Structure: OLS Estimations

Independent	Dependent variables:					
	ROA_	NIM_	ROA_	NIM_	ROA_	NIM_
Market share (*MS*)	-0.89 (3.16)	-0.04^{+} (0.02)	-0.45 (3.18)	-0.04^{+} (0.02)	-1.01 (3.19)	-0.04^{+} (0.02)
Concentration by assets (HHI_a)	3.01 (6.20)	0.12** (0.04)				
Concentration by deposits (HHI_d)			-4.54 (6.13)	0.06 (0.04)		
$CR5_d$ in terms of deposits					1.30 (2.61)	0.04* (0.02)
Technical efficiency (*TE*)	0.74 (0.57)	0.005 (0.003)	0.54 (0.56)	0.002 (0.003)	0.73 (0.56)	0.003 (0.003)
Scale efficiency (*SE*)	-1.46^{+} (0.86)	-0.006 (0.01)	-1.39 (0.87)	-0.007 (-1.21)	-1.48^{+} (0.86)	-0.006 (0.01)
Equity over total assets (ETA)	0.14*** (0.01)	0.0005*** (0.00009)	0.13*** (0.015)	0.0004*** (0.0056)	0.14*** (0.015)	0.0005*** (0.00009)
Log of gross domestic product (LOGGDP)	0.13 (0.186)	-0.005*** (0.001)	0.05 (0.19)	-0.005*** (0.00009)	0.14 (0.19)	-0.004*** (0.001)
Constant	-0.03 (1.80)	0.05*** (0.0116)	1.50 (1.79)	0.07*** (0.001)	-0.63 (2.74)	0.04* (0.02)
F-test	15.06	16.57	15.12	15.23	15.06	15.79
Prob > F	0.00	0.00	0.00	0.00	0.00	0.00
R-squared	0.0905	0.0988	0.0908	0.0915	0.0905	0.0946
Adjusted-R2	0.1037	0.0928	0.0848	0.0855	0.0845	0.0886

Note:Standard error statistics in parentheses

$^{+}$p<0.10, * p<0.05, ** p<0.01, ***p< 0.001

As explained in the ES hypothesis, efficiency influences market share of firms and concentration. Therefore, it is necessary that technical efficiency and concentration have a significant and positive relationship with both market power and concentration. Two supplementary regressions have been tested (equations 5.4 and 5.5) and the statistical evidence derived from these has given further supportive evidence to reject the ES hypothesis. The results are illustrated in Table 5.10; *MS* is positively correlated to *TE* but not significantly with *SE*. The concentrations (HHI_a dependent variables) were significantly negative with *TE*, whereas with HHI_d, the results were significantly negative with *TE* and significantly positive with *SE*. These results do not support the ES hypothesis and fail to support the necessary conditions where *TE* should have a positive relationship with both *MS* and concentration.

Table 5.10: Necessary Conditions for ES hypothesis (OLS Estimations)

Variables	*MS*	HHI_a	HHI_d
Technical efficiency (*TE*)	0.07*** (0.005)	-0.03*** (0.0025)	-0.02*** (0.0025)
Scale efficiency (*SE*)	-0.02* (0.009)	-0.002 (0.0046)	0.02** (0.0047)
Equity over total assets (ETA)	-0.0006*** (0.00015)	-0.0006*** (0.00007)	-0.0003*** (0.00008)
Log of gross domestic product (LOGGDP)	-0.003+ (0.0018)	-0.008*** (0.0009)	-0.01*** (0.0009)
Constant	0.04** (0.01)	0.20*** (0.007)	0.21*** (0.007)
F-test	118.00	89.27	80.48
Prob > F	0.00	0.00	0.00
R-squared	0.341	0.298	0.261
Adjusted-R2	0.338	0.293	0.251

Note: Standard error statistics in parentheses
+ p<0.10, * p<0.05, ** p<0.01, ***p< 0.001

GDP growth and ETA have been included into the regression model as control variables. The results indicate that profitability (ROA and NIM) has a significant positive relationship with ETA, but shows that GDP is not significant. On the other hand GDP has a positive impact on ROA but seems to have a weak and statistically negative impact on NIM. A positive relationship between GDP growth and profitability indicate the importance for economic development for financial performance. Carbo-Valverde and Rodriguez-Fernandez (2007) findings show a negative relationship between margins and GDP growth, suggesting that economic growth fosters lower margins.

ii) Fixed Effect and Random Effects Regressions

We estimated the SCP equation using both the fixed effect (FE) and random effect (RE) models. The results obtained from fixed and random effect are quite similar. These are presented in Table 5.11 and summarised in Tables 5.12 to 5.14. Table 5.12 summarises the estimation results from Table 5.11 with regards to the relationship between market structure and concentration with dependent variables of profitability (ROA) and (NIM). With ROA as a dependent variable, we did not find any evidence to support the SCP as concentration is always negative. This suggests an inverse relationship between ROA and concentration. Moreover, the MS coefficient is significantly negative in the majority of cases, thus indicating that greater market share also reduces banking profitability. Goddard et al. (2001) suggested that a negative value in the market share could be treated as a sign that on average, smaller banks were more profitable than larger ones.

Table 5.11: Profitability and Market Structure

Variables	ROA_		ROA_		ROA_		NIM_		NIM_		NIM_	
	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE
MS	-7.652 15.52)	0.636 (6.13)	-7.151 15.493	1.324 (6.14)	-8.011 (15.52)	0.550 (6.15)	-0.155** (0.06)	-0.142** (0.04)	-0.155** (0.06)	-0.138** (0.04)	-0.151** (0.06)	-0.140** (0.04)
HHI_a	-10.20 (8.78)	-4.666 (7.04)					0.103** (0.03)	0.0738* (0.03)				
HHI_d			-12.32+ (6.285)	-9.578 (5.83)					0.039+ (0.02)	0.0282 (0.02)		
$CR5_d$					-3.859 (3.82)	-0.896 (3.21)					0.037** (0.01)	0.029* (0.01)
TE	0.150 (0 .64)	0.460 (0.58)	0.0714 (0.643)	0.362 (0.57)	0.0768 (0.65)	0.504 (0.58)	-0.0008 (0.002)	0.001 (0.002)	-0.0008 (0.002)	0.0009 .00227	-0.00011 (0.002)	0.0016 (0.002)
SE	2.555+ (1.44)	-0.0489 (1.15)	2.693+ (1.44)	0.180 (1.15)	2.486+ (1.44)	-0.161 (1.14)	0.0117* (0.005)	0.007 (0.005)	0.0132* (0.005)	0.0087+ (0.005)	0.0125* (0.005)	0.0078 (0.005)
ETA	0.268*** (0.02)	0.214*** (0.02)	0.272*** (0.02)	0.216*** (0.02)	0.269*** (.025)	0.215*** (0.02)	0.00023** (0.0001)	0.0003** (0.0001)	0.00021* (0.0001)	0.0003** (0.00008)	0.000221* (0.00009)	0.0003** (0.00008)
LOGGDP	0.841 (1.14)	0.259 (0.37)	0.852 (1.04)	0.175 (0.36)	1.050 (1.08)	0.305 (0.38)	0.0127** (0.004)	0.00196 (0.003)	0.0080* (0.004)	-0.000082 (0.003)	0.0104** (0.004)	0.00134 (0.003)
Constant	-8.271 (9.44)	-2.030 (3.16)	-8.214 (8.45)	-0.977 (2.96)	-8.439 (9.79)	-2.282 (4.11)	-0.0823* (0.034)	0.00619 (0.024)	-0.0401 (0.031)	0.0258 (0.022)	-0.0782* (.036)	-0.00047 (0.026)
F-test	22.09		22.58		22.03		5.76		4.47		5.22	
Prob > F	0.0000		0.0000		0.0000		0.000		0.000		0.0003	
Wald-test		120.03		122.66		119.51		30.00		25.40		28.76
Prob > chi2		0.000		0.000		0.000		0.000		0.000		0.000
LM test		0.0084		0.0073		0.0078		0.0000		0.0000		0.0000

Note: Standard error statistics in parentheses

+ p<0.10, * p<0.05, ** p<0.01, ***p< 0.001

Table: 5.12: Summary of Results

Variables	ROA		NIM	
	FE	RE	FE	RE
Market share (*MS*)	negative	positive	significant negative	significant negative
Concentration (HHI_a) by assets	negative	negative	significant positive	significant positive
Concentration (HHI_d) by deposits	significant negative	negative	significant positive	positive
$CR5_d$	negative	negative	significant positive	significant positive

The significant negative relationship of market share with NIM rejects the RMP hypothesis. The results reveal weak evidence of a positive relationship between concentration and interest margin (NIM) both under FE and RE.

Overall, estimation results show a positive relationship between the coefficients of technical efficiency (*TE*) variables and scale efficiency (*SE*) variables with profitability (ROA). However, these preliminary results do not support the efficient structure hypothesis as the market structure (*MS*) is negatively correlated to the ROA and NIM and either *MS* or concentration are significant. Neither of these reflects the necessary conditions applied for accepting the (*ES*) hypothesis (Table 5.13). Technical efficiency (*TE*) has mixed results with NIM. Nevertheless, scale efficiency (*SE*) has a significantly positive relationship with NIM. Scale efficiency seems to have a much more important role, thus showing that there is evidence that scale efficiency (*SE*) produces greater profitability, although it still does not support the *ES* hypothesis.

