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Tahir, Izah Mohd

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MARKET STRUCTURE AND EFFICIENCY IN ASEAN BANKING

A THESIS SUBMITTED TO THE UNIVERSITY OF WALES IN FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

By

Izah Mohd TAHIR

[DBS (ITM, MALAYSIA), SmPP (UKM, MALAYSIA), MA (UWB, UK)]

School of Accounting, Banking and Economics
University of Wales, Bangor

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LIST OF ACRONYMS

ASEAN	:	Associations of South East Asian Nations
IMF	:	International Monetary Funds
US	:	United States
SCP	:	Structure Conduct Performance
RMP	:	Relative Market Power
ESX	:	X-Efficiency
ESS	:	Scale Efficiency
ASEAN-5	:	Refers to five countries in the Associations of South East Asian Nations *i.e.*, Singapore, Malaysia, Thailand, the Philippines and Indonesia
ZOPFAN	:	Zone of Peace, Freedom and Neutrality
PMF	:	Post-Ministerial Conferences
EC	:	European Community
AFTA	:	ASEAN Free Trade Area
GNP	:	Gross National Product
US$	:	United States Currency
GDP	:	Gross Domestic Product :
M1/GNP	:	The ratio of narrow money, M1 to Gross National Product
M2/GNP	:	The ratio of broad money, M2 to Gross National Product
MAS	:	Monetary Authority of Singapore
ACU	:	Asian Currency Units
S$	:	Singapore Currency
NCD	:	Negotiable Certificates of Deposits
BNM	:	Bank Negara Malaysia
SPTF	:	Skim Perbankan Tanpa Faedah or Interest Free Banking System
REPOs	:	Repurchase Agreements
PDS	:	Public Debt Securities
EPF	:	Employee Provident Fund
DFI	:	Development Finance Institutions
IOFC	:	International Offshore Financial Centre
BIBF	:	Bangkok International Banking Facilities
BAAC	:	Bank for Agriculture and Agriculture Cooperatives
Exim Bank	:	Export Import Bank
IFCT	:	Industrial Finance Corporation of Thailand
NBFI	:	Non-bank Financial Intermediaries
KB	:	Commercial Banks
PNB	:	Philippines National Bank
EKB	:	Expanded Commercial Banks
Rupiahs	:	Indonesian Currency
DTC	:	Deposit Taking Cooperative
BLR	:	Base Lending Rate
BAFIA	:	Banking and Financial Institutions Act
MYR	:	Malaysian Currency
Pesos	:	Philippines Currency
GATS	:	General Agreement on Trade and Services
BOT	:	Bank of Thailand
BSP	:	Bangko Sentral Ng Pilipinas

CBP	:	Central Bank of the Philippines
SMSA	:	Standard Metropolitan Statistical Area
SFA	:	Stochastic Frontier Approach
EFA	:	Economic Frontier Approach
TFA	:	Thick Frontier Approach
DFA	:	Distribution-Free Approach
DEA	:	Data Envelopment Analysis
FDH	:	Free Disposal Hull
S&L	:	Savings and Loan
ROA	:	Return on assets
ROE	:	Return on equity

GENERAL NOTES

1. Totals given in the tables may not equal the sum of individual items due to rounding.

ABSTRACT

The increasing importance of the relationship between market structure and bank performance in general, together with the lack of empirical research on this relationship in the Association of South East Asian Nations (ASEAN) banking markets, provide the main motivation for this study.

Many researchers have sought to estimate the relationship between aspects of market structure such as concentration and market share, and indicators of bank performance such as profitability and prices. However, there is still no consensus with regard to the most appropriate theory in the light of the empirical data. In this study, the possible relationships between market structure and bank performance suggested by prior research are examined for the five main banking markets in ASEAN, *i.e.* Singapore, Malaysia, Thailand, the Philippines and Indonesia, for the period 1991 to 1995. This relationship is tested using pooled and cross sectional estimate, as well as on a country by country and year by year basis.

This is the first study in which data for all five ASEAN countries has been analysed. The database which has been constructed for the present study has been obtained from a variety of primary sources, supplemented by commercial data services, thus providing the cross-national set of comparable data needed for the modelling of bank efficiency that is reported in this thesis.

The study uses two measures of efficiency; (i) the standard accounting approach, *i.e.*, the cost-to-income ratio, and (ii) the stochastic X-efficiency measure. Using the cost-to-income ratio as a proxy for efficiency, generally the pooled results suggest that both the Relative Market Power and the Relative Efficiency hypotheses may explain the profit-structure relationship in ASEAN banking markets. That is, firstly, market share appears to reflect market power, the larger firms in the market gaining higher profits; secondly, banks operating at higher levels of efficiency are also able to gain higher profits. Using the stochastic X-efficiency measure, the pooled results also provide support for both the Relative Market Power and Relative Efficiency hypotheses. In addition, we find that, overall, government ownership and market demand conditions are negatively related to bank profitability, whilst the level of risk capital is positively related.

The individual country estimates suggest that Relative Market Power is supported only in the Philippines using the cost-to-income ratio and in the Philippines and Indonesia using the stochastic X-efficiency measure. Moreover, Relative Efficiency is also supported only in the Philippines and Indonesia using stochastic X-efficiency. In contrast, using the cost-to-income ratio, the Relative Efficiency hypothesis is supported in all five ASEAN countries which would imply that, in the region as a whole, bank efficiency is the primary driver of higher profits.

CHAPTER 1

INTRODUCTION

1.1 Background to the Study

Like other banking markets in developing countries, ASEAN banking markets differ from those of the more developed industrialised countries in several ways, as discussed by Fry (1988). For example, the banking markets of ASEAN can be considered as relatively uncompetitive in nature, whereas in most of the industrialised countries they are more competitive. Furthermore, although regulations concerning financial institutions exist in all countries, these appear to be enforced more consistently and effectively in the developed countries. Thirdly, financial innovation in the developed countries has been led by market forces and the liberalisation of markets, whereas in developing countries such as the ASEAN member states it has been predominantly at the behest of the World Bank and the IMF.

It is therefore of interest to explore the behaviour of the banking markets in ASEAN, in order to provide an insight into the structure of these markets and to ascertain whether this has any effect on the performance of banks. This is the first study for the five ASEAN countries. The data has been pooled from different sources: these include the BANKSCOPE database, central bank publications for each country and direct contact with the relevant authorities. The database which has been gathered for the present study is unique and, given the extensive validation undertaken, may provide a good basis for further research in this area.

Although the countries in ASEAN are quite different in terms of size, level of development and economic structure, these countries are homogenous in nature, sharing a similar political experience and trading extensively with each other. In fact, they are also similar in terms of the institutional arrangements underlying financial savings mobilisation. Given this fact, the knowledge concerning the structure and performance of the ASEAN banking markets can provide information to policy makers on matters relating to the potential impact of bank mergers and acquisitions as well as more general economic policy initiatives. The findings of this study should contribute, therefore, to such policy making in the region.

There have been various studies of the relationship between structure and performance in the banking literature. However, the majority of these investigations have concerned US banking where the structure of the market is quite different from other countries. The main difference lies in the fact that, in the US, many of the financial products such as retail deposits and small loans are offered on a local or domestic basis, and prices can differ quite significantly among these local markets. Therefore, the research emphasis tends to be on the relationship between local market concentration and performance measures. Moreover, the US banking market is relatively unconcentrated, as Berger and Humphrey

(1997, page 195) have noted:

> Although some financial products such as large certificates of deposit and large wholesale loans are competed on a nationwide basis, the US national market is extremely unconcentrated by world standards. For example, it would take over 2000 banking organizations to account for 90% of deposits in the US, while in most other developed countries 90% of deposits would be accounted for by fewer than 10 organizations.

Despite the fact that Structure-Conduct-Performance research contains too many inconsistencies and contradictions to establish a satisfactory SCP relationship in banking (Gilbert, 1984), many studies have shown that market structure does in some way affect performance. To be precise, the SCP paradigm suggests that market structure to some extent influences a bank's competitive behaviour (conduct) and its profitability (performance), and that market structure can therefore be considered to be an important determinant of the degree of competition and the resultant performance in a particular market. The general view is that competition in a more concentrated market will be less vigorous than in a less concentrated market and thus the performance of banks in more concentrated markets may be less desirable in social terms.

Initially, two main theories emerged to describe the relationship between structure and performance. In the traditional SCP model, markets served by a few firms with significant disparities in size are more likely to be characterised by coordination of policies and collusive agreements (Scherer, 1982). This results in inferior performance in terms of the quality and quantity of goods and services produced, higher prices, and profits that exceed a normal return. On the other hand, the efficient structure hypothesis posits that the positive relationship observed between market structure and performance can be attributed to the gains made in market share by more efficient firms, leading in turn to increased concentration.

These two theories have opposing implications for antitrust or regulatory authorities. To the extent that the SCP paradigm is evident in a particular market, then altering the market structure to be more competitive and allocating resources more effectively are likely to be socially beneficial. However, in the eventuality that the efficient structure hypothesis holds in that particular market, the restriction on increasing concentration in the market is not warranted. In view of the conflicting implications of the above two theories, further investigation of the evidence comparing market power and efficiency effects seems advisable, particularly in banking markets outside the US.

In an early survey in this area, Heggested (1979) poses three basic questions relating to the importance of studying banking structure and performance. Firstly, does market structure matter, or is the banking industry so highly regulated that market structure is simply not a relevant factor in determining market performance? Secondly, which aspects of market structure are most important, and, therefore, which types of regulatory reform will have the greatest impact? Finally, what aspects of bank performance are most sensitive to differences in market structure? In short, if bank performance is determined by the structure of the markets then regulatory authorities need to be concerned, especially with those aspects which relate to mergers and the growth of large banks.

More recently, Molyneux *et. al.* (1996) have noted that the study of the SCP relationship in banking is mainly used to evaluate which type of banking structure best serves the public in terms both of the cost and the availability of banking services. These authors identify two main objectives: (i) the attainment of an 'efficient' banking system; and (ii) the minimisation of the likelihood of bank failures. At the same time, there has been a methodological development in the research literature which concerns the interpretation of the positive relationship between structure and performance in banking. Previous researchers tested the SCP by regressing a performance measure on market structure variables such as concentration and market share. The majority of these studies found the coefficient on market share to be significant and on concentration to be insignificant. The interpretations of these findings diverge into two main viewpoints concerning relative efficiency. Some authors assume that this finding supports the 'efficient structure' hypothesis since market share and profits are correlated with efficiency. Some argue that this supports the 'relative market power' hypothesis since firms with large market shares can exercise greater market power and earn higher profits.

This issue has received much of attention in the US and recently in European banking markets by authors such as by Goldberg and Rai (1996), Molyneux and Forbes (1995) and Molyneux and Thornton (1992). This new development has led to the refinement of the SCP debate. To resolve this issue, Berger (1995) has divided the theories into either 'market power' or 'efficient structure' hypotheses. The market power hypotheses include the traditional Structure-Conduct-Performance (SCP) hypothesis and the Relative Market Power (RMP) hypothesis. The traditional SCP hypothesis remains unchanged; *i.e.*, higher profits are earned as a result of anti-competitive behaviour in setting prices in concentrated markets. The Relative Market Power hypothesis states that firms with large market shares and well differentiated products are able to exercise market power in pricing these products and thus, earn higher profits. This situation may not occur in concentrated markets.

The Efficient Structure hypothesis is broken into two components, Relative Efficiency (RE) version and the Scale Efficiency (SE) version. Under the Relative Efficiency hypothesis which is sometimes referred to as X-Efficiency but which is generalised as RE in this thesis, firms with superior management or production technologies will operate at lower costs and therefore obtain higher profits. The resulting higher market shares may also lead to higher concentration. The Scale Efficiency hypothesis states that firms have similar production and management technology but operate at different levels of economies of scale. Operating at an optimal level of scale economy will result in lower costs and the resulting higher profits will lead to higher market concentrations. This is an alternative explanation of the positive relationship between profitability and market structure.

1.2 Aims, Methodology and Plan of Chapters

There are three main reasons which justify a study of the relationship between market structure and performance in ASEAN banking.

1. As far as we are aware, there has been no previous study on this issue in the Association of South East Asian Nations (ASEAN), an important union in economic terms with a population greater than 350million;

2. The analysis will contribute to the general understanding of the determinants of performance in ASEAN financial markets, specifically in the first half of the 1990s;

3. An explanation of the relationship between market structure and bank performance will assist researchers and policy makers in matters relating to changes in the institutional environment of ASEAN banking, particularly the potential impact of bank mergers and acquisitions.

To summarise, the main aim of the present study is to investigate the relationship between structure and performance in ASEAN banking markets between 1991 and 1995. This particular period is chosen for this purpose because the financial system in the ASEAN countries exhibited quite similar patterns in terms of their environment and regulatory policies. In fact the early 1990's was the period where each country took steps to liberalise their financial systems, tightened their regulatory policies and, most importantly, changed government strategy which had previously deferred to foreign rivals.

The statistical method that is used in this study is multiple regression. In this context, the study builds on the prior work of Berger (1995). The analysis presented in this study, however, concern three of the four hypotheses within Berger's structure (Structure-Conduct-Performance, Relative Market Power and Relative Efficiency hypotheses), omitting the Scale Efficiency hypothesis. However, this study uses two different proxies for bank efficiency: (i) a cost-to-income ratio, where data is available for all the five ASEAN countries, and (ii) a stochastic X-efficiency measure where Singapore is omitted due to data shortages.

This thesis is divided into ten chapters. The next chapter, Chapter Two, provides a brief but comprehensive overview of the structure of the financial system in five major countries in ASEAN, known as ASEAN-5: Singapore, Malaysia, Thailand, the Philippines and Indonesia. We also highlight the major objectives and some of the activities of ASEAN. In addition, the characteristics of these five countries with respect to size, level of development and economic structure are also analysed. Against this background, Chapter Three describes in more detail the structure of the banking markets of the five ASEAN countries in terms of the size of the financial system and the structure of the markets. In addition, we also highlight the steps which the governments of these countries have taken towards liberalising their financial systems.

The following chapters are concerned with the existing theory and evidence surrounding our analysis of the banking industry. Chapter Four focuses on the concepts of market structure and performance and on the theories which explain the relationship between them. Since performance is also related to managerial efficiency, we further present the theoretical concepts of X-efficiency, economies of scale and economies of scope in Chapter Five. The empirical evidence that emphasises the relationship between market structure and performance within and outside the US is presented in Chapter Six of this thesis.