Table: 5.13 Summary of Results (Continued b)

Variables	ROA		NIM	
	FE	RE	FE	RE
Technical efficiency (*TE*) with:				
a) concentration (HHI_a) by assets	positive	positive	negative	positive
b) concentration (HHI_d) by deposits	positive	positive	negative	positive
c) $CR5_d$	positive	positive	negative	positive
Scale efficiency (*SE*) with:				
a) concentration (HHI_a) by assets	positive	negative	significant positive	significant positive
b) concentration (HHI_d) by deposits	significant positive	positive	significant positive	significant positive
c) $CR5_d$	significant positive	negative	significant positive	significant positive

Table 5.14: Summary of Results (Continued c)

Variables	ROA		NIM	
	FE	RE	FE	RE
Equity over total assets (ETA) with:				
a) concentration (HHI_a) by assets	significant positive	significant positive	significant positive	significant positive
b) concentration (HHI_d) by deposits	significant positive	significant positive	significant positive	significant positive
c) $CR5_d$	significant positive	significant positive	significant positive	significant positive
Log of gross domestic product (logGDP) with:				
a) concentration (HHI_a) by assets	positive	positive	significant positive	positive
b) concentration (HHI_d) by deposits	positive	positive	significant positive	negative
c) $CR5_d$	positive	positive	significant positive	positive

Table 5.14 shows the bank specific factors used to explain the region's banks' performance, the degree of capitalization, calculated as equity over total assets (ETA) is generally significantly positive for both ROA and NIM. These results imply that if

greater capital is available, increase profitability is experienced. Bigger capital availability will encourage banks to increase their portfolio of risky assets, in the form of loans and securities (Claeys and Vander Vennet, 2003). As observed by Chortareas et al. (2010), higher capital ratios can give higher incentives to shareholders to monitor managers' operations and strategies thereby indirectly encouraging profitability. The macroeconomic control variable, GDP, shows an overall significantly positive relationship to ROA when NIM is used as the dependent variable. This result is quite reasonable for the region, considering they are in the process of rebuilding their banking industry after their crisis experience. Certainly, for these capital scarce countries, the demand for capital will rise as the economy grows.

As far as the efficient structure hypothesis is concerned, none of its versions seem to support as it fails the necessary conditions (Table 5.15).

Table 5.15: Necessary Conditions (ES) Hypothesis

Variables	*MS*		HHI_a		HHI_d	
	FE	RE	FE	RE	FE	RE
Technical Efficiency (*TE*)	0.006*** (0.002)	0.0065*** (0.002)	-0.003 (0.003)	-0.016*** (0.003)	-0.008* (0.004)	-0.017*** (0.003)
Scale efficiency (*SE*)	-0.005+ (0.003)	-0.002 (0.004)	0.027*** (0.006)	0.036*** (0.005)	0.033*** (0.008)	0.022*** (0.005)
Equity over total assets (ETA)	-0.0001** (0.00006)	-0.0002*** (0.00006)	-0.0001+ (0.0001)	-0.0004*** (0.0001)	0.0002 (0.0001)	-0.0002** (0.0001)
Log of gross domestic product (LOGGDP)	-0.011*** (0.002)	-0.004* (0.002)	-0.065*** (0.004)	-0.020*** (0.002)	-0.054*** (0.006)	-0.012*** (0.001)
Constant	0.126*** (0.02)	0.0631*** (0.02)	0.596*** (0.03)	0.254*** (0.01)	0.503*** (0.04)	0.209*** (0.009)
F-test	9.56		127.23		54.12	
Prob > F	0.0000		0.0000		0.0000	
Wald-test		30.22		359.81		269.98
Prob > chi2		0.000		0.000		0.000
LM test		0.0000		0.0000		0.0012

Note: Standard error statistics in parentheses
+ p<0.10, * p<0.05, ** p<0.01, ***p< 0.001

iii) Cross Country Regressions

Table 5.16 shows the results obtained county by country: Indonesia (ROA_I), Korea (ROA_K), Malaysia (ROA_M), Philippines (ROA_P) and Thailand (ROA_T). We do not find evidence to support the two market power hypotheses (SCP and RMP) as the value of the concentration coefficient[107] (HHI_a in terms of assets[108]) is always negative (with the exception of Korea). This again suggests an inverse relationship between concentration and profitability. Moreover, the market share is negative in the majority of cases, thus indicating that greater market share also reduces banking profitability. Looking at the signs and significance of the coefficient for efficiency, technical efficiency (*TE*) and scale efficiency (*SE*), the preliminary results do not support the efficient structure (ES) hypotheses. *TE* appears to be significantly positive in Korea (under the random effect approach), and the Philippines, whereas, for *SE* significant positive results were found in Thailand.

Looking at the control variables, ETA is positive in some of the countries (particularly Indonesia and Korea), while GDP growth seems to affect the Asian crisis region in different ways. The results lead us to conclude that GDP growth has no significant relationship with profitability and contributed less to the banks' performance in Indonesia, Malaysia and Thailand. The positive impact of GDP growth supports the argument of a positive association between growth and financial sector performance, this is also confirmed by Kosmidou (2006) and Hassan and Bashir (2003). GDP is expected to have an impact on the demand for bank loans, whereby a rise in bank loans would increase the bank's profitability. The negative effect may reflect the poor performance of bank loans during the economic downturn (Laeven and Majnoni, 2003; Bikker and Metzemakers, 2004) which reflected the economic conditions of the region during the period of study.

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[107] The SCP hypothesis can be verified by finding a positive and statistically significant value of *HHI* and a value of *MS* equal to 0. Conversely, the RMP theory is confirmed if MS is found to be positive and statistically significant.

[108] Since the estimation using *HHI* is based on assets and deposits, both give similar results to the *k*-concentration level of the five large banks in terms of deposits. For summarization we used the *HHI* in terms of assets to discuss the comparison results by country.

Table 5.16: Market Structure-Performance and Efficiency: By Country ROA

Variables	ROA_I		ROA_K		ROA_M		ROA_P		ROA_T	
	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE
MS	35.16 (43.01)	11.98 (14.79)	-2.96 (10.13)	-3.09 (3.39)	-9.67 (18.58)	5.13 (3.84)	-13.18 (14.62)	-7.18 (8.11)	-18.36 (36.10)	3.75 (16.72)
HHI_a	-28.56 (24.08)	-25.29 (22.27)	39.00*** (9.73)	37.97*** (9.57)	-39.78 (49.81)	-26.06 (47.78)	-10.86 (13.23)	-11.45 (12.82)	-98.86** (32.20)	-121.9*** (30.51)
TE	-1.55 (1.59)	-.744 (1.44)	1.295 (1.39)	2.00+ (1.20)	-1.21* (0.53)	-0.87+ (0.48)	1.01* (0.44)	1.04* (0 .43)	0.122 (1.69)	-0.238 (1.86)
SE	2.39 (2.88)	-0.73 (2.20)	-3.16 (3.40)	-3.18 (3.00)	0.65 (0.12)	0.94 (1.08)	0.36 (1.53)	0.25 (1.48)	10.43* (4.98)	12.88** (4.86)
ETA	0.34*** (0.04)	0.27*** (0.03)	0.15* (0.06)	0.18** (0.05)	0.031 (0.02)	0.041* (0 .01)	0.002 (0 .02)	0.007 (0 .02)	0.25+ (0.148)	0.16 (0.10)
LOG GDP	-1.67 (3.86)	-2.53 (3.56)	0.63 (0.88)	0.58 (0.83)	-1.216 (1.51)	-1.069 (1.467)	1.261 (0.963)	1.259 (0 .946)	-2.345 (3.384)	0.167 (3.594)
Constant	11.47 (29.73)	20.40 (27.24)	-7.55 (9.49)	-7.74 (8.45)	16.22 (16.81)	12.50 (16.28)	-6.218 (6.921)	-6.565 (6.781)	21.47 (24.77)	-3.436 (26.72)
F-stat	11.59		7.69		1.76		2.50		6.21	
Wald Test		67.00		56.01		14.47		15.52		32.53

Note: Standard error statistics in parentheses;
+ p<0.10, * p<0.05, ** p<0.01, ***p< 0.001

Table 5.17 reports the results of our regressions when net interest margin (NIM) is the dependent variable. The results do not indicate any significant positive relationship between concentration (CONC) and market share (*MS*) except for Korea and Malaysia where, under the fixed effect model, both show a significant negative impact on NIM. Meanwhile, the concentration ratio shows a positive but insignificant impact on almost all the countries accept for Indonesia and the Philippines. The relationship between concentration and market share is very weak during the period of study, 1999-2005. The results show a positive value for the concentration level and a negative sign for market share in Indonesia, Malaysia, Korea and Thailand. These results conclude that bank concentration has a positive relationship with bank spreads, thus supporting the SCP hypothesis in the specific case of these countries.

Table 5.17: Market Structure-Performance and Efficiency: By Country NIM

	NIM_I		NIM_K		NIM_M		NIM_P		NIM_T	
	FE	RE	FE	RE	FE	RE	FE	RE	FE	RE
MS	-0.23 (0.15)	-0.13 (0.12)	-0.10** (0.03)	-0.028 (0.01)	-0.25*** (0 .06)	-0.0113 (0 .02)	-0.025 (0 .13)	-0.074 (0.08)	-0.170 (0.11)	-0.042 (0.04)
HHI_a	0.14+ (0.08)	0.14+ (0 .08)	0.03 (0.03)	0.04 (0.03)	0.236 (0 .18)	0.178 (0 .187)	-0.0105 (0.118)	-0.0030 (0.128)	0.0647 (0.10)	0.051 (0.09)
TE	-0.01 (0.005)	-0.01 (0.005)	0.01*** (0.004)	0.01*** (0.004)	0.001 (0 .001)	0.001 (0 .001)	-0.01 (0 .118)	0.002 (0.004)	0.01* (0.01)	0.01* (0.005)
SE	0.01+ (0.01)	0.01+ (0.009)	-0.01 (0.01)	-0.003 (0.01)	-0.01** (0 .004)	-0.01** (0 .004)	0.001 (0.003)	-0.004 (0.014)	0.006 (0.01)	0.02 (0 .01)
ETA	0.0002 (0.0001)	0.0002 (0.0001)	0.001* (0.0002)	0.001** (0.0002)	-0.00019 (0 .0001)	-7.58e-06 (0.0001)	0.001*** (0.0002)	0.001*** (0.0002)	0.0004 (0 .001)	0.001*** (0.0002)
LOG GDP	0.024+ (.014)	0.02+ (0.013)	0.009** (0.002)	0.011*** (0.003)	-0.02** (0 .005)	-0.02** (0 .005)	0.03** (0.008)	0.02** (0.009)	0.02* (0.01)	0.01 (0.01)
Constant	-0.15 (0.10)	-0.15 (0.10)	-0.07* (0.03)	-0.1*** (0.02)	0.15* (0 .06)	0.16* (0 .06)	-0.18** (0 .06)	-0.14* (0.06)	-0.16* (0.07)	-0.12 (0.07)
F-stat	1.78		19.53		9.45		4.18		5.12	
Wald Test		11.38		106.44		40.69		22.01		40.78

Note: Standard error statistics in parentheses;
+ p<0.10, * p<0.05, ** p<0.01, ***p< 0.001

Looking at the signs and significance of the coefficients for *TE* and *SE*, our preliminary results fail to reject the efficient structure (ES) hypothesis for Korea, Malaysia and Thailand. Tests for two supplementary regressions have also been run. The statistical evidence derived from these two regressions has given supportive evidence to reject the ES hypothesis with the exception of Korea (results are summarised in Tables 5.18 to 5.22).