The remaining chapters set out the results of the research study undertaken with respect to ASEAN banking. Chapter Seven discusses the methodology that we will use to investigate the relationship between market structure and performance, and Chapter Eight presents the variables used in the analysis, their definition and descriptive statistics. The results are then presented in Chapter Nine of this thesis and Chapter Ten concludes and provides some limitations to the study.

CHAPTER 2

AN OVERVIEW OF THE STRUCTURE OF FINANCIAL SYSTEM IN THE ASEAN-5 COUNTRIES

2.1 Introduction

The main aim of this chapter is to give a brief but comprehensive overview of the structure of the financial system in the five main members of the Association of South East Asian Nations[1] investigated in this research study. Initially, we will outline the major objectives of the association and also look at some of the major activities of ASEAN in various areas of interest. The evolution of the five countries in ASEAN with respect to size, level of development and economic structure will then be analysed. These countries are reasonably homogenous in terms of their historical experience and, with the exception of Singapore, have seen some emphasis on agricultural development as well as industry. The economic progress of the five ASEAN countries over the last three decades has generally been characterised by rapid economic growth, and structural changes in their

1 ASEAN Head Office : Jalan Sisingamangaraja, POB 2072, Jakarta, Indonesia, Telephone-021-712272 and Telex - 47214.

economies have brought about a radical transformation in the financial system of each country. To appreciate this, in Sections 2.3 and 2.4, we will discuss the stages of economic and financial development using some basic economic and financial indicators. In this case, we are not analysing in terms of either 'efficiency' or 'performance' but looking rather at the broader concept of development on the grounds that economic and financial development are interrelated.

Basically, financial development involves the evolution of financial instruments, financial markets and financial institutions. In general, the financial system in the countries involved can be broadly divided into three parts: namely, the banking system, the non-bank financial intermediaries and the financial markets. Section 2.5 therefore provides an overview of the structure of the financial systems of Singapore, Malaysia, Thailand, the Philippines and Indonesia. Section 2.6 offers some concluding remarks.

2.2 Formation of ASEAN

The Association of South East Asian Nations was established in August 1967 in Bangkok, Thailand, with the signing of ASEAN Declaration, otherwise known as the Bangkok Declaration, by the Ministers of Foreign Affairs of Malaysia, the Philippines, Indonesia, Singapore and Thailand. [2] The objectives of the organization as set out by the ASEAN Declaration are as follows: [3]

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[2] Brunei joined the organization in January 1984, shortly after attaining independence and Vietnam became the seventh member in July 1995. Official confirmation of Vietnam as a full member was carried out in the annual meeting of ASEAN foreign ministers on July 28, 1995 in Brunei Darussalam. On 23rd July 1997, Laos and Mynmar joined the organization and Cambodia is expected to join the organization soon.

[3] From Regional Surveys of the World: The Far East and Australasia , 1994 page 1024.

- To accelerate economic growth, social progress and cultural development in the region through joint endeavours in the spirit of equality and partnership in order to strengthen the foundation for a prosperous and peaceful community of South East Asian nations;
- To promote regional peace and stability through abiding respect for justice and the rule of law in the relationship among countries of the region and adherence to the principles of the United Nations Charter;
- To promote active collaboration and mutual assistance on matters of common interest in the economic, social, cultural, technical, scientific and administrative fields;
- To provide assistance to each other in the form of training and research facilities in the educational, professional, technical and administrative spheres;
- To collaborate more effectively for the greater utilization of their agriculture and industries, the expansion of their trade, including the study of the problems of international commodity trade, the improvement of their transportation and communication facilities and the raising of the living standards of their people;
- To promote South East Asian studies; and
- To maintain close and beneficial cooperation with existing international and regional organizations with similar aims and purposes and to explore all avenues for even closer cooperation among themselves.

Some of the activities of the ASEAN organization include areas such as Trade, Security, External Relations, Industry, Finance and Banking, Agriculture, Energy, Transport and Communications, Joint Research and Technology, Education, Social Development, Tourism, Culture and Publications. In the first summit meeting held in Denpasar, Bali, Indonesia in February 1976, two major documents were signed; *i.e.*, Treaty of Amity and

Cooperation and a Declaration of Concord. The Treaty of Amity and Cooperation laid down principles of mutual respect for the independence and sovereignty of all nations: non-interference in the internal affairs of one another; settlement of disputes by peaceful means; and effective cooperation among the five countries.[4] In the Declaration of Concord, various guidelines were drawn up for action in economic, social and cultural relations, including the maintenance of political stability; the establishment of a 'Zone of Peace, Freedom and Neutrality' (ZOPFAN); the promotion of social justice and improvement in living standards; mutual assistance in the event of natural disasters; and cooperation in economic development.

Ministerial Conferences meet annually in each member country in turn and are attended by the ministers of foreign affairs of member states. These meetings are followed by the 'post-ministerial conferences' (PMC) where ASEAN ministers of foreign affairs meet with their counterparts from countries that are dialogue partners, such as the European Community (EC), Japan, Australia, Canada, the Republic of Korea and New Zealand, as well as from other countries. The ministers of economic affairs also meet about once a year to direct ASEAN economic cooperation, and other ministers meet when necessary. Matters of economic cooperation are directed by the ministers of economic affairs through five committees: Finance and Banking; Food, Agriculture and Forestry; Industry, Minerals and Energy; Transport and Communications; and Trade and Tourism. Other ministerial meetings are serviced by committees of Culture and Information; Science and Technology; and Social Development. These eight committees are serviced by a network of subsidiary technical bodies comprising a subcommittee, expert groups, ad hoc working parties and so on. To support the conduct of relations with other countries and

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4 Amended in 1987 by a Protocol which would allow other states within and outside the region to accede to the treaty. Laos and Vietnam for example, signed the treaty in July 1992.

international organizations, ASEAN committees which are made up of the heads of the diplomatic missions of each ASEAN country, have been established in the capitals of Australia, Belgium, Canada, France, Germany, Japan, the Republic of Korea, New Zealand, Switzerland, the United Kingdom and the United States of America.

2.3 Analysis of Selected Key Economic Indicators in the ASEAN-5 Countries

The five ASEAN countries differ widely with respect to size, level of development and economic structure. These differences can be most easily depicted by comparing the data in Tables 2.1 to 2.3. Singapore is the smallest both in terms of the country's area and population but it is the most commercialized and industrialized country with the highest per capita gross national product in the region. At US$25,552, Singapore's per capita GNP is more than 24 times that of the poorest member state. At the opposite end of the scale is Indonesia, with a population larger than the other members combined and per capita income of US$1,062. The Philippines has the second lowest per capita income, but only marginally higher than Indonesia at US$1,196. Between the two extremes are two medium-sized developing countries, namely Malaysia and Thailand, with per capita incomes of US$4,446 and US$2,913 respectively.

Singapore, since its foundation in 1908, has developed into a major port of call and financial centre, connecting trade and transportation between the Pacific and the Indian Ocean. These roles have been enhanced by the parallel development of various supporting services including international finance and telecommunications. Singapore has one of the most open economies in the world, with two thirds of the domestic output of goods and services exported and almost all imports entering free of duties and other restrictions (Table 2.3). Although, in terms of the real GDP growth, Malaysia appears to have the highest growth, it can be seen from Table 2.1 that, in terms of the gross national savings as a percentage of GDP, Singapore records the highest ratio, about 48 percent compared to 38.8 percent in Malaysia, 33.8 percent in Thailand, 32 percent in Indonesia and only 15 percent in the Philippines. With sustained economic growth rate and higher national savings, the citizens of Singapore also appear to enjoy a longer life than do their counterparts.

Table 2.1

Key Economic Indicators for ASEAN-5 Countries, 1996

Indicators	Singapore	Malaysia	Thailand	Philippines	Indonesia
Population (millions)	3.74	21.17	60.0	71.9	198.34
Area ('000 of sq. miles)	1	330	513	300	1,905
GNP / Capita (US$)	25,552	4,446	2,913	1,196	1,062
Inflation (av. 1984-94)	3.9	3.1	5.0	10.0	8.9
Real GDP Growth (%)	7.7	8.2	7.0	5.9	7.6
Total External Debt (US$ billion)[a]	*N/a*	28.9	67.1	37.9	97.6
Gross National Savings (% of GDP)[b]	48.3	38.8	33.8	15.0	32.0
Adult Illiteracy (%,1995)	9	17	6	5	16
Life Expectancy (years)	75	71	69	65	63

Notes: [a] Figure for Philippines is for 1994, for Thailand & Indonesia are for 1995.
[b] Figure for Singapore and the Philippines are for 1994, Thailand & Indonesia for 1995.
N/a: not available

Source: World Development Report, World Bank, June 1996.
Economic Report, Ministry of Finance Malaysia, 1996/1997
International Financial Statistics, IMF, January 1998

Table 2.2

Structure of Production (Distribution of GDP %) of ASEAN-5 Countries, 1994

	Singapore	Malaysia	Thailand	Philippines	Indonesia
Agriculture	0	14	10	22	17
Industry	36	43	39	33	41
Manufacturing	27	32	29	23	24
Services	64	42	50	45	42

Source: The World Development Report, World Bank, June 1996.

Table 2.3

Structure of Exports and Imports of Merchandise by ASEAN-5 Countries, 1996

	Singapore	Malaysia	Thailand	Philippines	Indonesia
Total Export (million US$)	125,926	77,877	54,951	20,353	49,814
Total Import (million US$)	132,293	78,052	71,410	34,033	42,929
Average annual growth rate%, Export 1990-1996	11.0	16.4	15.8	17.0	11.7
Average annual growth rate%, Import 1990-1996	9.2	17.1	14.1	18.9	12.2

Source: International Financial Statistics, IMF, September 1998.

Compared to other ASEAN countries, Malaysia is well endowed with natural resources, which include crude petroleum and natural gas. In 1994, the manufacturing sector accounted for 32 percent of the total GDP compared with only 20 percent in 1980 and 14 percent in 1970 (BNM, 1994). In contrast, the contribution of the agriculture sector was correspondingly reduced from 22% in 1980 to 14% in 1994, in line with the government's 'Look East' policy during the 1980's which aimed to emulate the success of Japan and Korea in the hi-tech industries. The services sector remained relatively large, at 42 percent, in line with the need to provide the wide range of support services necessary to sustain the growth of an efficient export-oriented economy.

In Thailand, although 60 percent of the population still earns its living from agriculture, growth in recent years has increasingly come from the industry and services which now account for more than 80 percent of the GDP. Manufacturing output, formerly dominated by agro-industrial production and textiles, has become increasingly diversified, with especially rapid growth in the production of construction materials, transport equipment, electrical appliances and components, and machinery and equipment.

The development path of the Philippines was quite different during the 1980's due to its economic policies and political developments. Agriculture accounted for 22 percent of the GDP in 1994, and the Phillippines recorded the highest average annual growth rate of all the ASEAN countries. Services in the Philippines accounted for 45 percent of the GDP which is slightly higher than Malaysia though lower than Thailand and inflation was on average higher in the Philippines than any other ASEAN country.

Indonesia's natural resources are similar to those of Malaysia but they have to be shared by a much larger population. In terms of development strategy, Indonesia has been more inward looking than the other ASEAN countries. This, perhaps is a contributing factor to the slow development of industrialization. Nonetheless, the emphasis on industry and services by Indonesia has been relatively great, yielding 41 percent and 42 percent, respectively, of the total GNP in 1994.

Overall, Singapore seems to enjoy strong economic growth and excellent performance compared to its other counterparts, except for the Philippines which experienced the largest growth in exports and imports. As Fry (1988) noted, factors including rapid economic growth, spectacular expansion of exports and substantial increases in the rates of savings and investments have been associated elsewhere with high levels and rates of economic development, and this seems to be borne out by the ASEAN-5 economies.

2.4 Monetization and Financial Deepening in the ASEAN-5 Countries

The development of an efficient financial system which can harness sufficient resources has been recognised as an important factor in promoting rapid economic growth in a country. This development, referred to as 'financial deepening', involves the design and implementation of policies which will increase the monetisation of the economy, foster and develop a sound and diversified financial structure and maintain monetary stability. As one of the measures of structure of the banking sector, financial deepening generally leads to lower transaction costs, an optimum distribution of risks and better investment choices. Thus, financial deepening encourages economic efficiency and is in line with the objectives of economic development.

Financial deepening has a strategic role in supporting sustainable economic growth and building a strong network for the transmission of monetary policy. It also shows in another way how effective a financial system is, especially the banking sector, in mobilising and allocating funds to the most productive and efficient users in the private sector. As is widely recognised, the financial sector plays the important role of financial intermediary and limits, evaluates, and distributes financial risks. Indeed, one of the objectives of deregulation in the banking markets in the ASEAN-5 countries is to stimulate the process of financial deepening. Prior to deregulation, the financial system in these countries was marked with excessive regulations that inhibited financial deepening. These regulations, which covered areas such as interest rate decisions and the minimum reserve requirements, among others, retarded the development of the money and capital markets.

The financial indicators in Tables 2.4 to 2.8 summarise the development of monetisation and financial deepening in Singapore, Malaysia, Thailand, the Philippines and Indonesia over the period 1990 to 1995. Strictly speaking, no ideal method has yet been put forward in the literature to measure the process of financial deepening. However, financial depth is sometimes measured by a ratio of financial assets to gross national product (GNP). At the same time, since money supply is the main component of financial assets, financial depth can also be measured by the ratio of money supply to GNP. In this context, differences in the definition of money supply should be considered: narrow money (M1) consists of currency in circulation plus banks' demand deposits, whereas broad money (M2) is M1 plus banks' time and savings deposits. Narrow money is primarily a means of payment, therefore the M1 to GNP ratio suggests the level of monetization of the economy, whereas M2 to GNP provides a broader measure of financial deepening. The International Monetary Fund (IMF) provides standard definitions for these measures and publishes them for all member countries. The measures are in fact limited in that, some countries are more apt to use foreign currencies in making domestic payments and for the coverage of deposit institutions, and also, the types of deposits included in M2 tend to differ across countries.

Recognising these problems, we present these ratios along with other measures in Tables 2.4 to 2.8 in order to give a rough indication of the different levels of financial development

Table 2.4

SINGAPORE: Selected Measures of Monetisation and Financial Deepening, 1990-1995

	1990	1991	1992	1993	1994	1995
Currency / GNP	0.10	0.10	0.10	0.10	0.09	0.08
Demand Deposits / GNP	0.12	0.12	0.12	0.15	0.13	0.13
Quasi Money / GNP	0.68	0.71	0.69	0.63	0.65	0.63
M1 / GNP	0.22	0.22	0.23	0.24	0.22	0.21
M2 / GNP	0.91	0.92	0.92	0.88	0.87	0.84
Currency / M1	(0.47)	(0.46)	(0.45)	(0.39)	(0.40)	(0.39)
M2 per capita (US$)	13,082	15,453	16,326	17,796	21,959	24,113
Bank Deposits per capita (US$)	11,578	13,787	14,541	15,859	19,758	21,770
Total Financial System Assets / GNP [a]	2.94	2.73	2.85	3.40	3.38	3.37
Assets / GNP						
-Central Bank	*N/a*	*N/a*	*N/a*	0.58	0.56	0.57
-Commercial Banks	1.96	1.81	1.86	1.82	1.87	1.85
-Total Banking System	*N/a*	*N/a*	*N/a*	2.40	2.43	2.42

Notes: [a] For 1990-1992, the total financial system assets do not include the central bank due to data unavailability. *N/a*: not available
Source: Monetary Authority of Singapore, Annual Report, 1995/1996
International Financial Statistics, IMF, January 1998

in the ASEAN-5 countries between 1990 and 1995. As noted above, the ratio of M1 to GNP tends to reflect the degree of an economy's monetization, or the extent to which transactions are made in domestic currency rather than through barter or the use of foreign currency. This ratio tends to be low in a relatively underdeveloped economy due to limited transactions; *i.e.*, high levels of home production and self-sufficiency and continuing reliance on barter for exchanging goods. The M1/GNP ratio is also diminished

Table 2.5

MALAYSIA: Selected Measures of Monetisation and Financial Deepening, 1990-1995

	1990	1991	1992	1993	1994	1995
Currency / GNP	0.10	0.10	0.09	0.09	0.09	0.08
Demand Deposits / GNP	0.13	0.13	0.14	0.19	0.18	0.17
Quasi Money / GNP	0.46	0.50	0.57	0.58	0.62	0.65
M1 / GNP	0.23	0.23	0.25	0.31	0.32	0.31
M2 / GNP	0.69	0.73	0.83	0.90	0.94	0.95
Currency / M1	(0.44)	(0.43)	(0.34)	(0.28)	(0.28)	(0.27)
M2 per capita (US$)	1,596	1,807	2,381	2,741	3,311	3,768
Bank Deposits per capita (US$)	1,361	1,562	2,039	2,366	2,821	3,247
Total Financial System Assets / GNP	2.97	3.03	3.12	3.69	3.56	3.52
Assets / GNP						
-Central Bank	0.37	0.36	0.45	0.65	0.53	0.43
-Commercial Banks	1.18	1.25	1.25	1.44	1.38	1.40
-Total Banking System	1.55	1.61	1.70	2.08	1.90	1.83

Source: 1. Bank Negara Malaysia Annual Report, various issues
2. International Financial Statistics, IMF, January 1998
3. Ministry of Finance, Malaysia, Economic Report 1996/1997

by high rates of inflation and substitution of foreign for domestic currency. As economies develop, this ratio tends to rise and international financial centres tend to have higher ratios than do relatively closed economies. The M1/GNP ratios in Tables 2.4 to 2.8 reflect this pattern. The countries with the highest income (Singapore, which is also an international financial centre, then Malaysia) have relatively high ratios. Indeed, Malaysia has experienced a significant rise in the M1 ratio reflecting lower inflation and increased

Table 2.6

THAILAND: Selected Measures of Monetisation and Financial Deepening, 1990-1995

	1990	1991	1992	1993	1994	1995
Currency / GNP	0.06	0.06	0.07	0.07	0.07	0.07
Demand Deposits / GNP	0.03	0.03	0.02	0.03	0.03	0.02
Quasi Money / GNP	0.62	0.64	0.67	0.71	0.71	0.72
M1 / GNP	0.09	0.09	0.09	0.10	0.10	0.10
M2 / GNP	0.71	0.74	0.76	0.81	0.80	0.81
Currency / M1	(0.70)	(0.67)	(0.72)	(0.70)	(0.70)	(0.73)
M2 per capita (US$)	1,074	1,272	1,436	1,684	1,908	2,209
Bank Deposits per capita (US$)	975	1,166	1,311	1,540	1,740	2,013
Total Financial System Assets / GNP	1.41	1.49	1.60	1.79	1.97	2.15
Assets / GNP						
-Central Bank	0.22	0.23	0.24	0.25	0.24	0.26
-Commercial Banks	0.84	0.87	0.92	1.04	1.15	1.24
-Total Banking System	1.06	1.10	1.16	1.29	1.39	1.50

Source: 1. Bank of Thailand Annual Report for various issues.
2. Other data supplied by the Economic Research Department, Bank of Thailand.
3. International Financial Statistics, IMF, January 1998.

confidence in the domestic currency. The Philippines and Indonesia, at the other end of the spectrum, are low income countries that are only partially monetized. Nevertheless, the M1/GNP ratios show a slight increase in the Philippines over the five years whereas Indonesia has a stable ratio reflecting a degree of confidence in its domestic currency during that period.

Table 2.7

THE PHILIPPINES: Selected Measures of Monetisation and Financial Deepening, 1990-1995

	1990	1991	1992	1993	1994	1995
Currency / GNP	0.06	0.06	0.05	0.06	0.06	0.06
Demand Deposits / GNP	0.03	0.03	0.03	0.03	0.03	0.04
Quasi Money / GNP	0.20	0.20	0.20	0.23	0.26	0.30
M1 / GNP	0.08	0.08	0.08	0.09	0.09	0.09
M2 / GNP	0.28	0.27	0.28	0.32	0.35	0.38
Currency / M1	(0.67)	(0.64)	(0.63)	(0.59)	(0.60)	(0.57)
M2 per capita (US$)	213	254	298	335	461	521
Bank Deposits per capita (US$)	175	209	248	284	399	455
Total Financial System Assets / GNP	1.04	1.04	1.05	1.16	1.09	1.18
Assets / GNP						
-Central Bank	0.42	0.42	0.43	0.41	0.28	0.26
-Commercial Banks	0.49	0.45	0.47	0.52	0.56	0.65
-Total Banking System	0.91	0.87	0.90	0.93	0.84	0.91

Source : 1. International Financial Statistics, IMF, January 1998
2. Bangko Sentral Ng Pilipinas Annual Report for various issues

Similar to the M1/GNP ratio, the ratio of M2 to GNP also tends to rise with per capita income. Differences among countries are due generally to different rates of inflation and real interest rates, the level of real income, and the reliability and availability of bank services. The rate of inflation in the Philippines in 1995, for example, was 8.4, Indonesia 7.9 percent, and Thailand 5.8 percent. Singapore posted the lowest inflation rate of 1.4 percent while Malaysia was 3.5 percent (Bangko Sentral Ng Pilipinas, 1996). The M2/GNP ratios in Indonesia and the Philippines are both very much lower than the corresponding

Table 2.8

INDONESIA: Selected Measures of Monetisation and Financial Deepening, 1990-1995

	1990	1991	1992	1993	1994	1995
Currency / GNP	0.05	0.04	0.05	0.05	0.05	0.05
Demand Deposits / GNP	0.08	0.08	0.07	0.07	0.07	0.07
Quasi Money / GNP	0.33	0.34	0.36	0.34	0.35	0.40
M1 / GNP	0.12	0.12	0.12	0.12	0.12	0.12
M2 / GNP	0.46	0.46	0.48	0.46	0.48	0.52
Currency / M1	(0.38)	(0.35)	(0.40)	(0.39)	(0.41)	(0.39)
M2 per capita (US$)	250	271	307	361	418	450
Bank Deposits per capita (US$)	223	245	278	325	373	444
Total Financial System assets / GNP	1.10	1.05	1.08	0.98	0.97	0.96
Assets / GNP						
-Central Bank	0.26	0.25	0.26	0.22	0.19	0.18
-Commercial Banks	0.66	0.65	0.67	0.63	0.63	0.70
-Total Banking System	0.92	0.90	0.92	0.84	0.82	0.88

Source: 1. International Financial Statistics, IMF, January 1998.
2. Data supplied by the Indonesian Authorities

ratios in Singapore, Malaysia and Thailand due to the slower rate of penetration of the commercial banking system in these economies. The degree of monetisation in the economy is also reflected by the holdings of total bank deposits per capita. Singapore had by far the highest levels, with total bank deposits per capita rising from US$11,578 in 1990 to US$21,770 in 1995. As for the other countries, bank deposits per capita in 1995, in the Philippines (US$455) and Indonesia (US$444) are significantly lower than those in Malaysia (US$3,247) and Thailand (US$2,013).

Table 2.9 summarises the comparative analysis of selected measure of monetisation and financial deepening for the ASEAN-5 countries for the years 1990-1995. Overall, we can group the ASEAN countries into three categories according to the degree of financial development: Singapore, the most advanced country, is at one end of the scale; Malaysia and Thailand are in the middle and the Philippines and Indonesia are at the lower end of the scale.

Finally, it is worth noting that the dominance of the banking system (*i.e.,* the central bank and commercial banks) in Thailand, the Philippines and Indonesia is particularly marked, as the ratio of the banking system's assets to GNP of 1.25, 0.89 and 0.88 during 1990 to 1995 represents 72%, 82% and 86% of the ratio of 1.74, 1.09 and 1.02 respectively for the financial system as a whole. In Singapore, this ratio is also relatively high at % (2.42:3.38). The comparable percentage for Malaysia is lower (at 54%), indicating the greater importance attributed to non-bank financial institutions in that country.

Table 2.9

A Summary of Selected Measures of Monetisation and Financial Deepening in ASEAN-5 Banking Markets, 1990-1995[a]

	Singapore	Malaysia	Thailand	Philippines	Indonesia
Currency / GNP	0.10	0.09	0.07	0.05	0.05
Demand Deposits / GNP	0.13	0.16	0.03	0.03	0.07
Quasi Money / GNP	0.67	0.56	0.68	0.31	0.35
M1 / GNP	0.22	0.28	0.10	0.09	0.12
M2 / GNP	0.89	0.84	0.77	0.31	0.48
Currency / M1	0.43	0.34	0.70	0.62	0.39
M2 per capita (US$)	18,122	2,601	1,597	347	343
Bank Deposits per capita (US$)	16,216	2,233	1,458	295	315
Total Financial system Assets / GNP	3.38	3.32	1.74	1.09	1.02
Assets / GNP					
-Central bank	0.57	0.47	0.24	0.37	0.23
-Commercial Banks	1.86	1.32	1.01	0.52	0.66
-Total Banking System	2.42	1.78	1.25	0.89	0.88

Notes: [a] All figures are arithmetic means. Figures are calculated using Tables 2.4 to 2.8

2.5 An Overview of the Structure of Financial System in the ASEAN-5 Countries

In general, the financial systems of the five ASEAN countries can be divided into three areas: namely, the banking system, the non-bank financial intermediaries and the financial markets. Basically, the financial system in each of the five countries in ASEAN is somewhat similar in that it consists of commercial banks, development finance institutions, specialised banks, contractual savings institutions and savings bank. In these countries, there is a distinct pattern in the institutional arrangements for financial savings mobilization. The commercial banks in these countries mobilize a significant amount of savings but channel their funds mainly into short term financing. Development finance institutions were mostly established by the governments to provide medium and long term financing, especially in the financing of priority sectors. Most of their funds come from their respective governments or through external loans from multilateral institutions or private international capital markets. Specialised banks, on the other hand, cater for specialised financial services, such as underwriting, hire purchase, block discounting or leasing, and the mobilization of savings has became less important in their operations. Meanwhile, contractual savings institutions are common in the ASEAN-5 countries, providing social security or insurance especially to salaried employees. These savings banks are intended to mobilize savings from small savers and to inculcate the saving and banking habits among the populace, especially those in rural areas. To reduce administrative costs these banks often make use of the existing network of post offices.

The structure of the financial system in each ASEAN country is discussed separately in the following sub-sections, based on information provided by the Central Bank of each country.

2.5.1 Singapore

Banking came into existence in Singapore during the nineteenth century, when the development and financing of trade between Europe and the Far East first attracted banks to its shore. In the 1960's, new political leadership which resulted in independence in 1965 brought about significant changes to the Republic's industrial structure and to the financial system as a whole. Subsequently, the establishment of the Asian dollar market in 1968 brought prominence to Singapore as an important financial centre in the region.

Singapore's central bank, the Monetary Authority of Singapore (MAS) was formed in 1970 to regulate all elements of the monetary, banking and financial aspects of Singapore with the exception of currency issuing, authority for which still remains with the Board of Commissioners of Currency. Before 1970, the various monetary functions associated with the central banks had been performed by several government departments and agencies.

The financial institutions operating in Singapore at present include commercial banks, merchant banks, finance companies, insurance companies, provident funds and post office savings banks. According to the MAS annual report for 1995/1996, there were a total of 128 foreign banks (including offshore banks) as at March 1995, or 91 percent of the total number of commercial banks in the country (Table 2.10). The significant number of foreign banks operating in Singapore compared to the other four ASEAN countries can be attributed to the government's strategy of developing and promoting Singapore as an important financial centre and also to its highly open economic policy and liberal exchange rate policy.