Table 5.18: Efficient Structure (ES) hypothesis - Indonesia

INDONESIA				
Variables	***MS***		***HHI$_a$***	
	FE	**RE**	**FE**	**RE**
TE	0.005* (0.002)	0.008*** (0.002)	0.003 (0.004)	-0.0003 (0.003)
SE	0.0017 (0.004)	-0.002 (0.004)	-0.004 (0.007)	-0.0005 (0.004)
ETA	-0.0001 (0.00006)	-0.0001* (0.00006)	-0.00006 (0.0001)	-0.00005 (0.00008)
LOG GDP	-0.006^{+} (0.0031)	-0.008* (0.003)	-0.132*** (0.005)	-0.131*** (0.004)
Constant	0.054* (0.023)	0.0711** (0.025)	1.042*** (0.040)	(1.036)*** (0.033)
F-stat	2.55		248.88	
Wald Test		15.62		1273.56

Note: Standard error statistics in parentheses; FE is fixed effect; RE is random effect;
$^{+}$p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Table 5.19: Efficient Structure (ES) hypothesis - Korea

KOREA				
Variables	***MS***		***HHI$_a$***	
	FE	**RE**	**FE**	**RE**
TE	0.025^{+} (0.013)	0.0333* (0 .014)	0.0401** (0.014)	0.0210* (0.008)
SE	-0.079* (0.034)	-0.0854* (0.036)	-0.0744* (0.035)	-0.0542* (0.025)
ETA	0.0005 (0.0006)	0.0006 (0.0007)	-0.0002 (0.0007)	-0.0006 (0.0005)
LOG GDP	-0.038*** (0.008)	-0.042*** (0.009)	0.0141 (0.008)	0.0239** (0.007)
Constant	0.480*** (0.086)	0.505*** (0.094)	0.0177 (0.090)	-0.075 (0.076)
F-stat	5.93		6.21	
Wald Test		23.28		28.71

Note: Standard error statistics in parentheses; FE is fixed effect; RE is random effect;
$^{+}$p<0.10, * p<0.05, ** p<0.01, *** p<0.001

Table 5.20: Efficient Structure (ES) hypothesis - Malaysia

MALAYSIA				
Variables	***MS***		***HHI$_a$***	
	FE	**RE**	**FE**	**RE**
TE	0.003 (0.002)	0.004^{+} (0.002)	-0.005*** (0 .0007)	-0.003*** (0.0006)
SE	0.003 (0.005)	0.002 (0.006)	-0.002 (0.002)	-0.00241^{+} (0.001)
ETA	-0.0003* (0.0001)	-0.0003* (0.0001)	-0.00007 (0.00004)	-0.00004* (0.00002)
LOG GDP	-0.005 (0 .004)	-0.006 (0.004)	-0.023*** (0.002)	-0.024*** (0 .001)
Constant	0.0781* (0 .036)	0.0792* (0 .039)	0.297*** (0.014)	0.305*** (0 .012)
F-stat	2.48		85.24	
Wald Test		11.05		402.13

Note: Standard error statistics in parentheses; FE is fixed effect; RE is random effect;
$^{+}$p<0.10, * p<0.05, ** p<0.01, ***p< 0.001

Table 5.21: Efficient Structure (ES) hypothesis - Philippines

PHILIPPINES				
Variables	***MS***		***HHI$_a$***	
	FE	**RE**	**FE**	**RE**
TE	0.004^{+} (0.002)	0.005* (0.002)	-0.004 (0.002)	-0.0016 (0.002)
SE	-0.0022 (0.009)	-0.004 (0.010)	0.0044 (0.010)	0.002 (0.006)
ETA	-0.0002^{+} (0.0001)	-0.0003^{+} (0.0001)	0.00022 (0.0001)	0.00001 (0.00007)
LOG GDP	-0.0014 (0.005)	-0.002 (0.006)	0.010 (0.006)	0.006 (0.0056)
Constant	0.054 (0.041)	0.062 (0.045)	0.022 (0.046)	0.051 (0.038)
F-stat	2.54		1.54	
Wald Test		12.75		2.25

Note: Standard error statistics in parentheses; FE is fixed effect; RE is random effect;
$^{+}$p<0.10, * p<0.05, ** p<0.01, ***p< 0.001

Table 5.22: Efficient Structure (ES) hypothesis - Thailand

THAILAND				
Variables	*MS*		HHI_a	
	FE	**RE**	**FE**	**RE**
TE	0.004 (0 .006)	0.007 (0 .007)	-0.004 (0.007)	-0.0002 (0 .005)
SE	-0.0578** (0 .017)	-0.0609** (0.019)	-0.014 (0.019)	0.0037 (0.010)
ETA	-0.0002 (0 .0005)	-0.0008 (0.0005)	-0.0009 (0.0006)	-0.00004 (0 .0001)
LOG GDP	0.004 (0.012)	0.007 (0.014)	-0.017 (0.014)	-0.0346** (0.011)
Constant	0.077 (0.088)	0.0542 (0 .102)	0.280** (0.099)	0.387*** (0.081)
F-stat	3.29		3.39	
Wald Test		15.24		14.15

Note: Standard error statistics in parentheses; fe is fixed effect; re is random effect;
+ p<0.10, * p<0.05, ** p<0.01, *** p<0.001

5.6 Conclusion

This Chapter presents a study of market structure, performance and efficiency in the Asian region after the financial crisis (1999 to 2005). The banking sector in Southeast Asia (SEA) has experienced substantial changes during the past decade, especially after the 1997 financial crisis. One of the most relevant changes was the transformation of the banking industry, where each country implemented Mergers and Acquisitions (M&As) programmes which reduced the numbers of banks operating in the region. Following Berger (1995) this study tested the structure-conduct-performance hypothesis, accounting also for market power, technical and scale efficiencies. Technical efficiency and scale efficiency were then regressed against concentration and market share to establish whether the higher order conditions for the efficiency structure hypothesis are satisfied.

Our results seem to reject the traditional SCP paradigm in SEA banking but also uncover evidence of strong relationships between profitability and the banks' capital ratios. The results are consistent with Al-Obaidan (2008), Chortareas et al. (2009) and Seelanatha (2010). The empirical investigations in terms of profits (ROA) and NIM show results that the RMP and SCP hypotheses do not hold. Furthermore, we do not find evidence that

concentration and market share are associated with NIM, while *TE* is not found to be significantly related to either profits or NIM, thereby failing to support the ES hypothesis.

In contrast, when the estimation is run again by country, Korea is the only country found to support the ES hypothesis. The results suggest that high market concentration, with a small number of large banks in the industry, has intensified competition. The results also reject the traditional SCP and RMP hypotheses for all the countries with ROA as the dependent variable. In terms of NIM as the dependent variable, the country estimates for Indonesia, Malaysia, Korea and Thailand indicate that bank concentration has a positive relationship with NIM, thus supporting the SCP hypothesis in the specific case of these countries.

CHAPTER 6

COMPETITION AND EFFICIENCY IN SOUTH EAST ASIAN BANKING

6.1 Introduction

Since the 1997 Asian financial crisis, most of the South East Asian affected countries have actively reformed their regulatory framework and restructured their financial sectors. Mergers and acquisitions have created a new era of consolidation, which has raised concerns about competition in their banking sectors. Increased banking competition was expected to provide welfare gains by reducing monopoly rents and cost inefficiencies. A higher degree of competition is expected to result in lower monopoly power of banks and therefore lead to a decrease in banking prices. However, from a policy point of view, how these structural developments may influence the efficiency of the banking sector is still an open question.

This chapter analyses the relationship between competition and efficiency in our sample of SEA countries during the post crisis period, 1999 to 2005. The analysis presented in this chapter is motivated by several factors. Firstly, previous literature has concentrated on the effects of concentration, competition and market structure of the banking industry in developed markets (Molyneux et al., 1994; Hempell, 2002; Biker and Groeneveld, 2000). Our study contributes to the literature by looking at bank competitive behaviour in Southeast Asia during the post crisis period. Secondly, this study provides a cross country analysis on SEA bank competition by utilising a non-structural approach, the Panzar and Rosse *H*-statistic. As mentioned earlier, the literature on cross country comparisons on SEA is very limited. With the emergence of consolidation in the banking sectors through the planned restructuring, competition is an area that needs to be looked into, especially after the region has experienced crisis and recovery.

6.2 Methodology and Data

In Chapter 5, we investigated the SCP and the limitations of SCP approaches which indicate that the structure may not be the only important determinant on the level of competition. Developments in the New Empirical Industrial Organisation (NEIO) have proposed new techniques that infer the competitive conduct of market participants directly without needing information on market structure. The NEIO provides several approaches to examine market power and to quantify the degree of competition in the market place (Martin, 1993).

There are two main methods within these approaches that are used in the empirical analysis of banking: the Panzar and Rosse (1987) *H*-statistic method and the Conjectural Variations (CV) approach (Iwata, 1974; Bresnahan, 1982; Lau, 1982). Whilst both the SCP paradigm and the Panzar and Rosse method are reduced-form analyses, the conjectural variation approach is a structural approach. The Panzar-Rosse approach has been extensively utilised in evaluating competition in mature banking systems in North America, for example U.S. banking system study by Shaffer (1989); in Canada, Nathan and Neave, (1989) and in various European countries, for example, Molyneux et.al. (1994) look into banking systems in France, Germany, Italy, Spain and the United Kingdom; and Molyneux et al., (1996) at Japan. Vesala (1995) concentrates on Finland; Coccorese (2002) on Italy, De Brandt and Davis (2000) investigate banking competition in France, Germany and Italy; Egli and Rime (1999) look at Switzerland; Hondroyiannis et al. (1999) at Greece; Bikker and Groeneveld (1998) to the EU-15 countries; Hempell (2002) at Germany; and Maudos, Pastor and Perez (2002) at Spain.