There are three categories of commercial bank in Singapore. These are differentiated by the type of licence issued to them, which in turn reflects the degree of restrictions imposed on their banking operations. They are classified as full banks, restricted banks or offshore banks. Another distinction is between those banks granted approval to operate Asian Currency Units (ACUs) and those without this facility. Fully licenced foreign banks are

Table 2.10

Number of Financial Institutions in Singapore, 1990-1995[1]

	1990	1991	1992	1993	1994	1995
Banks	141	137	131	128	132	140
Local[2]	13	13	13	13	13	12
Foreign	128	124	118	115	119	128
-Full Banks	*22*	*22*	*22*	*22*	*22*	*22*
-Restricted Banks	*14*	*14*	*14*	*14*	*14*	*14*
-Offshore Banks	*92*	*88*	*82*	*79*	*83*	*92*
(Banking offices including head offices and main offices)	(92)	(431)	(439)	(435)	(446)	(463)
Asian Currency Units	199	198	196	195	198	209
-Banks	*131*	*127*	*121*	*118*	*123*	*132*
-Merchant Banks	*67*	*70*	*75*	*77*	*75*	*77*
-Others	*1*	*1*	*0*	*0*	*0*	*0*
Finance Companies	28	27	27	27	27	23
(Finance Companies offices including head offices)	(137)	(135)	(129)	(130)	(131)	(128)
POSBank	142	147	150	149	146	145
Merchant Banks	68	71	76	78	76	77
Insurance Companies	124	135	136	140	142	141
-Direct Insurers	*57*	*60*	*60*	*58*	*58*	*58*
-Professional Reinsurers	*25*	*29*	*32*	*36*	*36*	*35*
-Captive Insurers	*42*	*46*	*44*	*46*	*48*	*48*
Representative Offices	45	49	52	52	50	57
-Banks	*42*	*46*	*50*	*50*	*47*	*54*
-Merchant Banks	*3*	*3*	*2*	*2*	*3*	*3*
Stockbroking Companies	57	63	71	72	78	81
-Local Companies	*26*	*26*	*26*	*33*	*33*	*33*
-Foreign companies	*31*	*37*	*45*	*39*	*45*	*48*
Investment Advisers	60	81	93	108	125	136
International Money Brokers	8	7	7	8	10	11
SIMEX Members						
-Corporate Clearing Members	*37*	*39*	*37*	*39*	*38*	*39*
-Corporate Non-Clearing Members	*43*	*39*	*36*	*30*	*31*	*30*
-Individual Members	*279*	*277*	*264*	*371*	*387*	*411*
-Commercial Associate Members	*11*	*12*	*12*	*12*	*12*	*12*

Notes: [1] Ending March. [2] All local banks are full banks.
Source: Monetary Authority of Singapore, annual report 1995/1996.

authorised to engage in the entire range of domestic banking business. Restricted licenced foreign banks can also perform domestic banking functions, but they are not allowed to accept savings and fixed deposits below S$250,000 from the non-bank public. On the other hand, offshore licenced banks can engage in any transactions with non-residents, but they cannot accept in any currency or fixed deposits below S$250,000 from the non-bank public. Neither are they allowed to accept any interest bearing deposits from resident non-bank customers nor lend to them in excess of S$50,000. As of the end of March, 1995, there were 34 full banks of which 12 domestic banks and 22 branches of foreign banks; and also 14 restricted banks and 92 offshore banks.

In 1995, 19.9 percent of the commercial banks' loans and advances were allocated to general commerce; 15.5 percent to the non-bank financial institutions and professional and individuals, respectively; 15.3 percent to building and constructions; 10.1 percent to the manufacturing sector; 2 percent to transport, storage and communications; 0.1 percent to agriculture, mining and quarrying while the rest was allocated to other sectors. These loans and advances took the form of overdrafts, term loans, discounted bills and trust receipts. On the other hand, in terms of its deposits, 62 percent of the total deposits of the commercial banks were held as fixed deposits; 22 percent as savings; 16 percent as demand deposits while the rest were in the form of Singapore Dollar negotiable certificates of deposits (S$NCDs), (MAS annual report, 1995/1996).

Merchant banks are the second largest financial institutions and first made appearances in Singapore during the 1970's. Some of them are direct branches of foreign banks but the majority are either joint ventures with participation by leading domestic banks and foreign merchant banks or investment companies, or a consortium of international foreign banks or credit institutions. In Singapore, there is no special legislation regarding their activities. Although merchant banks are incorporated under the Companies Act, the MAS's approval is necessary. Like other financial intermediaries, their activities are supervised by the MAS, especially since all the 77 merchant banks have been granted ACU licences. Their domestic operations are regulated through directives, notices and guidelines issued by the MAS. They are not allowed to accept deposits from the public or to raise funds by issuing promissory notes, certificates of deposits, or commercial paper. However, they may obtain funds from banks, other approved financial institutions, shareholders and companies related to shareholders with the approval of MAS. ACU operations are in the areas of interbank and commercial lending activities while the major source of funding is in the form of borrowing from banks.

Among the private-sector financial institutions, finance companies rank second after commercial banks in deposit-taking activities. They are established mostly by banks to extend their activities to areas in which they are restricted by statutory or practical limitation. Their rapid growth, especially during the mid -1960's, can be attributed to two factors: firstly, bank cartelization of interest rates prevented banks from offering higher interest rates to attract deposits, and so several banks established finance companies as subsidiaries to circumvent the restriction. The bank cartel, however, was abolished in 1975. Secondly, the finance companies were able to satisfy the needs in areas in which the banks were not involved. As a result of mergers and takeovers during the 1980s, the number of finance companies decreased to 28 finance companies with 137 offices in 1990 to 23 with 128 offices in 1995. All the finance companies are locally incorporated and licensed and regulated by the Monetary Authority of Singapore.

Unlike other bank and financial institutions, the government-owned POSBank, established in 1972, is the only specialised saving bank in Singapore which provides limited banking services to the public. Its main function is to accept deposits and to provide funds for public sector development such as housing, although from 1952 to 1972 the Post Office system operated a less active savings scheme. It introduced current accounts in 1984, traveller's cheques in 1986, and a current/savings account facility in 1988. The number of POSBank branches increased from 142 in 1990 to 150 in 1993 but reduced to 145 in 1995.

Among the other financial institutions in Singapore are insurance companies consisting of direct insurers, professional insurers and captive insurers. The insurance companies are regulated by MAS, which adopted a strategy of promoting the offshore operations of the insurance industry. As such, the authority has been successful in attracting a core of 35 professional reinsurers which use Singapore as a base for regional operations, apart from 58 direct insurers and 48 captive insurers. A major development in the insurance industry occurred in 1992, when MAS obtained in-principle agreement from the Inland Revenue Authority of Singapore to allow general insurers to treat 'Incurred But Not Reported' (IBNR) claim reserves as tax-deductible items. This has brought Singapore's taxation policy in line with that of other developed insurance centres. Reference should also be made to the Central Provident Fund Board, a non-bank financial intermediary which is funded by monthly contributions from employers and employees. At the end of 1995, the total value of members' contributions amounted to S$13.5 billion whereas total withdrawals from the institutions valued S$7.3 billion.

In Singapore, the most important financial market is the Asian dollar market which was established in 1968, through which US dollars and other convertible currencies are transacted. In1995, there were 209 institutions operating ACUs. These included the 132 banks and 77 of the merchant banks. The number has increased significantly since 1969 when there were only 11 ACU operators. The aggregated balance sheet value of the ACU rose from US$389.8 million in 1970 to reach US$478.2 billion at the end of 1995. This market follows the Eurodollar market closely in that activities are largely confined to interbank transactions. At the end of 1995, interbank lending took 54 percent of total assets or US$259 billion while interbank deposits accounted for US$379 billion or 79 percent of total liabilities (Table 2.11). The majority of the loans were made to banks outside Singapore; only 4 percent were given in the area. A similar picture emerges in deposits, where the deposits of banks outside Singapore comprise a large percentage.

Table 2.11

Assets and Liabilities of ACU Institutions and Market Shares, 1970, 1987 and 1995 (in million US$)

	1970	%	1987	%	1995	%
Loans to:						
Non-banks	13.9	3.6	55,010.8	22.5	173,269.2	36.2
Banks						
-In Singapore	13.1	3.4	5,079.7	2.1	18,591.6	3.9
-Outside Singapore[1]	357.1	91.6	166,013.2	67.8	240,173.7	50.2
Other assets[2]	5.7	1.5	18,765.0	7.7	46,198.2	9.7
Deposits of						
Non-banks	243.7	62.5	41,575.5	16.9	80,603.6	16.9
Banks						
-In Singapore	5.7	1.5	6,538.7	2.8	25,133.5	5.3
-Outside Singapore[3]	135.3	34.7	185,946.6	75.9	350,973.0	73.3
Other Liabilities[4]	5.1	1.3	10,807.6	4.4	21,522.7	4.5
TOTAL ASSETS/LIABILITIES	389.8	100	244,868.5	100	478,232.9	100

Notes: [1] Includes loans to other ACU institutions
[2] Includes NCDs held
[3] Includes liabilities to other ACU institutions
[4] Includes NCDs issued

Source: Banker Research Unit (1980)
MAS, Annual Report 1995/1996

2.5.2 Malaysia

The Malaysian Financial System can be divided into two components; namely, the banking system and the non-bank financial intermediaries. The banking system comprises both monetary institutions and non-monetary institutions. The monetary institutions are those institutions whose principal liabilities are generally accepted as money; these comprise the Central Bank, the Bank Negara Malaysia (BNM), and the commercial banks (including the Bank Islam Malaysia Berhad), which are the only institutions allowed to operate current accounts. The non-monetary institutions include institutions which are closely linked to the monetary institutions and whose liabilities are generally accepted as near money. These institutions which also come under the supervision of the Central Bank are the finance companies, the merchant banks and the discount houses. In addition, the banking system covers the foreign bank representative offices and the offshore banks in the International Offshore Financial Centre in Labuan.

The non-bank financial intermediaries, which are supervised by various government departments and agencies, may be broadly divided into five groups of institutions; namely, provident and pension funds, insurance funds, development finance institutions, savings institutions and a group of financial intermediaries, which comprise unit trusts, building societies: the Pilgrims Management and Fund Board, Cagamas Berhad, the Credit Guarantee Corporation, leasing companies, factoring companies and venture capital companies. Like other ASEAN countries, the commercial banks have long dominated the financial system. The first bank was a foreign bank, the Standard Chartered Bank, established in 1875. During the colonial years, foreign banks dominated the banking system. For example, in 1959, the five largest banks in Malaysia were all foreign incorporated and accounted for nearly 75 percent of the total bank deposits and 67% of all bank loans (BNM, 1989). In contrast, by the end of 1995, domestic banks accounted for 79% of the total bank deposits and for 76% of all bank loans (BNM, 1996).

Table 2.12 shows the financial structure in terms of the number of financial institutions from 1990-1995. As we can see from the table, the number of commercial banks has reduced from 39 in 1990 to 38 because of the fact that, in 1991, the first merger in the Malaysian banking industry took place between Bank of Commerce and United Asian Bank. However, there was a significant increase in the number of branches during the period although foreign banks were not allowed to expand their branch networks. In 1994, two foreign banks sold their operations to local concerns thus reducing the number to 14.

Table 2.12

Structure of the Malaysian Banking Institutions and the Number of Institutions, 1990-1995

	1990	1991	1992	1993	1994	1995
Banking System						
Monetary Institutions						
Central Bank	1	1	1	1	1	1
	11	*11*	*11*	*11*	*11*	*11*
Commercial Banks[1]	39	38	38	38	38	38
	998	*1050*	*1125*	*1220*	*1283*	*1433*
-Domestic Banks	23	22	22	22	24	24
	852	*904*	*979*	*1074*	*1139*	*1287*
-Foreign Banks	16	16	16	16	14	14
	146	*146*	*146*	*146*	*146*	*146*
Non-monetary Institutions						
-Finance Companies	45	41	41	40	40	40
	542	*603*	*699*	*789*	*860*	*988*
-Merchant Bank	12	12	12	12	12	12
	17	*17*	*17*	*17*	*17*	*17*
-Discount Houses	7	7	7	7	7	7

Notes: [1] Including Bank Islam
Figures in italic are the number of branches.
Source: Bank Negara Malaysia , Annual Report for various years.

A major development in the banking system in Malaysia was the introduction of the Interest Free Banking Scheme (Skim Perbankan Tanpa Faedah, SPTF) on a pilot basis using the three largest domestic banks in 1993. This development built on the initial success of Islamic banking activities in the country. This began in 1983 with the establishment of Bank Islam Malaysia Berhad, which provided the foundation for a viable and comprehensive Islamic banking system in Malaysia to run parallel to the traditional banking system. In 1994, an Islamic cheque clearing and settlement system was also introduced alongside the existing conventional cheque clearing and settlement system. An inter-bank money market system which operates on an interest-free basis was also launched simultaneously in that year.

Among the non-monetary institutions, finance companies have been important in terms of the numbers. However, the number of finance companies reduced to 40 in 1995 although the number of branches increased significantly during that year. Like their counterparts in other ASEAN countries, the majority of Malaysia's finance companies are subsidiaries of commercial banks and merchant banks. By the end of 1995, 12 finance companies were wholly owned subsidiaries of domestic banks and another four were subsidiaries of locally incorporated foreign banks whilst two were subsidiaries of merchant banks. Hire purchase financing, in particular the financing of motor vehicles, remained the domain of the finance company industry, though expansion in other activities is still to be seen.

The third most important financial institutions are the merchant banks whose business complies with the guidelines on fee based income such as corporate advisory services, trading operations and consortium loan syndicates. During the 1990-1995 period, the number of the merchant banks remained at 12, all of which were based in the capital city of Kuala Lumpur. The seven discount houses operating in the country derived their funds mainly from deposits including repurchase agreements (REPOs), overnight and weekend deposits and call money, while the main uses of funds were for investments such as treasury bills, government securities, bank acceptances, public debt securities (PDS) and negotiable instruments of deposits. In 1994, three of the discount houses ventured into lead managing while all discount houses were engaged in the underwriting of PDS issues. With regard to fund management operations, none of the discount houses undertook this activity although the approval to do so had been given in September 1991. This was primarily due to the lack of technical expertise and an inadequate capital base (BNM 1994).

The next group in the Malaysian financial system is the non-bank financial intermediaries which comprise provident, pension and insurance funds; development finance institutions; and saving institutions . There are twelve main provident and pension funds in the country of which the biggest is the Employee Provident Fund (EPF). Others include the Pension Trust Funds, the Social Security Organisation, the Armed Forces Fund, the Malaysian Estate Staff Provident Fund, the Teachers Provident Fund and the six largest other approved statutory and private provident and pension funds. The non-bank intermediaries play an important role in the development of the Malaysian economy and the funds serve as important mobilisers of long-term savings in the economy for rechannelling into both the public and private sectors to finance long-term investment. The existence of saving institutions in Malaysia complements the commercial and finance companies as major deposit-taking institutions. The main savings institution is the National Savings Bank established in 1974 through the reorganisation of the former Post Office Savings Bank system.

Another group of savings institutions are the cooperative societies which comprise the urban credit cooperatives, rural credit cooperatives, housing cooperatives and the cooperatives in Sabah and Sarawak. Development finance institutions (DFIs) are specialised financial institutions established by the government to promote investments in the manufacturing and agricultural sectors. Some of these have a distinct agricultural emphasis, while others operate primarily in the commercial and industrial sectors of the economy. At present there are seven DFIs, the first of which was established in 1955.

Other financial intermediaries operating on a much smaller scale, such as unit trusts, building societies, credit guarantee corporations, and leasing and factoring companies, were established mainly to complement and supplement the activities of the major financial institutions in mobilising savings and in meeting the financing needs of particular sectors of the economy. At the same time, the establishment of these intermediaries was also in response to the government's efforts to promote home ownership and greater Bumiputra participation in the Malaysian economy, as well as to assist in the development of the financial markets. These are of significance in terms of the role played in the financial sector although they still constitute a relatively small sub-sector.

Another significant development in the Malaysian financial system was the establishment of the International Offshore Financial Centre (IOFC) in October 1, 1990 in Labuan, to conduct international business activities in banking, insurance, corporate funding, investments and trust management, professional services and other related areas. At present, of the 41 offshore banking licences issued, 39 are operational.

2.5.3 Thailand

The financial system of Thailand consists of the Bank of Thailand; 36 banks, including 29 commercial banks and four specialised banks owned by the government; 91 finance and securities companies; several government owned or sponsored specialised institutions; and a large number of small private and publicly owned institutions. Table 2.13 presents the structure of the financial system in terms of the number of financial institutions in the years 1990 to 1995. The commercial banking sector accounts for more than 50 percent of total financial assets and dominates the financial system. Most domestic banks were originally established by business groups and trading houses to help finance their operations. There are 15 domestic commercial banks which has extensive networks, all of which are quoted on the Stock Exchange of Thailand. In addition, there are 14 foreign bank branches and 47 Bangkok International Banking Facilities (BIBFs) [5] of which 32 are operated by foreign banks. BIBFs are offshore banking facilities which allow banks to borrow outside Thailand in foreign currencies and to on-lend either overseas or in the domestic market. Of December 1995, the BIBF foreign banks without branches accounted for 65 percent of the total bank lending of US$47.8 billion, while the foreign banks branches accounted for 13 percent out of the total of US$47.8 billion total bank lending (The Banker, March 1996).

To fulfill the special needs of the banking customers, the first specialised bank appeared in 1946, the government-owned Government Savings Bank which aims to mobilize savings through an extensive branch network. This was followed by the Government Housing Bank in 1953 which helps moderate income earners to purchase houses, the

5 Bangkok International Banking Facilities was set up in 1993 as a step to develop itself into a regional financial centre.

Bank for Agriculture and Agricultural Cooperatives (BAAC) in 1966 which makes loans to the agricultural sector and, most recently, in 1993 by the establishment of Exim Bank. The Export Import Bank was considered essential as in 1990 more than 74.7 percent of Thai exports were manufactured products which needed longer term export credit facilities than were provided by the Bank of Thailand (Bangkok Bank Monthly Review, 1991). To sum up, in Thailand as in the other ASEAN countries, these specialised financial institutions are taking the responsibility of extending credit to priority sectors efficiently and more adequately.

Table 2.13

Number of Financial Institutions in Thailand, 1990-1995 and Year of Establishments

Banks	Year	1990	1991	1992	1993	1994	1995
Bank of Thailand	1942	1	1	1	1	1	1
Banks							
Commercial Banks	1888	30	30	30	29	29	29
Specialized Banks		3	3	3	4	4	4
-Government Saving Bank	1946	1	1	1	1	1	1
- BAAC[1]	1966	1	1	1	1	1	1
-Government Housing Bank	1953	1	1	1	1	1	1
-Export Import Bank of Thailand	1993	-	-	-	1	1	1
Nonbank Financial Institutions							
-Finance & Securities Companies	1969	94	92	92	91	91	94
-Credit Foncier Companies	1969	18	18	18	16	14	13
-SFCT[2]	1964	1	1	1	1	1	1
-IFCT[3]	1959	1	1	1	1	1	1
-Saving Cooperatives	1946	858	892	898	965	1045	1610
-Agricultural Cooperatives	1916	1464	1669	1797	1977	2477	3610
-Pawnshops	1866	361	365	367	371	373	379
-Life Insurance Companies	1929	12	12	12	12	12	13

Notes: [1] Bank for Agriculture and Agricultural Cooperatives.
[2] Small Finance Corporation of Thailand
[3] Industrial Finance Corporation of Thailand.
Source: Data provided by the Economic Research Department, Bank of Thailand.

The second largest financial group comprises 91 finance and securities companies which were established in the early 1960s as affiliates of commercial banks either to provide services that parent banks could not undertake directly or to engage in more profitable but higher-risk consumer finance; subsequently they have expanded into certain types of corporate finance. They are forbidden from offering checking accounts and derive their funding from sales of promissory notes which can be withdrawn on demand. Their activities include short-term finance, hire purchase, underwriting and security and other investment and advisory services. They are however, not allowed to undertake foreign exchange business.

Other financial institutions include privately owned development banks, the Industrial Finance Corporation of Thailand (IFCT) which is financed primarily through foreign borrowing (with government guarantees), a large number of savings and agricultural cooperatives, credit foncier companies which finance the purchase of immovable assets, life insurance companies, and pawnshops. The numbers of savings and agricultural cooperatives increased significantly between 1990 and 1995. In contrast, the number of pawnshops increased only slightly from 361 in 1990 to 379 in 1995 and only one new insurance company was established in 1995.

2.5.4 The Philippines

The financial system of the Philippines traces its origin to the sixteenth century and the organization of 'obras pias', or Pious Works, which were funded by devout Catholics and which were invested in loans secured by real estate. The first bank was established in 1851 and since then the financial system has evolved into a sophisticated system which contains various non-bank financial institutions (NBFIs) such as financing companies and investment houses (Bangko Sentral Ng Pilipinas, 1995). Notwithstanding the sophistication of the Philippines' financial system, the country remains one of the least developed *vis-a-vis* its neighbouring ASEAN economies. However, since the establishment of the Central Bank in 1949, the system has grown rapidly in size and variety.

There are two types of financial institutions: the banking institutions and non-bank financial intermediaries (Table 2.14). The banking sector consists the commercial banks (KB), thrift banks, rural banks and specialized government banks. The commercial banks form the dominant group of the financial system, accounting for more than half of its gross assets over the years. At present, the group is composed of 45 banks with the government owned Philippine National Bank (PNB) being the largest. Of these banks, 31 are domestic and 14 are foreign owned. The significant increase in the number of foreign banks from 4 in 1990 to 14 in 1995 reflects the policy of the government to encourage competition in the banking sector.[6] The branch offices of the commercial banks also expanded significantly during this period from 1,783 offices in 1990 to 3,002 in 1995.

Under the financial liberalization initiated in 1981, the differentiation between banks and non-banks performing quasi-banking functions was narrowed with the introduction of universal banking.[7] Different minimum capital requirements are imposed, however, on different bank categories according to the possible risks that these banks face in performing the functions which they are authorised to undertake. Therefore universal

6 This follows the introduction of Republic Act No. 7721 otherwise known as `An Act liberalising the entry and scope of operation of foreign banks in the Philippines and for other purposes' on May 8, 1994 (BSP, Annual Report, 1994, page 47).

7 The difference between universal banking and commercial banking is that universal banking extends term loans while commercial banks traditionally restrict themselves or are restricted to short-term lending only (Fry 1988, page 281).

Table 2.14

Number of Financial Institutions in the Philippines, 1990-1995

Institutional Group/Year	1990	1991	1992	1993	1994	1995
A. Banking Institutions	**3636**	**3791**	**4296**	**4657**	**5096**	**5569**
Commercial Banks - HO	30	31	32	32	33	45
Branches/Other Offices	*1783*	*1892*	*2222*	*2445*	*2743*	*3002*
Domestic Banks	26	27	28	28	29	31
Foreign Banks	4	4	4	4	4	14
Thrift Banks - HO	103	101	98	97	100	99
Branches/Other Offices	*550*	*562*	*620*	*683*	*721*	*826*
Rural Banks - HO	804	784	787	780	784	790
Branches/Other Offices	*241*	*279*	*353*	*415*	*490*	*556*
Specialised Government Banks-HO	3	3	3	3	3	*3*
Branches/Other Offices	*124*	*139*	181	*202*	222	*248*
B. Non-Bank Financial Institutions	**3700**	**4051**	**4484**	**5152**	**5848**	**6697**
Investment Houses	*32*	*33*	*29*	*34*	*37*	*62*
Financing Companies	*186*	*191*	*197*	*204*	*200*	*211*
Securities Dealers/Brokers	*116*	*123*	*126*	*126*	*129*	*128*
Investment Companies	*65*	*64*	*64*	*65*	*65*	*64*
Lending Investors	*882*	*1093*	*1249*	*1559*	*1799*	*1986*
Pawnshops	*2324*	*2423*	*2693*	*3032*	*3485*	*4109*
Government NBFIs	*3*	*4*	*4*	*5*	*5*	*5*
Venture Capital Corporation	*10*	*10*	*10*	*10*	*10*	*10*
Building and Loan Associations	*6*	*6*	*6*	*7*	*7*	*7*
Non-Stock Savings & Loan Associations	*76*	*104*	*106*	*110*	*111*	*115*
TOTAL	**7338**	**7842**	**8780**	**9809**	**10944**	**12266**

Notes: Beginning 1989, Fund Management Activities were absorbed by the Investment Houses.

Source: Data provided by the Supervisory Reports and Studies Office, Bangko Sentral Ng Pilipinas.

banks or expanded commercial banks (EKBs) are required to have greater capitalization than other types of banks.[8] This is to strengthen the condition of the financial intermediaries in order to meet the growing needs for financial services.

Thrift banks, the second largest banking group, also showed a significant increase in the number of bank offices though the number of actual banks fell from 103 in 1990 to 99 in 1995. A similar trend was shown by the rural banks. On the other hand, the number of branches of the three government-owned specialised banks doubled between 1990 (124 branches) and 1995 (248 branches).

Although from the start the banking system has dominated the financial system, significant numbers of other non-bank financial intermediaries (NBFIs) exist. Among these are the investment houses, financing companies, pawnshops, two large government-owned insurance systems (SSS), and the Government Service Insurance System (GSIS). Investment institutions such as investment houses and financing companies as well as the fund managers were formed during the 1960's and 1970's.

A proliferation of specialised financial institutions occurred place during the post war period: the Development Bank of the Philippines was established in 1947, the rural banks in 1952, the private development banks in 1959, the National Cottage Industries and the Amanah Bank in 1963. These institutions were established to meet the particular credit needs of specific sectors or groups, as perceived by the government. They were specifically prohibited from using their resources for purposes other than those prescribed by the authorities. However, one cannot deny the importance of the pawnshops which

8 The minimum capitalization for the universal banks (EKBs) is Peso 1 billion whereas for the commercial banks (KBs) the limit is P500 million.

continue to serve the needs of smaller groups of the populace in rural areas. The number of pawnshops in the Philippines, approximately doubled from 1990 to 1995. Other non-bank financial intermediaries also significantly increased their number of branches, which contributes to the increase in the number of NBFIs from 3,700 units in 1990 to 6,697 units in 1995.

In the Philippines financial system, there is a prevalence of interlocking directorates in that a director of one institutions can simultaneously hold a position on the board of directors of other financial as well as non financial institutions. This feature is implicitly encouraged by the nature of universal banking as universal banks are permitted to make equity investments in allied and non-allied financial institutions.[9] This is to reduce the fragmentation of financial intermediaries, to increase competition and to achieve economies of scale in order to make the financial system more efficient.

Overall, the growth in the number of financial institutions in the Philippines essentially reflects the efforts of banks and non-bank financial institutions to establish their presence in the various parts of the country in the face of increasing competition.

2.5.5 Indonesia

The financial system of Indonesia consists of the central bank, Bank Indonesia, deposit money banks, savings banks, insurance companies, leasing companies, non-bank financial institutions and various other credit institutions (Bank Indonesia, 1994/1995).

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9 There are two types of allied undertakings, financial and non-financial. Allied financial undertakings include leasing companies, banks, investment houses, financing companies, credit card operations etc. Examples of non-financial undertakings are warehousing companies. Non-allied undertakings include enterprises engaged in agriculture, manufacturing, power etc.

Table 2.15 presents the structure of the financial system in terms of the number of financial institutions for the period 1990 to 1995. Overall, there has been an increase in the number of financial institutions, reflecting the positive impact of government promotion of banking services throughout the country.

Table 2.15

Number of Financial Institutions in Indonesia, 1990-1995

BANKS	1990	1991	1992	1993	1994	1995
Bank Indonesia	1	1	1	1	1	1
Deposit Money Banks	169	189	200	234	240	240
-National Foreign Exchange Banks[1]	*28*	*33*	*40*	*57*	*67*	*82*
-Foreign Banks	*28*	*29*	*30*	*39*	*40*	*41*
-Other Commercial Banks[2]	*85*	*99*	*101*	*111*	*106*	*90*
-Development Banks	*28*	*28*	*29*	*27*	*27*	*27*
Nonbank Financial Institutions[3]	14	14	14	0	0	0
Savings Banks[4]	2	2	2	0	0	0
Insurance Companies	129	130	138	145	153	155
Leasing Companies	116	125	135	175	193	238
Other Credit Institutions[5]	8006	8297	8520	8717	8923	8998
All Institutions	**8437**	**8758**	**9010**	**9272**	**9510**	**9632**

Notes: [1] Including 7 state banks; the remainder are national private banks.
[2] National private banks undertaking only domestic currency business including one state savings bank since May 1989.
[3] Nine investment finance, three development finance, and two other finance companies.
[4] One state savings bank and two private savings banks. Since May 1989, state savings banks has been included as a deposit money bank.
[5] Village banks, rural paddy banks, and government-owned pawnshops.
Source: Data provided by the Indonesian Authorities.

The deposit money banks are categorised according to three criteria: their authority to carry out foreign exchange transactions; their ownership; for example, state-owned, private national and foreign, and private joint ventures; and the restrictions on their activities. They include national foreign exchange banks (private and state-owned commercial banks), foreign banks, joint venture banks, development banks and national non-foreign exchange banks (smaller commercial banks not licenced to carry out foreign exchange transactions). The number of deposit money banks significantly increased to 240 in 1995, and particularly of importance was the increase in the number of foreign banks from 28 in 1990 to 41 in 1995. This increase reflects the policy of the government to encourage competition from foreign banks. A number of commercial banks were also upgraded to foreign exchange banks during the period, increasing the total number of foreign exchange banks to 82 in 1995, an increase of 54 banks. Another contributing factor to the large increase in the number of deposit money banks was the conversion of 14 non-bank financial institutions (NBFIs) to commercial banks in 1993. These non-bank financial intermediaries comprised of nine investment finance, three development finance and two other finance companies. At the same time, in keeping with the growing demand for foreign exchange services, a number of national private commercial banks were upgraded to foreign exchange banks.

Another interesting point to note is the increase in the number of insurance companies, leasing companies and other credit institutions during the same period. Other credit institutions comprising village banks, rural paddy banks and government-owned pawnshops for example, also increased in number, reflecting the objectives of the government to expand the scope of bank services and to support the development and modernization of the rural area. State pawnshops became public corporation in 1990, in order to widen pawn services to the public and to cover not only low income customers but also middle income earners, providing small loans to those in financial difficulty.