More recent interest in the Panzra-Rosse modelling approach has been fostered by its use in the analysis of competition in emerging markets' banking systems, for example Gelos and Roldós (2002) on Central Europe and Latin America; Belaisch (2003) on Brazil; Yildirim and Philippatos (2002) investigate the countries in Central and Eastern Europe; Levi Yeyati and Micco (2003) in Latin America; and Zambrano and Luis (2003) in Venezuela. Cross country studies include Claessens and Laeven (2003) and Bikker and Haaf (2002). Following

this established strand of the literature, we employed Panzar and Rosse approach for the following analysis.

6.2.1 Panzar and Rosse *H*-statistic

The new empirical industrial organisation (NEIO) approach provides non-structural tests to circumvent the problems of measuring competition encountered by traditional industrial organisation approaches[109]. Claessens and Laeven (2004) argue that the actual behaviour of a bank is not only related to market structure, but also to barriers to entry influencing the likelihood of the entry of new competitors and therefore the behaviour of incumbents forecasting such an entry. The competition measures from the New Empirical Industrial Organisation (NEIO) include; the Panzar and Rosse (P-R) model, which provides an aggregate measure of competition, and the Lerner index, an individual measure of market power. For the purpose of this chapter we concentrate on the Panzar and Rosse (1977; 1987) method.

Panzar and Rosse (1977) develop a test that examines whether firm conduct is in accordance with the models of perfect competition, imperfect or monopolistic competition, or monopoly. The Panzar and Rosse test is also known as the revenue test. This test is based on empirical observation of the impact on firm-level revenues of variations in the prices of the factors of production that are used as inputs in the production processes of a group of competing firms. Built into the test is an explicit assumption of profit-maximizing behaviour on the part of the firms.

Panzar and Rosse show that the *H*-statistic, defined as the sum of the elasticity of a firm's total revenue with respect to each of its factor input prices, differs under perfectly competitive, imperfectly competitive and monopoly market conditions. The intuition is straightforward in the polar cases of perfect competition and monopoly, but more complex in the intermediate case of imperfect or monopolistic competition.

[109] The Panzar-Rosse approach has been widely applied to assess competitive conditions in the banking systems of the United States, Canada and Japan since the early 1980s, with later work focusing on European countries, transition economies and a few studies focusing on the Asian region. Most of these banking systems exhibited characteristics of monopolistic competition (Bikker and Haaf, 2002).

The Panzar and Rosse (1977) *H*-statistics indicate the nature of the market structure under certain assumptions[110] as shown in Table 6.1. It investigates the extent to which a change in factor input prices is reflected in (equilibrium) revenues earned by a specific bank. The Panzar and Rosse (P-R) model is derived from a reduced form revenue equation and measures the sum of elasticity of total revenue of the firm with respect to the firm's input prices. The test is derived from a general banking market model, which determines equilibrium output and the equilibrium number of banks, by maximising profits at both the bank level and the industry level.

This implies, first, that the bank (i) maximises its profits, where marginal revenue equals marginal cost (Bikker and Haaf, 2002, p.2193):

$$R_i'(x_i, n, z_i) - C_i'(x_i, w_i t_i) = 0 \qquad (6.1)$$

Where R_i refers to the revenues and C_i to the costs of bank (i) (the prime denoting marginal), x_i is the output of bank (i), n is the number of banks, w_i is a vector of m factor input prices of bank (i), z_i is a vector of exogenous variables that shift the bank's revenue function, t_i is a vector of exogenous variables that shift the bank's cost function. Secondly, at the market level, it means that, in equilibrium, the zero profit constraint holds:

$$R_i^*(x^*, n^*, z) - C_i^*(x^*, w_i t_i) = 0 \qquad (6.2)$$

This can be summarised in the following equation with * indicating equilibrium values:

$$H = \sum_{k=1}^{m} \frac{\delta R_i^*}{\delta W_{ki}} \frac{W_{ki}}{R_i^*} \qquad (6.3)$$

[110] (1) banks are profit maximizing, single product firms facing normally distributed revenue and cost functions; (2) banks produce revenue using labour, capital and deposits (intermediated funds) as inputs; (3) higher input prices are not associated with higher quality services that operate higher revenue; and (4) banks are in long run equilibrium. Nonetheless, product differentiation is allowed in the monopolistic competition model (Gelos and Roldos, 2002).

Where R_i^* the revenue of bank (i) is W_i is a vector of m factor input prices of bank (i). Market power is measured by the extent to which a change in factor input prices δW_k is reflected in the equilibrium revenue δR_i^* earned by bank (i). According to PR model it provides a measure of "*H*-statistic" which ranges between 0 and 1 of the degree of competitiveness of the industry:

$$H = \sum_{k=1}^{m} \beta_k \qquad (6.4)$$

Panzar and Rosse (1987) show that the H-statistic is negative ($H \leq 0$) for a neoclassical monopolist, or a perfectly collusive oligopolist (Cartel). The profit maximizing monopolist sets the output price so that it operates at an output level where marginal revenue equals marginal cost. Marginal cost is linearly homogeneous in input prices (so a 1% increase in all input prices leads to precisely a 1% increase in marginal cost), so if the monopolist tries to pass the increase in marginal cost on to consumers, its output quantity will decrease more than proportionally since a monopolist always operate on the elastic portion of its demand function. Consequently, the gross revenue of the monopoly will decrease, and the H-statistic is negative.

A *H*-statistic which is instead significantly greater than zero indicates that the revenue function facing the individual firm depends either implicitly or explicitly upon the decisions of its actual or potential rivals. Panzar and Rosse (1987) introduce the interdependence among banks into a structural model through the hypothesis that free entry and exit result in long-run equilibrium where the zero profit constraint holds at the market level. They show that the H-statistic is equal to one ($H = 1$) for a competitive price-taking firm in long-run equilibrium. In long-run competitive equilibrium, banks face a perfectly elastic demand curve which is tangent to the minimum point of their average cost curve, where production technology is characterised by CRS and marginal cost equals average cost. When the prices of inputs increase, banks, as price takers in the output market, incur a loss even at their profit-maximizing level. This is because total revenue cannot cover total costs. As a result, some banks will have to exit from the

market place, the industry supply curve shifts upward and price therefore increases, attracting new entry Competitive exit and entry adjust the level of output price until the surviving banks face a demand price adequate cover the new higher marginal cost (average cost). Free entry and exit make the output price an endogenous variable, although it is out of the control of individual banks. When the market settles down into a new long-run equilibrium the total revenue of the surviving banks increases by the same percentage as the average cost, that increases by the same percentage as input prices.

Finally, Panzar and Rosse (1987) show that the *H*-statistic takes a value between zero and one ($0 < H < 1$) if a bank is operating under monopolistic competition in long-run equilibrium. Different from monopoly, the perceived demand curve facing the individual firm under monopolistic competition depends upon the prices (quantities) of the substitute products in the market. The perceived elasticity of demand is a nondecreasing function of the number of rivals since an increase in the number of rivals increases the closeness of the substitutes among market participants. The entry or exit of additional products in response to profits or losses will cause the movement of the demand curve until, in long-run equilibrium, zero economic profits are achieved. The revenue of each firm will increase less than proportionally to changes in input prices. A summary interpretation of the *H*-statistic is given in Table 6.1.

The critical feature of a P-R model, besides being static model, is that the banks or firms need to be observed in long run equilibrium. The long run equilibrium test is carried out using the *H* statistic where it measures the sum of elasticity of the return on assets (ROA) with respect to input prices. Values of *H* statistic equal to zero would indicate equilibrium, while less than zero would mean disequilibrium. If the results shown are not in long run equilibrium, it is correct that $H < 0$ no longer proves monopoly, but it also remains true that $H > 0$ disproves monopoly or conjectural variations in short run oligopoly.

Table 6.1: The Panzar-Rosse *H*-statistic[111]

Parameter region	*Competitive environment test*
$H\text{-statistic} = \sum_{j=1}^{k} \frac{\partial \ln GTR}{\partial \ln w_j}$, GTR = gross total revenue; w = factor prices	
$H \leq 0$	- Monopoly, perfectly collusive oligopolist (Panzar and Rosse, 1987) - Profit maximizing firm facing a fixed demand curve in short run competitive equilibrium and conjectural-variations short-run oligopolist (Shaffer, 1983). - *H* is a decreasing function of the perceived demand elasticity (Panzar and Rosse, 1987).
Market in long run equilibrium: $\sum_{j=1}^{k} \frac{\partial \ln PF}{\partial \ln w_j} = 0$, PF=profitability (Shaffer, 1983)	
$0 < H < 1$	- Monopolistic competition in long run equilibrium. - Free entry (Chamberlinian) equilibrium excess capacity.
$H = 1$	- Perfect competition in a long run equilibrium (Rosse and Panzar, 1977). - Free entry equilibrium with full (efficient) capacity utilization.

The Panzar and Rosse methodology assumes that banks are treated as single product firms and is consistent with the intermediation approach to banking, where banks are viewed mainly as financial intermediaries. The P-R model is considered a valuable tool in evaluating market conditions owing to its simplicity and transparency without lacking efficiency (Delis, 2009). The main advantage of the P-R model is data requirements, which are less demanding, compared to other approaches, since it relies more on bank total revenue and input price (does not require data on output price and quantities). Since *H* statistics do not contain any specific hypothesised definition of the market structure, it is robust with respect to any implicit market definitions (Shaffer, 2004; Kasekende et al., 2009). The non-necessity to define locations of the market a priority implies that the bias caused by the misspecification of market boundaries is avoided; hence for a bank that operates in more than one market, the *H* statistic will reflect the average of the bank's conduct in each market (Delis, 2008, p. 4). Under the P-R model, utilising the bank level

[111] Sources: Matthews et al. (2007); Ahi, (2002); Panzar and Rosse, (1977) and (1987); Shaffer, (1982); Nathan and Neave, (1989); and Molyneux et al., (1994).

data allows for bank-specific differences in the production function. The assumption of a single product firm is also consistent with the intermediaries approach to banking (De Bandt and Davies, 2000).