2.6 Conclusion

This chapter has traced the establishment and major activities of the countries which comprise ASEAN. The establishment of ASEAN is seen as an important catalyst in inter and cross border integration between countries not only covering trade, economics and politics but also in the areas of finance and banking. It will not be surprising if, in years to come, when the liberalisation of the financial system and markets of these countries has been fully completed, a new era of globalization dawns, especially in the area of banking and finance. The countries must therefore prepare themselves for this globalization.

This chapter has also provided a comparative analysis of the key economic variables in order to give an overall cross country comparison, highlighting the importance of financial development and deepening. In spite of their different cultural, political and regulatory environments, the five ASEAN countries are in fact relatively homogenous in nature and share similar experiences. With the exception of Singapore, they have laid emphasis on agricultural development. However, this trend is changing as the economies develop, shifting towards manufacturing and services. By and large, each country's recent development can be seen very much as a function of economic globalization.

The structure of the financial system in each of the five ASEAN countries has also been reviewed, and the development and changing patterns in the financial system as a whole have been analysed. We find that the financial system of each of the countries is similar in terms of structure and institutional arrangements for financial savings mobilisation. Offshore banking appears to be an important part of the financial system as a whole and thus competition in the system comes not only from within the financial institutions themselves but also from the offshore banking system. Foreign banks, especially, tend to focus on offshore banking because, even if they are allowed to set up a business in ASEAN countries, they are restricted in terms of branching and the type of domestic business they can undertake. However, in terms of our overall analysis, we find that the financial system in all the five ASEAN countries have experienced an important degree of financial deepening.

CHAPTER 3

THE STRUCTURE OF BANKING MARKETS IN THE ASEAN-5 COUNTRIES

3.1 Introduction

In the previous chapter, we have looked in outline of the financial systems in the five ASEAN countries and the contribution of their banking markets. It has been argued that the structural characteristics of banking markets are important determinants of how well individual banks operating in the market might serve their customers (for example, Rose, 1987). Section 3.2 of this chapter examines the structure of the banking markets of Singapore, Malaysia, Thailand, the Philippines and Indonesia, in terms of their assets, deposits and market shares by type of institution. Section 3.3 goes on to examine concentration in these banking markets.

An important change occurred in the ASEAN financial sector in the 1980s and early

1990s, beginning with the gradual financial reforms undertaken in each country, each of which had the objective of ensuring an efficient and modern financial sector that could develop in parallel to the developed countries' banking systems. Thus, Section 3.4 highlights the financial changes that have taken place in the ASEAN-5 countries' banking sectors, particularly the reforms that took place during the 1980s and the first half of the 1990s. This section focuses on both the situation during the pre liberalisation period in order to highlight the market characteristics and the situation during the liberalisation period of the 1980s and 1990s. Section 3.5 offers some conclusions.

3.2 Size of Banking Markets

When we refer to 'concentration', what is meant is the extent to which assets, funds and sources of revenue are controlled by the leading firms in the market place. The degree of market concentration will therefore depend on identifying the size of the market and of the firms that serve it.[10] This section focuses on the first of these variables, the size of the banking sector, and provides an overview of banking assets and deposits in the ASEAN-5 countries. This information was obtained form central bank publications in each country, and from other relevant authorities as indicated in Appendix 1 of this thesis.

3.2.1 Singapore

Based on the 1993, 1994 and 1995 figures, we can see that commercial banks in Singapore play a dominant role in the banking system in that they comprise more than half of the share of the total financial system's assets as a whole (Table 3.1). In fact, the

[10] An in-depth discussion of the concept of concentration can be found in Chapter 4 of this thesis.

share has increased during the period though the increase is relatively small. Next in importance to the central bank are the merchant banks with a share of 13.3 percent in 1993 which reduced to 12.3 percent in 1995. The share of the finance companies, though comprising a small share of total assets, grew from S$11.4 billion in 1990 to S$21.1 billion in 1995, an increase of about 100 percent. The non-bank financial intermediaries consisting of the POSBank and Insurance industry in aggregate make up about 11 percent of the market and their size has doubled during the period.

Table 3.1

SINGAPORE: Total Financial Assets and Market Share by Type of Financial Institution, 1990-1995 (in billion S$)

Financial Institutions/Year	1990	1991	1992	1993	1994	1995
Monetary Authority of Singapore	*N/a*	*N/a*	*N/a*	54.4 (17.1)	60.7 (16.6)	68.7 (16.8)
Commercial Banks	134.0 -	136.1 -	153.3 -	170.3 (53.6)	202.0 (55.2)	224.6 (54.9)
Finance Companies	11.4 -	12.5 -	13.2 -	15.0 (4.7)	19.0 (5.2)	21.1 (5.2)
Merchant Banks	32.3 -	30.0 -	36.8 -	42.2 (13.3)	45.1 (12.3)	50.3 (12.3)
Non-Bank Financial Intermediaries	23.1 -	26.9 -	31.4 -	36.0 (11.3)	39.2 (10.7)	44.7 (10.9)
POSBank	*14.7*	*17.1*	*19.5*	*21.8*	*22.2*	*24.2*
Insurance Industry	*8.4*	*9.8*	*11.9*	*14.2*	*17.0*	*20.5*
TOTAL	200.8 -	205.5 -	234.7 -	317.9 (100)	366.0 (100)	409.4 (100)

Note: The assets include those of the ACU activities
N/a: not available
Source: Monetary Authority of Singapore, Annual Report 1995/1996 and supplement data provided by the relevant authority

Meanwhile, as we can see from Table 3.2 which presents the size of deposits in the Singapore banking sector by type of institution during the period 1990-1995, there is not much overall change in the position of their market shares. On the other hand, there is substantial change during the period in the amount of deposits. For example, the commercial banks' deposits grew from S$64 billion in 1990 to S$109 billion in 1995, an increase of nearly 42 percent but the market share of deposits remained stable over the period.

Table 3.2

Structure of Deposits by Type of Institution, 1990-1995 (in million S$)[1]

	1990	1991	1992	1993	1994	1995
Commercial Banks	63,979.7 (69.1)	72,241.1 (70.3)	78,483.2 (66.9)	85,400.8 (69.4)	99,032.2 (70.5)	108,885.5 (70.1)
Merchant Banks	6,845.9 (7.4)	5,956.4 (5.8)	11,099.4 (9.5)	6,711.3 (5.5)	7,453.2 (5.3)	8,779.6 (5.6)
Finance Companies	8,397.2 (9.1)	8,972.1 (8.7)	9,550.9 (8.1)	10,567.8 (8.6)	13,790.3 (9.8)	15,417.8 (9.9)
POSBank	13,370.5 (14.4)	15,639.4 (15.2)	18,104.1 (15.4)	20,289.4 (16.5)	20,247.7 (14.4)	22,309.1 (14.4)
TOTAL	92,593.3 (100)	102,809 (100)	117,237.6 (100)	122,969.3 (100)	140,523.4 (100)	155,392.0 (100)

Notes: [1] Deposits of non-bank customers and does not include NCDs.
Figures in parentheses are market shares

Source: Data supplied by the Monetary Authority of Singapore

3.2.2 Malaysia

Table 3.3 shows the composition of assets in the Malaysian financial system by type of institution for the period 1990 to 1995. On the whole, the total assets of the financial system rose from MYR329 billion to MYR733 billion at the end of 1995, reflecting an average annual growth of 20 percent. Besides the proliferation of new financial institutions and new financial instruments, the rapid growth of assets in the financial system basically reflects the increase in size the of the monetary institutions. Total assets of the monetary institutions rose from MYR171.6 billion in 1990 to MYR384 billion at the end of 1995, an average increase of 17 percent.

Within the banking system, the commercial banks remain as the largest group of financial institutions with market shares of 40.3 percent of the total assets of the financial system in 1995. Even though the assets rose from MYR130.7 billion in 1990 to MYR295.5 billion in 1995, the market shares rose marginally to 40.3 percent at the end of 1995, compared with 39.6 percent at the end of 1990. This phenomena is also reflected in the assets and market shares of the non-monetary institutions. The assets of the non-monetary institutions grew at an average rate of 16 percent during the period. Of these, the finance companies increased the size of their assets from MYR39.4 billion in 1990 to MYR91.9 billion in 1995, though their market share remained somewhat stable over the period. Similarly, the size of the merchant banks and discount houses has doubled, and their market shares are also maintained. It is important to note the significance of non-bank financial intermediaries in the Malaysian financial system. The market share of these institutions is much larger relative to those of the non-monetary institutions, with total assets expanding from MYR102.3 billion in 1990 to MYR230 billion in 1995, reflecting an average annual growth of 13 percent.

The provident, pension and insurance funds make up the largest of the non-bank financial intermediaries (NBFIs). In 1990, they held about 60 percent of the total assets of the

Table 3.3

MALAYSIA: Total Financial Assets and Market Share by Type of Financial Institution, 1990-1995 (in billion Ringgit)

Financial Institutions/Year	1990	1991	1992	1993	1994	1995
Monetary Institutions	171.6	198.1	238.3	324.9	335.3	384.0
	(52.1)	(53.2)	(54.6)	(57.0)	(53.4)	(52.4)
-Central Bank	*40.9*	*44.6*	*62.7*	*100.3*	*92.8*	*88.5*
	(12.4)	*(12.0)*	*(14.4)*	*(17.6)*	*(14.8)*	*(12.1)*
-Commercial Banks[1]	*130.7*	*153.5*	*175.6*	*224.6*	*242.5*	*295.5*
	(39.6)	*(41.2)*	*(40.2)*	*(39.4)*	*(38.6)*	*(40.3)*
Non-monetary Institutions	55.4	67.5	75.1	89.0	106.4	119.0
	(16.8)	(18.1)	(17.2)	(15.6)	(16.9)	(16.2)
- Finance Companies	*39.4*	*49.0*	*54.9*	*63.3*	*73.5*	*91.9*
	(12.0)	*(13.2)*	*(12.6)*	*(11.1)*	*(11.7)*	*(12.5)*
-Merchant Banks	*11.1*	*13.3*	*14.6*	*18.8*	*23.6*	*27.1*
	(3.3)	*(3.5)*	*(3.3)*	*(3.3)*	*(3.7)*	*(3.7)*
-Discount Houses[2]	*4.9*	*5.2*	*5.6*	*6.9*	*9.3*	-
	(1.5)	*(1.4)*	*(1.3)*	*(1.2)*	*(1.5)*	-
Non-Bank Financial Intermediaries	102.3	106.6	123.2	156.6	186.5	230.0
	(31.0)	(28.6)	(28.2)	(27.4)	(29.7)	(31.4)
-Provident, Pension & Insurance Funds	*61.6*	*70.0*	*81.4*	*98.9*	*117.8*	*188.2*
- DFIs[3]	*6.1*	*6.5*	*6.4*	*8.9*	*9.7*	*12.0*
-Saving Institutions[4]	*8.5*	*9.2*	*9.9*	*13.8*	*15.7*	*15.6*
-Other Financial Institutions[5]	*26.1*	*20.9*	*25.5*	*35.0*	*43.3*	*64.2*
TOTAL	**329.3**	**372.2**	**436.6**	**570.5**	**628.2**	**733.0**
	(100)	**(100)**	**(100)**	**(100)**	**(100)**	**(100)**

Notes: [1] Including Bank Islam Malaysia Berhad
[2] Assets of the Discount Houses for 1995 are included in the other financial institutions
[3] DFIs are development finance institutions which include Malaysian Industrial Development Corporation (MIDF), Sabah Development Bank Berhad, Sabah Credit Corporation, Bank Pembangunan Malaysia Berhad and Bank Industri Malaysia Berhad.
[4] Including National Savings Bank, Bank Kerjasama Rakyat and the cooperative societies.
[5] Including unit trusts, building societies, Pilgrims Management and Fund Board, Credit Guarantee Corporation, Cagamas Berhad, leasing companies, factoring companies and venture capital companies.
Market shares are in parentheses

Source: Bank Negara Malaysia , Annual Report for various issues.

NBFIs and 81 percent in 1995. This reflects the importance of the provident and pension funds in mobilising funds for the development of the Malaysian economy.

In terms of its deposits, the non-financial private sector remained the largest holders of deposits in the financial system. Of these, the share of deposits with the commercial banks remained the largest, representing more than 60 percent of the total (Table 3.4). The growth of commercial bank deposits was more than double. Next in importance are the finance companies, which held about 20 percent of the total in 1995, whereas the share of deposits with the merchant banks, discount houses and National Savings Bank are relatively small, with market shares of 3.9, 2.2 and 2.5 percent respectively in 1995.

Table 3.4

Structure of Non-Financial Private Sector Deposits[1] with the Financial Institutions[2] in the Malaysian Banking Markets, 1990-1995 (in billion Ringgit)

Deposits[3] with:	1990	1991	1992	1993	1994	1995
Commercial Banks	59.6 (64.1)	69.3 (64.3)	86.3 (64.6)	104.2 (67.9)	120.3 (68.4)	136.1 (66.8)
Finance Companies	19.4 (20.9)	24.5 (22.7)	29.2 (21.9)	30.0 (19.6)	33.0 (18.8)	40.1 (19.7)
Merchant Banks	-	-	4.2 (3.1)	5.8 (3.8)	7.4 (4.2)	8.0 (3.9)
Discount Houses	-	-	2.5 (1.9)	3.0 (2.0)	3.6 (2.0)	4.5 (2.2)
National Savings Bank	2.7 (2.9)	3.0 (2.8)	3.4 (2.5)	4.1 (2.7)	4.6 (2.6)	5.1 (2.5)
Other[4]	11.3 (12.1)	10.9 (10.1)	8.0 (6.0)	6.2 (4.0)	6.9 (3.9)	9.9 (4.9)
TOTAL	**93.0 (100)**	**107.7 (100)**	**133.6 (100)**	**153.3 (100)**	**175.8 (100)**	**203.7 (100)**

Notes: [1] Refers to deposits of business enterprises (excluding non-financial public enterprises) and individuals.
[2] Excluding provident and insurance funds and other financial intermediaries
[3] Refers to demand, savings and fixed deposits, negotiable certificates of deposits and Repos.
[4] Refers to savings institutions and development finance institutions

Source: Bank Negara Malaysia, Annual Report, for various years.

On the other hand, deposits with other savings institutions and development finance institutions made up about 5 percent of the market in 1995. By and large, the size of deposits increased significantly, from MYR93 billion in 1990 to MYR203 billion in 1995.

3.2.3 Thailand

Meanwhile in Thailand, as shown in Table 3.5, over the six- year period, from 1990-1995, the Thai financial system also underwent substantial change. The total assets of the financial system expanded 2.8 times to reach Baht8,738 billion in 1995. This increase was largely due to the accumulation of assets by the non-bank financial intermediaries; reflected in a substantial increase in market share from 18 percent in 1990 to 23.8 percent in 1995. This reflects the importance of the non-bank financial intermediaries in the financial system of the country. The finance and securities companies, the largest institutions in the group, holding more than 60 percent, expanded 4.3 times to reach Baht1,588.1 billion in 1995. In fact, the finance and securities companies expanded their share from 12 percent to 18 percent of the total assets of the financial system as a whole, or, looked at in another way, 68 percent of the NBFIs' assets in 1990 and 76 percent in 1995.

On the other hand, if we look at the market shares of the commercial banks, we find that it has reduced slightly from 59 percent in 1990 to 57.7 percent in 1995. The vibrant growth experienced by the non-bank financial intermediaries contrasted sharply with the relative decline of the government financial institutions.[11] The share of central bank assets was reduced from 15.7 percent to 12.1 percent during the period under study. On the whole,

[11] The government owns Bank of Thailand, Specialised Banks and Small Finance Corporation of Thailand.

Table 3.5

THAILAND: Total Financial Assets and Market Share by Type of Financial Institution, 1990-1995 (in billion Baht)

	1990	1991	1992	1993	1994	1995
Bank of Thailand	481.1	580.8	669.9	761.1	852.7	1055.7
	(15.7)	(15.7)	(15.1)	(13.7)	(12.3)	(12.1)
Banks						
Commercial Banks	1806.6	2169.9	2555.6	3204.6	4065.1	5045.1
	(59.0)	(58.8)	(57.6)	(57.8)	(58.6)	(57.7)
Specialised Banks	223.4	252.8	284.9	351.4	434.8	556.1
	(7.3)	(6.9)	(6.4)	(6.3)	(6.3)	(6.4)
Government Saving Bank	*132.8*	*140.2*	*150.9*	*165.5*	*183.9*	*210.5*
BAAC[a]	*54.8*	*67.2*	*76.9*	*105.7*	*122.7*	*160.0*
Government Housing Bank	*35.8*	*45.4*	*57.1*	*78.3*	*111.8*	*154.1*
Export Import Bank of Thailand	-	-	-	*1.9*	*16.4*	*31.5*
Non Bank Financial Intermediaries	549.9	684.3	922.6	1224.4	1589.4	2081.1
	(18.0)	(18.6)	(20.8)	(22.1)	(22.8)	(23.8)
Finance & Securities Co.	*373.1*	*487.7*	*689.9*	*931.3*	*1223.5*	*1588.1*
Credit Foncier Companies	*5.0*	*5.0*	*6.2*	*7.4*	*7.1*	*7.9*
SFCT[b]	*0.2*	*0.2*	*0.6*	*0.6*	*0.7*	*1.6*
IFCT[c]	*38.0*	*47.8*	*57.1*	*70.4*	*90.2*	*118.1*
Saving Cooperatives	*65.0*	*65.0*	*75.0*	*98.0*	*126.8*	*194.0*
Agricultural Cooperatives	*15.4*	*15.4*	*17.7*	*24.0*	*26.8*	*36.0*
Pawnshops	*8.5*	*8.5*	*9.2*	*10.0*	*15.0*	*15.0*
Life Insurance Companies	*44.7*	*54.7*	*66.9*	*82.7*	*99.3*	*120.4*
TOTAL	**3061.0**	**3687.8**	**4433.0**	**5541.5**	**6942.0**	**8738.0**
	(100)	**(100)**	**(100)**	**(100)**	**(100)**	**(100)**

Notes: [a] Bank for Agriculture and Agricultural Cooperatives
[b] Small Finance Corporation of Thailand
[c] Industrial Finance Corporation of Thailand
Market shares are in parentheses

Source: Data supplied by the Economic Research Department, Bank of Thailand.

the aggregate share of the government-owned financial institutions declined from 23 percent to 18.5 percent in 1995. In terms of size, other NBFIs grew significantly over the period, though their shares as a whole remained relatively small compared to the finance and securities companies and other financial institutions. Notwithstanding the expansion in bank assets in Thailand, the structure of deposits has changed significantly. The declining role of the commercial banks as the preferred financial intermediary has reduced the share of bank deposits in the country's overall savings, while the share of savings mobilised by mutual funds and stock markets has grown steadily. As can be seen from Table 3.6, the share of commercial bank deposits shrank from 58 percent in 1990 to 39 percent in 1995 while that of market capitalization of the securities exchange rose from 25 percent in 1990 to 43 percent in 1995 and the share of savings in the form of holdings of mutual fund units grew from 1 percent to 2.4 percent in 1995. However, in terms of the

Table 3.6

Deposits by Type of Financial Institution, 1990-1995
(in billion Baht)

	1990	1991	1992	1993	1994	1995
Commercial Banks	1,440.8 (57.9)	1,751.5 (55.6)	2,035.1 (48.3)	2,425.1 (36.2)	2,760.9 (38.2)	3,249.9 (38.9)
Finance & Securities Companies	257.5 (10.3)	300.6 (9.5)	415.4 (9.9)	522.1 (7.8)	688.0 (9.5)	914.6 (10.9)
Life Insurance Companies	19.4 (0.8)	23.4 (0.7)	28.4 (0.7)	33.8 (0.5)	40.6 (0.6)	94.1 (1.1)
Government Savings Bank	112.8 (4.5)	120.6 (3.8)	131.0 (3.1)	143.5 (2.1)	149.0 (2.1)	182.1 (2.2)
BAAC	19.0 (0.7)	24.7 (0.8)	33.0 (0.8)	46.6 (0.7)	57.9 (0.8)	82.7 (0.9)
Government Housing Bank	25.4 (1.0)	32.4 (1.0)	42.5 (1.0)	47.5 (0.7)	59.5 (0.8)	72.3 (0.9)
Mutual Funds (net assets value)	*N/a*	*N/a*	43.7 (1.0)	149.2 (2.2)	174.8 (2.4)	197.6 (2.4)
Stock Exchange (market capitalization)	613.5 (24.7)	897.2 (28.5)	1,485.0 (35.2)	3,325.4 (49.7)	3,300.8 (45.6)	3,564.6 (42.6)
TOTAL	**2,488.4 (100)**	**3,150.4 (100)**	**4,214.1 (100)**	**6,693.2 (100)**	**7,231.5 (100)**	**8,357.9 (100)**

Notes: *N/a*: not available, figures in parentheses are market shares
Source: Data supplied by Economic Research Department, Bank of Thailand

deposit size of the commercial banks we can see that significant growth occurred, from Baht1,441 billion in 1990 to Baht3,250 in 1995. Similarly with the deposits of the finance and securities companies, life insurance companies, the Government Savings Bank, the Bank for Agriculture and Agricultural Cooperatives (BAAC), and the Government Housing Bank.

3.2.4 The Philippines

Like the other ASEAN countries, commercial banks have dominated the financial system in the Philippines banking sector. Looking at Table 3.7, we find that commercial banks comprise about 55 percent of the share of total assets as a whole in 1995 compared to a 46 percent share in 1990. In fact, their size has approximately doubled during the period. This expansion in their assets reflected the entry of two new domestic banks and ten new foreign banks into the financial sector.[12] In contrast, the central bank's assets and market share are of interest. Its market share significantly decreased from 40 percent in 1990 to about 22 percent in 1995. On the other hand, the assets increased between 1990 and 1993, then fell again between 1994 and 1995.[13] Thrift banks, which accounted for 3 percent of total assets in 1990, rose to 6 percent in 1995 which is largely attributed to the combined expansion of the savings banks (61 percent), private development banks (30 percent) and stock savings and loan associations (9 percent). Similarly, the Specialised

12 These two new commercial banks are the International Exchange Bank and China Trust Bank. However, during the year, under Resolution No. 1168 dated 11 October 1995 and MB Resolution No. 1464 dated 27 December 1995, BSP approved the conversions of PDCP Development Bank and Bank of Southeast Asia-Savings and Mortgage Bank respectively from thrift banks to commercial banks. More requests on this type of conversion are under the evaluation of the central bank.

13 With effect on July 3 1993, under the new Central Bank Act, the assets and the liabilities of the former CB were split between the new BSP and the CB-BOL (the former CB now operating as a Board of Liquidators). This financial restructuring followed the losses in its operations in the early 1980s allowing the BSP to improve its operations and also greater flexibility in the conduct of monetary policy (Bangko Sentral Ng Pilipinas, Annual Report 1994).

Table 3.7

THE PHILIPPINES: Total Financial Assets and Market Share by Type of Financial Institution, 1990-1995 (in billion Pesos)

Financial Institutions/Year	1990	1991	1992	1993	1994	1995
1. Central Bank	444.9 (39.9)	529.2 (40.7)	585.9 (39.2)	608.6 (34.9)	479.5 (25.4)	501.9 (21.7)
2. Commercial Banks	513.2 (46.0)	568.8 (43.7)	644.9 (43.2)	772.6 (44.3)	976.3 (51.8)	1272.4 (54.9)
3. Thrift Banks	37.3 (3.3)	46.9 (3.6)	59.6 (4.0)	74.0 (4.2)	104.0 (5.5)	140.9 (6.1)
a. Saving Banks	*21.7*	*29.6*	*36.3*	*44.4*	*67.3*	*86.3*
b. Private Dev. Banks	*11.2*	*12.1*	*16.8*	*22.0*	*27.9*	*42.1*
c. Stock Saving & Loan Associations	*4.4*	*5.2*	*6.5*	*7.6*	*8.8*	*12.5*
4. Specialised Government Banks	40.1 (3.6)	58.5 (4.5)	91.0 (6.1)	146.5 (8.4)	157.0 (8.3)	174.7 (7.5)
5. Rural Banks	13.9 (1.2)	15.5 (1.2)	18.2 (1.2)	22.2 (1.3)	27.6 (1.5)	36.0 (1.6)
6. NBFIs	66.0 (5.9)	82.7 (6.4)	94.3 (6.3)	119.2 (6.8)	141.9 (7.5)	191.5 (8.3)
TOTAL	**1115.0** **(100)**	**1301.6** **(100)**	**1493.9** **(100)**	**1743.1** **(100)**	**1886.3** **(100)**	**2317.4** **(100)**

Notes: Market Shares in parentheses
Source: Supervisory Reports and Studies Office, Bangko Sentral Ng Pilipinas

Government Banks, Rural Banks and the NBFIs, all recorded an expansion of their total assets. However, the proportions held by the rural banks are still very small despite expansion in terms of the numbers as we have seen earlier.

As banks expanded their geographical reach and widened their array of financial services, the deposit base of the system correspondingly expanded. When we observe the deposits size of the banking system, we find that the total deposit base grew from a mere P376 billion in 1990 to P1,378 billion in 1995 (Table 3.8). The commercial banks maintained their dominant position, accounting for more than 80 percent of deposits. This was followed by the thrift banks with 8 percent of the total, while specialised government banks, rural banks, private development banks and savings and loan associations accounted for the remaining 12 percent in 1995. The bulk of the deposits are in the form of savings deposits (63%), followed by time deposits (28%) and the remaining 9 percent in the form of demand deposits (BSP, annual report 1996).

Table 3.8

Outstanding Deposits[1] of the Philippines Banking System by Type of Institution, 1990-1995 (in billion Pesos)

	1990	1991	1992	1993	1994	1995
Commercial Banks	310.7 (82.6)	332.0 (81.4)	426.6 (79.7)	556.8 (80.6)	693.1 (81.4)	1,119.6 (81.2)
Thrift Banks	26.6 (7.0)	30.0 (7.4)	41.4 (7.7)	51.6 (7.5)	65.2 (7.7)	116.1 (8.4)
Savings Bank	17.3 (4.6)	19.4 (4.8)	27.9 (5.2)	33.3 (4.8)	42.2 (4.9)	62.4 (4.5)
Private Development Banks	6.3 (1.7)	7.0 (1.7)	9.1 (1.7)	13.0 (1.9)	16.9 (2.0)	41.0 (3.0)
Stock Savings and Loan Associations	3.0 (0.8)	3.6 (0.9)	4.3 (0.8)	5.3 (0.8)	6.1 (0.7)	12.7 (0.9)
Specialised Government Banks	5.2 (1.4)	7.7 (1.9)	15.4 (2.9)	17.1 (2.5)	10.3 (1.2)	0.2 (0.01)
Rural Banks	6.9 (1.8)	8.1 (1.9)	10.5 (2.0)	13.4 (1.9)	17.6 (2.1)	26.1 (1.9)
TOTAL	**376.0** **(100)**	**407.8** **(100)**	**535.2** **(100)**	**690.5** **(100)**	**851.4** **(100)**	**1,378.1** **(100)**

Notes: [1] Deposits include demand, savings and time deposits only.
Figures in parentheses are market shares.
Source: Bangko Sentral Ng Pilipinas, Annual Report for various years.

3.2.5 Indonesia

The assets of the Indonesian financial system approximately doubled from 1990 to 1995. Table 3.9 presents the structure of the financial system in terms of the assets size and market shares according to type of financial institutions. Despite the increase in the number of other credit institutions, the market share of these remained more or less the same over the period. On the other hand, the deposit money banks, which dominate the financial system, increased their share from 64.7 percent in 1990 to 75.5 percent in 1995 and their share as a whole increased from Rp133,598 billion in 1990 to Rp308,618 billion in 1995, reflecting an increase of more than double of the size. Both Bank Indonesia and deposit money banks on aggregate made up about 94 percent of the total assets of the financial institutions in 1995. Of the deposit money banks, national foreign exchange banks made up 49.8 percent in 1990, which increased to 61.8 percent in terms of market shares in 1995. The share of foreign banks, even though relatively small compared to the domestic banks, increased from 4.7 percent in 1990 to 7.4 percent in 1995. This reflects the government policy of encouraging competition from foreign institutions. Other commercial banks, consisting of banks undertaking domestic currency business, reduced their share from 5.2 percent in 1990 to 2.4 percent in 1995. Similarly, the size as well as the share of the development banks fell from Rp10,299 billion in 1990 to Rp9,765 billon in 1995 and from 5 percent to 2.4 percent of the total respectively.

Next in importance are the leasing companies, the assets of which doubled during the period, maintaining a share of 5.7 percent. Other credit institutions comprising village banks, rural paddy banks and government-owned pawnshops hold a very small percentage share of the financial system. However, their assets size also increased from Rp851billion to Rp2,087billion, an increase of more than double.