Besides its advantages, P-R models also have several limitations. The first drawback is that it assumes that market participants are price-takers in the input market (Kasekende et al., 2008). This method also assumes that reduced-form revenues are not affected by shifts in the market's demand curve in a long-run competitive equilibrium in the long-run a perfectly competitive industry gives rise to a horizontal industry supply curve (the supply curve of the input factors). The second problem of the Panzar and Rosse method is related to its requirement of long-run equilibrium for the identification of the models of perfect and monopolistic competition. Since the H-statistic is not reliable for samples that are not in long run equilibrium, the empirical estimation of the reduced-form revenue function requires a separate test for long-run equilibrium[112]. This brings in new econometric difficulties. Cross-sectional estimation rarely, if ever, yields consistent estimates of structural parameters since the large number of heterogeneous firms has to be fully controlled for (Schemalensee, 1989). The use of panel data allowing for fixed effects for individual firms would be a solution for controlling for unobservable heterogeneity across firms. However, for an accurate identification of the *H*-statistic it is necessary to ensure that the market is in long-run equilibrium at each point in time. Put another way, if the market proves to be in long-run equilibrium in some periods and is in disequilibrium in other periods, the estimated *H*-statistic derived from the panel data cannot be used to indentify the models of perfect and monopolistic competition. Indeed, as shown by Shaffer (1983), any profit-maximizing firm facing a fixed demand curve, even in a short-run but not long-run competitive equilibrium, will exhibit $H < 0$[113].

An additional disadvantage is related to the economic interpretation that one can infer from the magnitude of the derived *H* statistic (Bresnahan, 1989). As argued by Shaffer

[112] The empirical test for long-run equilibrium was developed by Shaffer (1982). It is rested on the following statement: "competitive capital markets will equalize risk-adjusted rates of return across banks such that, in equilibrium, rates of return should not be correlated statistically with input prices" (Molyneux *et al.*, 1994, p. 449).
[113] Kasekende et al., 2008

(2004), although the sign of H is informative, the specific value of H (apart from the long-run competitive equilibrium value of 1) carries an ambiguous interpretation under existing theoretical analysis. This is because the H-statistics does not map directly into any static or dynamic oligopoly equilibrium concept. Overall, the application of the Panzar and Rosse method in the banking industry suggests that the banking market, in both developed and developing countries, is generally characterised by monopolistic competition. This result implies that product differentiation is one of the characteristics of banking production. Any investigation of the degree of competition in the banking industry will therefore need to allow for the heterogeneity of products (Yildirim and Philippatos, 2007).

6.2.2 Model Specification

We estimate the following reduced form revenue equations on pooled samples for each country[114]:

$$ln\text{TREV} = \alpha + \beta_1 ln\text{P}_{1,it} + \beta_2 ln\text{P}_{2,it} + \beta_3 ln\text{P}_{3,it} + \gamma_1 ln\text{ETA}_{it} + \gamma_2 ln\text{AST}_{it} + \gamma_3 ln\text{TLA}_{it} + \gamma_4 ln\text{LLPL}_{it} + \varepsilon_{it} \quad (6.5)$$

For t = 1 ...T, where T is the number of periods observed and i = 1....I, where I is the total number of banks. The dependent variable is *ln*TREV, which is *ln* of total revenue over total assets (proxy for output price for loans). Molyneux et al. (1994) and Bikker and Haaf, (2002), treat interest as dependent variable whereas Casu and Girardone (2006), Nathan and Neave (1989) and De Bandt and Davies (2000), argue that the differences between interest and non-interest income is becoming less significant in more competitive environments. Recent developments in the banking industry have shown great interest in accounting non-interest income along with non-interest income from fee-based products and off balance sheet activities to total revenue (Casu and Girardone, 2006).

[114] We followed a similar specification of dependent variables to Laeven (2006), Casu and Girardone (2006) and Claessens and Laeven (2004). The empirical application of the P-R approach usually assumes log-linearity in the specification of the marginal revenue and cost functions. *ln* denotes the natural logarithm. For estimation purposes, the log-specification is intended to avoid heteroskedasticity (Rozas, 2007).

Output variables are treated as dependent variables and divided by total assets in order to account for the differences in banks' sizes. $ln P_1$ is the average cost of labour (personnel expenses/total assets); $ln P_2$ is the average cost of deposits (interest expenses/ total deposit and money market funding); and $ln P_3$ is the ratio of other operating expenses and administrative expenses to total assets (proxy for input price of equipment/fixed capital).

Bank specific factors are used to give an overall view of the banking industry and act as control variables at individual bank's levels, we include (1) *ln*ETA, the ratio of total equity to total assets (to control for different risk propensities); (2) *ln*AST, logarithm of total assets (to control potential size effects); (3) *ln*TLA, ratio of total loans to total assets (to show the proportion of loan over total assets); and (4) *ln*LLPL, ratio of loan loss provision over total loans (as a proxy for bank risk). The *H*-statistics measures are calculated as the sum of the input prices coefficient $\beta_1+\beta_2+\beta_3$.

An important feature of *H*-statistic is that the test must be undertaken on observations that are in the long-run equilibrium (Nathan and Neave, 1989). According to past studies (Molyneux et al., 1994; De Bandt and Davies, 2000; Bikker and Haaf, 2002), the equilibrium test is based on the proposition that in competitive capital markets, risk-adjusted rates of return will be equalized across banks. We estimate the equilibrium test by recalculating the P-R *H*-statistic by replacing the dependent variable total revenue over total assets, with the natural log of return on assets (ROA):

$$ln\,\mathrm{ROA} = \alpha + \beta_1 ln\,\mathrm{P}_{1,it} + \beta_2 ln\,\mathrm{P}_{2,it} + \beta_3 ln\,\mathrm{P}_{3,it} + \gamma_1 ln\,\mathrm{ETA}_{it} + \gamma_2 ln\,\mathrm{AST}_{it} + \gamma_3 ln\,\mathrm{TLA}_{it} + \gamma_4 ln\,\mathrm{LLPL}_{it} + \varepsilon_{it} \quad (6.6)$$

Following Claessens and Laeven (2004), the measure of ROA is (1+ROA) which allows for an adjustment for any negative values due to losses in any year. The long-run equilibrium test measures the sum of the elasticity of return on assets with respect to input prices. If the *E*-statistic $(\beta_1+ \beta_2+ \beta_3) = 0$, the banking market is in long run equilibrium. If rejected, the market is assumed not to be in equilibrium (Claessens and

Laeven, 2004). We test whether $E = \sum_{j=1}^{J} \beta_j$ is equal to zero again using the F- test. If rejected, the market is not in equilibrium, and if accepted, then it indicates that in equilibrium prices of input are not related to banks returns on assets.

6.2.3 Accounting for Bank Efficiency

Recent research investigating financial sector competition has expanded to include more studies on developing countries. However, as highlighted earlier there is a lack of literature that investigates the competitive conditions in Southeast Asia, especially after the experience of the 1997 financial crisis. In this section, we add efficiency[115] variable in the determinants of competitive conditions.

$$lnTREV = \alpha + \beta_1 ln P_{1,it} + \beta_2 ln P_{2,it} + \beta_3 ln P_{3,it} + \gamma_1 ln ETA_{it} + \gamma_2 ln AST_{it} + \gamma_3 lnTLA_{it} + \gamma_4 ln LLPL_{it} + \gamma_5 ln EFF + \varepsilon_{it} \quad (6.7)$$

The equilibrium test has to be carried out again, recalculating Panzar and Rosse's H-statistic, replacing the dependent variable total revenue over assets with the natural log of return on assets as shown in equation (6.6).

6.2.4 Data and Descriptive Analysis

Our sample includes banking institutions in five countries in Southeast Asia: Indonesia, Korea, Malaysia, Philippines and Thailand from 1999 to 2005. Bank-level data are obtained from the BankScope database. The data used in this Chapter are the same used in this thesis empirical analyses and are described in detail in Chapter 4. The DEA efficiency scores used in equation 6.7 relate to the estimation of efficiency which includes the impact of environmental variables.

Table 6.2 reports the banks observations used for each country. It is clear from the table that the countries with the largest number of banks in the sample are Indonesia (around

[115] The efficiency estimation is estimated using the four stage analysis as per used in Chapter 4.

51 banks on average per year) and Malaysia (27 banks on average). In contrast, the countries that have the lowest number of bank observations per year are Korea and Thailand (both have 16 banks on average). The peculiarities of the banking markets in selected Asian countries can be inferred by looking at the average size of banks in terms of total assets. The average bank in Korea is around four times larger than the average Thai bank in our sample. Philippines and Indonesian banks have the smallest banks in our sample. One can see that the sample is reasonably representative, our sample accounts for 98% of total banking sector assets in Indonesia and 93% in Malaysia. Our Thai sample provides the lowest coverage accounting for 56% of total banking sector assets over the period. Table 6.3 presents some descriptive statistics.

Table 6.2: Sample Used For Empirical Analysis

	Indonesia	Korea	Malaysia	Philippine	Thailand	Total
1999	64	17	33	27	13	154
2000	53	17	27	26	16	139
2001	49	16	26	21	17	129
2002	48	16	27	25	16	132
2003	48	17	27	27	17	136
2004	49	17	26	25	16	133
2005	44	14	26	20	15	119
Total Commercial Banks	355	114	192	171	110	942
Commercial Banks/All Banks (%)	97.79	74.05	92.75	87.24	56.41	84.48
Average number of banks (1999-2005)	51	16	27	24	16	134
Average size of banks (USD millions)	2519.35	46911.34	7148.12	2197.47	11209.16	69985.44

Source : Bankscope, Annual report from Bank of Indonesia, Bank of Korea, Bank of Thailand, Bank Negara Malaysia and Bangko Sentral ng Pilipinas.

Table 6.3: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
ix	365.096	842.977	0.300	7637.000
nix	121.679	281.104	-0.800	2645.800
ii	533.397	1381.590	0.300	14279.600
nii	154.369	488.554	0	5466.100
TREV	0.096	0.073	-0.368	1.061
P_1	0.011	0.007	0	0.123
P_2	0.108	0.602	0.005	12.678
P_3	0.030	0.073	-0.005	1.009
ETA	11.026	11.717	-129.210	99.720
AST	9791.377	21799.980	6.500	201215.100
TLA	51.666	18.599	0.620	89.820
LLPL	0.014	0.270	-5.133	4.182
ROA	0.841	4.519	-30.440	66.960

Note: ix [interest expenses]; nix [non- interest expenses (personnel expenses + Administration Expenses)]; ii (interest income); nii [non-interest income (other operating income+ fee/commission income)]; TREV [total revenue over total assets]; P_1 [the ratio of personnel expenses over total assets acted as average labour cost]; P_2 [the ratio of interest expense over total deposits and money market funding]; P_3 [the ratio of other operating expenses and administrative expenses over total assets]; ETA [the ratio of total equity to total assets]; AST [total assets]; TLA [the ratio of loans to total assets]; LLPL [the ratio of loan loss provision to total loans]; ROA [return on assets].

6.3 Analysis and Results

Following the recent empirical literature on competition in banking markets, we estimated the H-statistics using an unbalanced panel series data framework. Due to some countries samples being too small, we are only able to implement this approach by pooling country-level data over several years. As a consequence, we can only estimate changes in competition over time, across all countries in the region and not for individual countries. The regression models are estimated using a fixed effects estimator. [116]

Table 6.4 details the regression results. The estimated *H*-statistics for all the selected countries is 0.479, indicating a monopolistic competition. Such results are confirmed by the country level estimations. The value of *H*-statistics ranges from 0.663 in Korea to

[116] The Hausman test was used to choose between fixed (FE) and random effect (RE). FE is reasonable with panel data and it gives consistent results. RE may give a better P-value as they are a more efficient estimator. The Hausman test, tests the null hypothesis that coefficient estimated by the efficient RE estimators are the same as the ones estimated by the consistent FE estimator. We found that they are a significant P-value, Prob > chi2 is smaller than 0.05, therefore it is safe to use FE.

0.060 in Malaysia. *F*-test results indicate that the hypothesis for *H*-statistic is equal to zero (monopoly) is rejected in all countries. Therefore the hypothesis of $1<H<0$ (monopolistic competition) holds in all the selected countries. The results are consistent with the study by Claessens and Laeven (2004) and other studies on developing countries (Al-Muharammi et al., 2006; Parera et al., 2006).

The results also imply that the banking sector earned revenue under monopolistic competition and any form of conjectural variation oligopoly and monopoly can be clearly rejected. During the period of study, Malaysia turned out to be the least competitive country and Korea the most competitive followed by Indonesia, the Philippines and Thailand.

Table 6.4: *H*-Statistic Fixed Effects, 1999-2005

	Indonesia	Korea	Malaysia	Philippine	Thailand	All
$ln P_1$	0.080	0.084	-0.025	0.054	0.189	0.044
	(0.076)	(0.051)	(0.862)	(0.164)	(0.119)	(0.416)
$ln P_2$	0.424***	0.505***	-0.057	0.428***	0.180***	0.300***
	(0.383)	(0.089)	(0.078)	(0.088)	(0.060)	(0.027)
$ln P_3$	0.130**	0.074**	0.142***	0.160	-0.085	0.135**
	(0.056)	(0.037)	(0.036)	(0.184)	(0.084)	(0.021)
*ln*eta	-0.082	0.222***	-0.273***	0.046	0.133*	-0.020
	(0.074)	(0.058)	(0.075)	(0.119)	(0.071)	(0.037)
*ln*ast	-0.224***	-0.018	-0.177**	0.047	-0.547***	-0.110*
	(0.067)	(0.110)	(0.088)	(0.137)	(0.128)	(0.042)
*ln*tla	0.253	-0.380*	0.271*	-0.015	0.348***	0.155***
	(0.041)	(0.194)	(0.137)	(0.126)	(0.097)	(0.003)
*ln*llpl	0.025*	0.030	-0.020	0.046	0.011	0.014
	(0.015)	(0.018)	(0.218)	(0.029)	(0.017)	(0.009)
constant	0.641	1.356	-1.568	-0.548	1.556	-0.420
	(0.655)	(1.162)	(1.005)	(1.457)	(1.021)	(0.390)
H - statistic	0.633	0.663	0.060	0.642	0.283	0.470
	(0.631)	(0.662)	(0.030)	(0.612)	(0.279)	(0.129)
F test (*H* stat = 0)	40.990	15.270	14.310	9.440	3.050	52.56
F test (*H* stat = 1)	249.040	285.070	548.140	50.790	212.770	910.84
Equilibrium Test: *F* value for *H*=0	1.36	3.45	1.46	1.56	1.96	0.600

Notes: * *p<0.10*, ** *p<0.05*, *** *p<0.01*; Standard errors in parentheses.

Because Malaysia has been aggressively involved in consolidation through mergers and acquisitions (as illustrated in Table 6.5), it has drastically reduced the number of banks

operating in the country, which possibly led to lower competition among banks. These results are in line with those by Suffian et al. (2006, pp.16). Their findings indicate that even though the results pointed to the monopolistic competition in the banking sector, it does not show any indication of changes in the market in recent years.

Table 6.5: Banking Groups in Malaysia after Consolidation

Anchor Bank	Merger Groups
Malayan Banking Bhd. (MayBank)	Mayban Finance Bhd., Aseambankers Malaysia Bhd., Phileo Allied Bank Bhd., Pacific Bank Bhd., Sime Finance Bhd. and Kewangan Bersatu Bhd.
The Bumiputra – Commerce Bank Bhd.	Bumiputra-Commerce Finance Bhd. and Commerce International Merchant Bankers Bhd.
RHB Bank Bhd.	RHB Sakura Merchant Bankers Bhd., Delta Finance Bhd. and Interfinance Bhd.
Public Bank	Public Bank Bhd., Public Finance Bhd., Hock Hua Bank Bhd., Advance Finance Bhd. and Sime Merchant Bankers Bhd.
The Arab Malaysian Bank Bhd. (AMMB)	Arab Malaysian Finance Bhd., Arab Malaysian Merchant Bank Bhd., Bank Utama Malaysia Bhd. and Utama Merchant Bankers Bhd.
Hong Leong Bank Bhd.	Hong Leong Finance Bhd., Wah Tat Bank Bhd. and Credit Corporation Malaysia Bhd.
Perwira Affin Bank Bhd.	Affin Finance Bhd., Perwira Affin Merchant Bankers Bhd., BSN Commercial Bank Bhd., BSN Finance Bhd. and BSN Merchant Bank Bhd.
Multi-Purpose Bank Bhd.	International Bank Malaysia Bhd., Sabah Bank Berhad, MBf Finance Bhd., Bolton Finance Bhd., Sabah Finance Bhd., Bumiputra Merchant Bankers Bhd. and Amanah Merchant Bank Bhd.
EON Bank Bhd.	EON Finance Bhd., Oriental Bank Bhd., City Finance Bhd., Perkasa Finance Bhd. and Malaysian International Merchant Bankers Bhd.
Southern Bank Bhd.	Ban Hin Lee Bank Bhd., Cempaka Finance Bhd., United Merchant Finance Bhd., Perdana Finance Bhd. and Perdana Merchant Bankers Bhd.

Source: Bank Negara Malaysia (BNM)

Despite generally difficult regional conditions, which occurred as a result of the onset of the Asian financial crisis in 1997, the Philippines has emerged as one of the most resilient economies in the region. The country started its pursuit to encourage greater competition and strengthen their supervisory and regulatory system in the 1980s which became more intensive during the 1990s. During the Asian crisis, the Philippines followed the policy of mergers and consolidations in order to create a stronger financial system and create well managed banking institutions. Even though big mergers have increased market

concentration, overall competition levels are stable since market shares have remained relatively dispersed among the remaining players. The commercial banking industry seems to be progressing into further consolidation without necessarily inhibiting effective competition (Reyes, 2001, pp.116).

Thailand's *H*-statistic is just 0.263 which is low for a country that has received financial support from the IMF. This result is in line with Kubo (2006); he evaluated Thailand's banking competition using Bresnahan's (1989) conjectural variation model. Thailand has implemented two big changes, and both had an impact on the degree of competition in the country's banking industry. The first change relates to the ownership structure of financial institutions through nationalisations and liquidation of distressed banks; this was coupled with the abolishment of restrictions on the foreign ownership of commercial banks in order to invite foreign banks and investors to recapitalize the distressed banks. The second big change relates to financial authorities' attitude towards entry in the banking sector. Kubo (2006, pp.21) concludes that in spite of the aforementioned changes in the competitive environment of the banking industry in terms of ownership structure and regulations, our estimation results reveal the possibility of a decline in competition.

Table 6.4 also reports the results relative to the control variables. An analysis of the sign and significance of the regression coefficients indicates that the price of funds is always positive for all the countries (with the exception of Malaysia) and statistically significant in most countries. The price of labour shows a positive sign and is not statistically significant in all the countries (with exception of Malaysia). The impact of the price of labour and the price of capital seem to be minimal compared to the price of funds (again with the exception of Malaysia). Nevertheless, these results are consistent with previous studies, which found that the impact of capital factor input prices varies by countries and it is the least important variable of *H*-statistics (Casu and Girardone, 2006; Molyneux et al., 1994; Bikker and Haaf, 2002; Sufian et al., 2007). One explanation for this occurrence may due to the poor quality of capital expenses and fixed assets data (Casu and Girardone, 2006).

The coefficients of ETA are positive in Korea, the Philippines and Thailand whereas they are negative in Malaysia and Indonesia. The results suggest that during the years of recovery, well-capitalised banks are exposed to riskier operations and may hold more equity as a safety measure, which in turn decreases the cost of funds. Regulatory changes during the process of recovery may force high risk banks to carry more equity. AST (total assets) is used to account for differences in bank sizes, which may lead to lower total revenue per unit of assets and can be considered as a proxy to economy of scale (De Bandt and Davies, 2000; Shaffer, 2002). The coefficient has a negative sign in almost all the countries (except the Philippines) which suggests that the larger banks seem to be less efficient compared to smaller banks.

Loan over total assets (TLA) results show a mixed outcome too with a positive sign in Indonesia, Malaysia and Thailand, whereas a negative sign was reported in Korea and again in the Philippines. The inclusion of loan loss provision has provided positive results to all the countries (the exception being Malaysia). Past literature reports mixed results on the expected sign of the coefficient of this variable. The coefficient can be negative if banks spend more resources on credit underwriting and loan monitoring, and consequently fewer problem loans at the expense of higher operating costs (Mester, 1996). The coefficient of this variable can be positive if banks have a high ratio of loan loss provisions to net loans, indicating poor loan quality this calls for higher operating costs related to credit risk and loan loss management (Berger and DeYoung, 1997).

6.3.1 The Panzar- Rosse *H*-statistic and Efficiency

The inclusion of efficiency as one of the independent bank specific variables in the calculation of the *H*-statistics is motivated theoretically because it can be assumed to be one of the exogenous variables that shift the bank's costs (Casu and Girardone, 2006; Bikker, 2004). The crisis experience and the restructuring that took place during the process of recovery significantly changed the way banks operate in the SEA region. The impact of these changes reflect changes in the degree of efficiency levels of each country and the inclusion of efficiency may account for significant changes to the measurement of competition and reflect the success of the recovery programme in each country.

Interestingly the value of the *H*-statistic decreases in the country which reported the highest efficiency level country (Korea) and in the country the least affected by the crisis (the Philippines). On the other hand, the results show an increase in the value of the *H*-statistic in Malaysia, Indonesia and Thailand.

As detailed in Chapter 2, Indonesia was the country worst hit by the crisis. It had a significant impact on commercial banks both publicly and privately owned, as indicated by the number of bank failures during and after the crisis. Creed (2000) highlighted the weaknesses in Indonesia's banking systems which are: it is prone to excessive loan concentration, weak management systems and inadequate information. As a result, the Indonesian government proposed financial liberalisation as a strategy to increase bank efficiency, performances and competitiveness. Through a new restructuring programme, it was assumed that a more competitive environment would encourage banks to be more efficient by lowering costs and increasing revenue with better allocation of resources (Viverita, 2008). The major financial restructuring actions taken by the Indonesian government were through mergers and acquisitions, which were also considered to be a way of achieving performance improvements (DeLong, 2001; Houston et al., 2001). Indonesia's government have also made changes to their competition policy since the 1997 crisis in the hope that the new policies would attract more involvement from foreign investors to assist Indonesia's banking sector to improve on its pre financial crisis condition. Competition policy plays an important role in increasing competitiveness and economic efficiency and this has motivated Indonesia to make substantial changes in raising competitiveness. As shown in Chapter 4, Indonesia's commercial bank efficiency has increased throughout the period studied and the inclusion of efficiency variables has further proven that the changes and recovery plans made in Indonesia have helped to develop a more efficient and competitive banking environment.

Table 6.6: *H*-Statistic Fixed Effects 1999-2005 with DEA

	Indonesia	Korea	Malaysia	Philippine	Thailand	All
lnP_1	0.131**	0.083	0.037	0.181	0.285**	0.106***
	(0.066)	0.051	0.097	0.182	0.111	2.66
lnP_2	0.435***	0.495***	-0.062	0.398***	0.269***	0.324***
	(0.033)	0.091	0.078	0.089	0.059	12.550
lnP_3	0.142***	0.062	0.137***	0.055	-0.034	0.140***
	(0.048)	0.039	0.022	0.195	0.077	6.940
lneta	-0.095	0.225***	-0.268***	0.001	0.075	-0.052
	(0.063)	0.058	0.074	0.123	0.066	-1.490
lnast	-0.166***	-0.015	-0.160*	0.034	-0.465***	-0.093**
	(0.058)	0.110	0.088	0.146	0.118	-2.310
lntla	0.248***	-0.387*	0.250*	0.028	0.080	0.151***
	(0.035)	0.194	0.137	0.129	0.112	4.880
lnllpl	0.240*	0.033	-0.024	0.043	-0.002	0.010
	(0.013)	0.019	0.022	0.030	0.016	1.110
lneff	0.457***	-0.109	0.196	0.331	0.536***	0.425***
	(0.059)	0.128	0.143	0.214	0.137	8.62
Constant	0.996*	1.222	-1.298	0.311	3.171***	0.141
	(0.567)	1.175	1.020	1.553	1.014	0.380
H - statistic	0.708	0.640	0.112	0.633	0.520	0.570
	(0.173)	0.173	0.038	0.173	0.180	0.117
F test (H stat = 0)	0.380	2.780	3.190	0.810	0.410	67.520
F test (H stat = 1)	0.120	1.080	2.630	0.070	0.240	965.270
Equilibrium test: F value for *H*= 0	1.31	3.82	2.33	1.87	1.64	0.45

Notes: * $p<0.10$, ** $p<0.05$, *** $p<0.01$; Standard errors in parentheses.

The *H*-statistics for Indonesia increased from 0.633 to 0.708 after the inclusion of efficiency variables and have a positive relationship with TREV, thus leading us to reject the monopoly hypothesis and the conjectural variations oligopoly hypothesis. To summarise, Indonesia's commercial banking revenues behaved as if earned under monopolistic competition. The same conclusion can also be reached for Malaysia and Thailand.

Thailand's banking sector underwent tremendous changes since the financial crisis in 1997. During the post crisis reforms, family ownership in a number of banks was replaced with state and foreign ownership and also regulations were relaxed to allow new entrants into the industry. These changes have had a huge effect on bank efficiency, leading to a substantial increase (see Chapter 4) and also boosted their competitiveness in the sector. The improvements in Thailand's banking competitive conditions were crucial

for the industry to adapt and improve all their operations. In the past ten years the structure of Thailand's banking sector has changed, domestic banks no longer dominate the industry; in fact the banking system has increased the share of foreign ownership of Thai banks. Wonglimpiyarat (2008) suggested that the higher level of competition in Thailand's banking industry is the result of (1) the rise in non-banks in retail banking which mostly involve credit card and personal loan business and (2) the heightened competition from foreign banks.

The *H*-statistic results for Malaysia also show positive changes after the inclusion of efficiency. This is again consistent with Claessens and Laeven (2004) and other previous studies (Al-Muharrami et al., 2006; Parera et al., 2006).

Korea also experienced significant consequences of the financial crisis and for the past decade it underwent financial deregulation and restructuring. Prior to the crisis, the concentration ratio increased significantly (see Chapter 5) due to consolidation and bank closures. Inclusion of efficiency variables has slightly decreased the *H*-statistic from 0.663 to 0.640. The process of restructuring that took place after the crisis, has significantly increased the concentration ratio. The entry of foreign banks and an increase in foreign ownership of domestic banking may have helped to maintain Korean banks' competitiveness. Finally, the results for the Philippines also indicate a decrease in *H*-statistic following the inclusion of efficiency in the dependent variables. However, efficiency maintains a positive relationship with total revenue.

To validate our analyses, we conducted an equilibrium test (Equation 6.6). The results indicate that banking systems are in not in long run equilibrium. If the market is in equilibrium, the dependent variable will have no correlation with prices of input factor. For both analyses (with and without efficiency), it is possible to reject rejected the hypothesis of $H = 0$ even though the value of H is close to zero. It may be inferred from the findings that the selected SEA commercial banks were in long run equilibrium before the crisis and fell into disequilibrium during the crisis period. However, the systems appear to have made rapid adjustment to a new equilibrium which is similar to what

Molyneux et al., (1996) found with Japanese commercial banking and Park (2009) on Korean commercial banking.

6.4 Conclusion

During the past ten years there have been many studies analysing the 1997 financial crisis which have arrived at many different conclusions on the cause and consequences of the event. However, very few studies have concentrated on the relationship between competition and efficiency during the post crisis period. Our aim was to investigate the relationship between efficiency and competition in the selected countries.

The structural changes in SEA have improved the region's banking industry performance which has been significantly affected by regulatory changes which spurred a trend towards consolidation, resulting in the recent wave of mergers and acquisitions. To investigate the impact of increased efficiency on the competitive conditions in SEA banking markets, we employed the non-structural Panzar and Rosse statistic.

The estimated *H*-statistic for the five selected SEA countries is 0.570, thus indicating monopolistic competition. Such results, confirmed by the by country estimations, are consistent with the current literature. When the DEA efficiency scores were included in the bank specific factors, we found that the overall results have only decreased slightly almost to no effect. On the other hand, the values of the *H*-statistic for each country have increased with the exception of Korea and the Philippines. An analysis of the sign and significance of the regression coefficient indicates that the DEA efficiency scores are negative in Korea, whereas they are positive in all the other selected countries although insignificant (with exceptions of Indonesia and Thailand). This indicates that Korean banks were the most efficient but generated the lowest total revenues. These results may be explained by the fact that banks that show the highest inefficiencies and incur higher cost might be able to generate greater profits than more cost efficient banks.

CHAPTER 7

SUMMARY AND CONCLUSIONS

7.1 Summary

Past literature has highlighted the importance of understanding the relationship between bank performance and efficiency. Recent economic reforms and regulatory changes, characterized by deregulation and concomitant prudential re-regulation, have attracted much research interest. Despite this being an area of interest for many years and policies being adopted widely by developed and developing countries, the existing literature seems to have conflicting views of banks performance and efficiency, which creates gaps that are open to further research. The 2008 economic crisis that has affected countries around the globe and has led to arguments as to best policy options to improve the soundness of banking systems include future strategies regarding the implementation of new regulation and policy frameworks.

The main objective of this thesis is to gain a better understanding of the changes surrounding the aftermath of the 1997 financial crisis, concentrating on the banking sector. In particular, the thesis has examined the following three main research issues: efficiency, concentration and competition. The specific case analyzed is the experience of the six Southeast Asian (SEA) countries (Indonesia, Korea, Malaysia, the Philippines and Thailand) most affected by the 1997 financial crisis, over the period of 1999 to 2005. The period being considered is the recovery period, in which each country proceeded with restructuring and reform programs, in order to bring back their stability and competitiveness in the financial sector.

We chose to carry out our empirical investigation in the SEA banking sector, because its reform experience is particularly suitable for addressing our research questions. As outlined in Chapter 1 and detailed in Chapter 2 and Chapter 3, the selected SEA banking sectors were undergoing various changes and facing new controls on operational activities. These changes illustrate an important point in the world economy and provide some indications to policy makers to aid in making better decisions towards sustaining

the banking industry and understanding the impact of these changes on the affected countries and region. The determination to strengthen the region's financial sectors can be seen in three significant areas. Macroeconomic policy frameworks have been strengthened, particularly the substantial accumulation of foreign reserves, the transparency of policies has increased, which is reflected in the routine disclosure of external debt and reserve information by Asian authorities and corporate governance has improved through the reform of regulatory and supervisory systems. Despite substantial changes of the SEA region's banking system, during the transformation period, there is a paucity of empirical literature analyzing the impact of these reforms on the region's efficiency, market structure, competition and concentration. The SEA experience has therefore provided a valuable opportunity to develop a better perspective on the impact of financial reforms and changes in policy, concentrating on the characteristics of banks' efficiency, competition and concentration.

In Chapter 4, we examined the efficiency of the Southeast Asian banking sector in the post-crisis period (1999–2005) using non-parametric techniques (DEA) for the measurement of efficiency. The findings suggest that all the countries were determined to embark on structural changes and reforms to strengthen their banking sectors and to accommodate the changes into their regulatory environment. The results also suggest that crisis-resolution in the region is varied and may have created conflicting arguments. However, despite all the complications, the region has recovered and so far, is smoothly adapting to its fresh environment with new regulatory policy and strict prudential norms. The inclusion of environmental variables has proven to be significant and improved the mean efficiency in most of the selected countries. The method used has utilized slack and proven that slacks have an important role in evaluating managerial efficiency. Overall, our findings provide empirical evidence of the positive effects of reform on efficiency. Meanwhile, in terms of the performance of the countries since the recovery, this is still considered to be progressing, and there is no doubt that the process is still exposed to many obstacles created either by the recent developments in the global economy or by development within the countries' political and economic situations. The structural changes in SEA have improved the region's banking industry performance. Most

significantly, regulatory changes which spurred a trend towards consolidation, resulting in the recent wave of mergers and acquisitions. These changes were expected to stimulate efficiency, enhance competition and increase market concentration.

In Chapter 5, we investigated the second research question by looking into the relationship between market structure and profitability of banks. This is of concern to bank administrators and banking regulators. Most importantly, regulators need to consider the possible impact mergers may have on the combined banks' profitability and the viability of its impact on consumer welfare. In Chapter 5, we tested the structure-conduct-performance (SCP) and relative market power (RMP) hypotheses, and extended the test for the efficient structure (ES) hypothesis with technical efficiency and scale efficiency. Technical efficiency and scale efficiency were regressed against concentration and market share in order to check that the efficiency structure (ES) hypothesis conditions were satisfied. We used DEA for estimating both technical and scale efficiency based on the method applied in Chapter 4. Our OLS regression supported the RMP and SCP across the selected countries but did not support the ES hypothesis.

The findings that emerged from the GLS estimations, however, failed to support the SCP, RMP and ES hypotheses. The findings failed to support the theory that efficiency has a positive effect on market structure, which is a necessary condition for the ES hypothesis to be accepted. Once we separated the countries and ran the analysis on a country by country basis, our results uncovered evidence supporting the ES hypothesis but only in Korea. Each of these countries has utilized restructuring programs, involving mergers and acquisitions between weaker and stronger banks, to create a more stable banking industry. The SCP paradigm advocates that market concentration fosters collusion among large firms, which creates larger profits and it may be this that generated higher concentration levels in each country, within the period of study. The outcome of these findings is likely to be due to strict changes in the banking regulatory system, especially in countries previously affected by crisis. These countries came from lower income markets or an environment of low stability and weaker regulations. The policy reforms have increased bank efficiency and performance; however, efficiency alone does not

provide a strong basis for the banking industry to support higher competition. Asian banking needs to remain soundly regulated and become more competitive so as to support increasing demand in the market.

Finally, in Chapter 6 we attempted to answer our third research question: what is the impact of the post-crisis financial restructuring on competition in the banking sector of the selected Asian countries? Based on financial restructuring surrounding the Asian region, measurement of concentration and competition are important elements in welfare-related public policy towards banking market (Bikker, 2002). We applied the same method of DEA for the measurement of efficiency and used the Panzar and Rosse *H*-statistic to provide an aggregate measure of competition. Although the concentration of banking in the region showed an increased trend within the study period (Chapter 5), so did the competition level. However, the degree of competition decreased slightly once we controlled for efficiency changes. We found evidence that the most efficient banking systems, Korea and Thailand, are also among the least competitive. This result seems to indicate that the early reform programs in the region have pushed banks into becoming more efficient, but increased efficiency does not result in a more competitive banking system.

Summarizing the entire body of evidence presented in this thesis, the detected improvements in efficiency, driven by changes in the banking industry and economy in the Southeast Asian region during the post crisis period, support the idea that financial restructuring and reforms have had a positive effect on the selected crisis affected countries. The analysis on concentration indicates stronger concentration along with improvement in the degree of competition. These findings suggest that financial reforms successfully stimulate efficiency to increase or even improve competition and concentration.

7.2 Discussion on Findings

Crisis in the global financial system has significantly impacted on many banking sectors. These crises have brought major losses and the need to raise additional capital privately or through the respective national governments. This thesis concentrated on the 1997 financial crisis and specifically looks into the years of recovery, 1999 to 2005, analysing three main research questions:

1) What was the impact of environmental variables on the efficiency of Asian banking sectors after the 1997 financial crisis?
2) Did increased concentration in the sector bring about increased profitability but decreased efficiency of Southeast Asian banks?
3) What is the impact of the post-crisis financial restructuring on competition in the banking sector of the selected Asian countries?

The following discussion will outline what this analysis of efficiency, competition and concentration can contribute to wider policy debates in the provision of banking services.

7.2.1 The Efficiency of Asian Banking Sectors after the 1997 Financial Crisis

Within the banking efficiency analysis literature there is a dearth of studies which have considered how banks have 'survived' the Asian financial crisis of the late 1990s. Considering the profound changes that have occurred in the region's financial systems since then, such an analysis is both timely and warranted.

The financial crisis that hit Southeast Asia in 1997 raised various issues regarding the efficiency and the safety of local banking industries. After the crisis, bank regulators implemented several measures to reform the banking system with the aim of providing efficient banking services to the economy on a sustainable basis (Garcia, 1997). First, some governments decided to avoid closure of distressed banks by recapitalizing them. This process was accompanied by changes in management, ownership and governance. Second, Asian governments also avoided closure of banks by encouraging or even

forcing safe banks to merge with distressed banks (Hawkins and Turner, 1999; Hawkins and Mihaljek, 2001; Gelos and Roldós, 2004). This consolidation process contributed to restore the financial viability of distressed banks even if it is not clear whether merging a weak bank and a strong bank, can actually create a strong bank (Hawkins and Turner, 1999). However, such interventions could still be more cost-effective than a government bailout or takeover. Third, Asian governments have facilitated the access of foreign investors in order to import international best practice and technological benefits (Choi and Clovutivat, 2004). Finally, many other restructuring processes were also implemented such as the replacement of underperforming bank managers and revision of managerial incentives.

The aim of this analysis was to assess the implications for banking sector efficiency resulting from the restructuring process imposed on banking industries in Southeast Asia after the 1997 financial crisis. The study also highlighted the importance of other factors (environmental variables) that affected efficiency measures. Within a regional approach involving five countries (Indonesia, Korea, Malaysia, Philippines and Thailand) we find that Asian banks generally benefited from increasing returns after the crisis period. As discussed in section 7.1, the findings of the analysis suggests that the various financial reforms that took place in the region after the 1997/1998 crisis had a positive impact on increasing the efficiency performance of banks over the 1999 and 2005 period. However, we observe persistent differences in efficiencies across countries. Efficiency scores are relatively high for Korean banks and low for those in Indonesia and the Philippines. The results of our investigation show that such differences can be explained by various bank specific characteristics.

Overall the main outcome from this study is that financial sector reforms were successful in improving the efficiency of the commercial banks in Southeast Asia. As discussed earlier in Chapter 2, each country has actively involved in reform programs through the support of International Monetary Fund (IMF) and domestically-led reform strategies in Malaysia. A strong regulatory and supervisory system has been shown to be necessary to deal with financial crises and promote the efficient functioning of financial markets

(Caprio and Klingebiel, 2002). Therefore the challenge is to formulate an appropriate regulatory framework that enables the banking system to be more resilient to insolvency which successfully implemented in these affected countries (see Chapter 2 for changes in banking regulations). In addition the timing, sequencing and speed of restructuring measures are also important (Khatkhate, 1998 and Alawode and Ikhide, 1997) as are measures aimed at removing various market distortions (Eatwell, 1996; Mavrotas and Kelly, 2001). Overall, the broad reform process appears to have been successful in increasing efficiencies of the banking sector.

7.2.2 Competition and Concentration

The financial sector crisis that broke out in 1997 disrupted the structure and functioning of the industry around the Asian region and affected the world economy. In order to preserve investors' confidence and restore viability, policymakers responded to the crisis in the banking sector with liquidity and capital injections, implicit and explicit guarantee schemes as well as direct rescues and asset purchases. Policymakers backed major mergers aimed at rescuing distressed institutions and many restrictions on entry and operations were lifted. These changes affected industry concentration and the intensity of competition.

The results from our study raise two important implications for policymakers in Southeast Asian countries. On the one hand, the ongoing consolidation and banking restructuring process in these countries does not appear to have led to lower competition. Reductions in restrictions on banking activities, particularly on foreign bank operations (see Chapter 2 for changes in banks regulations) appear to have resulted in higher levels of competition. Increased competition is also shown to reduce bank risk-taking. Therefore, competition policy, which has been launched in Southeast Asia, can be viewed as a policy action aimed at strengthening the stability of the banking systems.

7.3 Limitations and Suggestions for Future Research

This thesis concentrated only on five Southeast Asian countries (Indonesia, Korea, Malaysia, the Philippines and Thailand) which were badly affected by the 1997 financial crisis. We looked at the region during the recovery process, which took place between the years 1999 to 2005. This may be considered the first exploration into Southeast Asian cross-country study after the restructuring took place. Data permitting, new regulatory changes will make it possible to expand the models employed here by using interest margins, foreign bank entry, and the ongoing changes in bank ownership/structure. The strategies of reforms during the period of study may be of interest as a comparison to the global crisis that presently affects the world economy.

Evidence measuring the level of competition in banking systems is scarce. Most studies of competition and the factors driving it have been conducted at the country level, because bank-level data sets comparable across countries were not available until recently. The literatures available shows that competition varies greatly across countries, but the extent of the variation depends on the data sets used and the period analyzed. It is hoped that further study would analyse more recent consolidation and the role of foreign banks in the region, especially focusing on the implications for systemic risk in the light of the 2008 credit crisis.

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