Table 3.9

INDONESIA: Total Financial Assets and Market Share by Type of Financial Institution, 1990-1995 (in billion Rupiah)

	1990	1991	1992	1993	1994	1995
Bank Indonesia	49045	55220	63885	68440	68116	74617
	(23.8)	(24.2)	(23.9)	(22.0)	(19.2)	(18.3)
Deposit Money Banks	133598	155255	182066	218434	251433	308618
	(64.7)	(68.0)	(68.2)	(70.1)	(70.9)	(75.5)
National Foreign Exchange Banks[1]	*102699*	*115812*	*138631*	*167425*	*194393*	*252783*
	(49.8)	*(50.7)*	*(51.9)*	*(53.7)*	*(54.8)*	*(61.8)*
Foreign Banks	*9777*	*12070*	*15175*	*18419*	*21937*	*30181*
	(4.7)	*(5.3)*	*(5.7)*	*(5.9)*	*(6.2)*	*(7.4)*
Other Commercial Banks[2]	*10823*	*12868*	*11009*	*12674*	*14174*	*15889*
	(5.2)	*(5.6)*	*(4.1)*	*(4.1)*	*(4.0)*	*(3.9)*
Development Banks	*10299*	*14505*	*17251*	*19916*	*20929*	*9765*
	(5.0)	*(6.4)*	*(6.5)*	*(6.4)*	*(5.9)*	*(2.4)*
Nonbank Financial Institutions[3]	4730	4180	4730	0	0	0
	(2.3)	(1.8)	(1.8)	(0)	(0)	(0)
Savings Banks[4]	268	334	473	0	0	0
	(0.1)	(0.1)	(0.2)	(0)	(0)	(0)
Insurance Companies	6204	4200	4600	11267	14415	-
	(3.0)	(1.8)	(1.7)	(3.6)	(4.1)	-
Leasing Companies[5]	11674	8192	9998	11758	18948	23437
	(5.7)	(3.6)	(3.7)	(3.8)	(5.3)	(5.7)
Other Credit Institutions[6]	851	935	1264	1513	1703	2087
	(0.4)	(0.4)	(0.5)	(0.5)	(0.5)	(0.5)
All Institutions	**206370**	**228316**	**267016**	**311412**	**354615**	**408759**
	(100)	**(100)**	**(100)**	**(100)**	**(100)**	**(100)**

Notes: [1] Including 7 state banks; the remainder are national private banks.
[2] National private banks undertaking only domestic currency business. Including one state saving bank since May, 1989.
[3] Nine investment finance, three development finance, and two other finance companies.
[4] One state savings bank and two private savings banks. Since May 1989, the state savings bank has been included as a deposit money bank.
[5] Gross assets for multi-use companies
[6] Village banks, rural paddy banks, and government-owned pawnshops.
Market Shares are in parentheses.

Source: Data supplied by the Indonesian Authorities.

In 1995, on average, time deposits comprise 57.8 percent of funds mobilised by the commercial banks, followed by demand deposits at 22.2 percent, with the remainder in the form of savings deposits (Table 3.10). Of this, the majority of time deposits are in Rupiahs (72%) and the rest are in foreign currency. Similarly, demand deposits in Rupiahs occupy 78 percent compared with funds in foreign currency, 22 percent in 1995.

Table 3.10

Funds[1] Mobilised by Commercial Banks by Type of Deposit as end of period 1990-1995 (in billion Rupiah)

End of Period	Demand Deposits Rupiah	Demand Deposits Foreign Currency	Demand Deposits Sub-total	Time Deposits Rupiah[2]	Time Deposits Foreign Currency	Time Deposits Sub-total	Savings Deposits	TOTAL
1990	15,124	4,130	19,254	38,789	15,450	54,239	9,661	83,154
1991	17,984	4,029	22,013	40,559	16,993	57,552	15,553	95,118
1992	19,464	4,298	23,762	45,182	20,437	65,619	25,469	114,850
1993	24,639	7,722	32,361	50,854	23,856	74,710	35,608	142,679
1994	29,750	9,347	39,097	62,382	28,608	90,990	40,319	170,406
1995	34,529	9,579	44,108	88,894	34,538	123,432	47,224	214,764

Notes: [1] Including funds held by the Central Government and non-residents
[2] Including certificates of deposits
Source: Bank Indonesia , Annual Report 1996/1997

To assist in a cross country assessment of the structure of the financial systems of the ASEAN-5 countries, Table 3.11 presents a summary countries according to type of institutions and their market shares in terms of assets for 1990 and 1995. In general, the financial systems of the five ASEAN countries are similar in that they consist of commercial banks, development finance institutions, specialised banks, contractual

Table 3.11

Number and Market Share (assets) by Type of Institution in ASEAN-5 Banking Markets, 1990 and 1995

	Singapore		Malaysia		Thailand		Philippines		Indonesia	
	1990	1995	1990	1995	1990	1995	1990	1995	1990	1995
Commercial Banks	141	140	39	38	30	29	30	45	169	240
	(66.7)	(65.9)	(45.3)	(45.8)	(70.0)	(65.7)	(76.5)	(70.0)	(78.3)	(89.4)
Domestic Banks	13	12	25	24	16	15	26	31	141	199
Foreign Banks	128	128	14	14	14	14	4	14	28	41
Finance	28	23	45	40	114	109	-		14	-
Companies	(5.7)	(6.2)	(13.7)	(14.3)	(16.1)	(22.3)			(3.0)	-
Merchant Banks	68	77	12	12	-		-		-	
	(16.0)	(14.8)	(3.8)	(4.2)						
Discount Houses	-		7	7	-		-		-	
			(1.7)	*N/a*						
Specialised Banks	-		7	7	2	3	807	793	28	27
			(2.1)	(1.9)	(3.5)	(4.5)	(8.1)	(11.6)	(6.5)	(2.9)
Savings Bank	1	1	1	1	1	1	103	99	2	0
	(7.3)	(7.1)	(2.9)	(2.4)	(5.1)	(2.7)	(5.6)	(7.8)	(0.1)	-
NBFIs	124	141	139	237	2695	5612	3700	6697	8265	9391
	(4.2)	(6.0)	(30.4)	(31.4)	(5.2)	(4.8)	(9.8)	(10.5)	(11.9)	(7.6)

Notes: In the Philippines, specialised banks include rural banks and specialised government banks. *N/a:* not available.
Source: Based on Tables 3.1, 3.3, 3.5 and 3.7

savings institutions and savings banks. The dominance of commercial banks is significant in that they form a large percentage of the market share especially in Indonesia, Thailand, the Philippines and Singapore, though a smaller percentage in the Malaysian banking system.

In Singapore, the number of foreign banks outnumbers domestic banks, comprising about 90 percent of the total commercial banks in the country but in the other ASEAN countries, domestic banks dominate the system. This perhaps contributes to the Singapore government's strategy of developing and promoting Singapore as an international financial centre with a highly open economic policy and liberal exchange rates.

In Indonesia, the number of commercial banks has increased significantly due to the fact that, in 1993, a number of non-bank financial intermediaries were converted to commercial banks. Also of importance is the increase in the number of foreign banks from 28 in 1990 to 41 in 1995. This reflects the policy of the government to encourage competition. Similarly, in the Philippines, the number of commercial banks also increased in 1995 due to the entry of ten foreign banks into the financial sector. It is worth mentioning that, in Singapore, Malaysia and Thailand, the number of domestic commercial banks was reduced by one in 1995 and the number of foreign banks remains unchanged. Specialised banks exist in all the countries, except Singapore. In the Philippines banking market, specialised banks occupied 11.6 percent of the market shares in 1995 from 8.1 percent in 1990. In Indonesia, the share of the specialised banks decreased from 6.5 percent in 1990 to 2.9 percent in 1995 and in Malaysia, the share fell from 2.1 percent in 1990 to 1.9 percent in 1995. In Thailand, the shares of the specialised banks increased from 3.5 percent in 1990 to 4.5 percent in 1995.

Finance companies form quite a significant share of the markets of Thailand and Malaysia while merchant banks are important in Singapore. But in all three countries, the number of finance companies decreased during the period under study. This is not surprising because, in Malaysia and Thailand for example, the finance companies did not perform as expected and many of them have been forced to liquidate or join with others. If we look at the saving banks, we find that their market share declined in Singapore, Malaysia, Thailand and Indonesia but increased significantly in the Philippines during the period, even though in all countries the share was relatively small.

Non-bank financial intermediaries (NBFIs) are more important in Malaysia than other countries, forming a 30 percent share of the total assets of the financial institutions. Similarly, NBFIs are important in the Philippines, comprising about 10.5 percent of the total in 1995. On the other hand, these institutions play a smaller role in Singapore, Thailand and Indonesia despite the fact that their numbers increased significantly during the period under study. There seems to be a decrease in the market shares of the NBFIs in Thailand, and Indonesia whereas the shares of NBFIs increased in Singapore, Malaysia, and the Philippines.

3.3 Bank Concentration Across the ASEAN-5 Countries

Various authors have examined and compared concentration across countries in the banking industry, for example, Honohan and Kinsella (1982) and, most notably, Revell (1987). Thornton (1991) also focussed on concentration in world banking and found that, over the period from 1979 to 1989, the percentage of banking assets accounted for by the world's largest 100 banks generally declined. His study also reveals that Japanese banks have become increasingly prominent amongst the world's largest banks, which nevertheless are predominantly western.

For the purpose of comparing bank concentration across the ASEAN-5 countries, we use concentration ratios based on a denominator consisting of total assets and total deposits of the three, five and ten largest banks in each country. The top ten banks for each country were obtained from the top 200 largest banks as reported in The Banker of

Table 3.12

Banking Concentration and Size of the Banking Sectors in the ASEAN-5 Countries, 1990-1995

Country	Year	Assets Size of the Banking Sector (in million US$)	Concentration in terms of assets and deposits					
			Assets of Largest			Deposits of Largest		
			Ten	Five	Three	Ten	Five	Three
Singapore	1990	115,105	60	53	40	63	57	41
	1991	126,035	63	56	41	63	57	41
	1992	142,684	63	55	41	61	55	39
	1993	163,868	67	57	42	66	58	41
	1994	209,008	63	54	40	63	56	39
	1995	240,895	64	54	40	62	55	39
Malaysia	1990	106,893	33	27	22	70	59	48
	1991	120,265	37	30	24	78	62	51
	1992	143,092	38	31	25	82	59	48
	1993	176,720	36	29	23	72	59	47
	1994	209,320	38	30	24	76	61	50
	1995	253,688	37	28	23	77	59	49
Thailand	1990	102,009	66	52	40	69	55	41
	1991	122,913	66	51	40	73	57	44
	1992	147,438	63	48	37	72	55	41
	1993	187,153	60	45	34	72	54	41
	1994	242,719	56	43	32	71	54	40
	1995	304,987	53	40	29	69	52	38
Philippines	1990	23,929	55	38	27	63	48	34
	1991	28,980	56	38	27	70	51	38
	1992	36,184	57	37	27	64	44	33
	1993	40,955	58	40	27	65	47	34
	1994	57,608	57	38	26	65	45	32
	1995	69,261	56	37	26	50	34	24
Indonesia	1990	83,382	72	56	38	76	60	41
	1991	86,548	72	53	36	69	53	35
	1992	97,503	73	53	36	68	51	32
	1993	114,197	71	49	32	68	47	30
	1994	131,790	64	43	29	64	43	27
	1995	143,681	66	43	29	59	38	25

Notes: Market size includes banks and non-bank financial intermediaries.
Figures for Malaysia relating to deposit size does not include provident and insurance funds and other non-bank financial intermediaries.

Source: Three, five and ten large banks were taken from top 200 Asians in The Banker for various years and BANKSCOPE where data are not available.

October 1991, 1992, 1993, 1994 and 1995 and 1996. [14]

Although each of the ASEAN-5 countries has at least ten well-known large banks that generally contribute to market concentration, there is only a modest concentration in the banking sector in Malaysia (Table 3.12). In Thailand, the higher concentration would appear to be promoted by severe restrictions on the entry of foreign and domestic banks. Surprisingly, however, concentration is relatively high in Singapore even though there are more foreign banks than domestic banks operating in the country. [15]

3.4 Financial Reforms in the ASEAN-5 Countries

In recent years, like other developing countries, the governments of the ASEAN-5 countries, have assigned a larger role to the private sector. They have recognised the increasing importance of the contribution of the private sector in improving financial intermediation in the process of economic development. Likewise, various efforts have been made to develop, liberalise and reform their financial sectors. It has been argued that the driving force behind financial innovations and reforms in the developing countries, has been market pressures from the developed countries and this has been substantiated by the ideas of McKinnon (1973) and Shaw (1973), as well as being most obviously and effectively recommended by the IMF and the World Bank. The policy implications of the

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14 For Singapore, only six banks were listed in the top 200 Asian banks reported in the Banker for 1991-1995, therefore the remaining four banks were obtained from BANKSCOPE.

15 The presence of foreign banks in the five ASEAN countries has stimulated the domestic banks to become active in the field of international banking. Several of these domestic banks (especially the larger banks) have set up offices in major cities all around Asia, the Pacific, Europe and the United States. In order to face stiff competition from banks all over the world, they have become very receptive to new banking concepts and innovations.

McKinnon-Shaw model are that economic growth can be increased by abolishing institutional interest rate ceilings, abandoning selective or directed credit programs, eliminating the reserve requirement tax, and by ensuring that the financial system operates competitively under conditions of free entry (Fry,1988). To this end, it is important that the financial sector mobilizes domestic resources and allocates them efficiently in order to finance productive activities and maintain macroeconomic stability.

In this section, we will look at the various measures taken by the ASEAN-5 governments to liberalise their financial sectors by emphasising the common elements of major reforms taken by all member states. We will divide the period under consideration into two phases: pre-liberalisation period and the liberalisation period of the 1980s and the first half of the 1990s.

3.4.1 The Pre-Liberalisation Period

Despite their differences in terms of the level of economic development, economic structures, and degrees of financial market sophistication, the financial systems of the ASEAN-5 countries prior to liberalisation shared many similar characteristics. Before the 1970's, for example, the financial systems of Malaysia, Thailand, the Philippines and Indonesia were characterised by a high degree of government involvement; not just by way of prudential supervision but also relating to the ownership of banks and financial institutions; to controls on the entry of new firms; to controls on international capital flows; and to the dictating of interest rates and often also in lending priorities, particularly for publicly-owned lending institutions (Adamos, 1992). This extensive government involvement in the banking and financial systems arose primarily from a desire to accelerate the pace of economic development. The theory introduced by McKinnon (1973) and Shaw (1973) predicts that pervasive government involvement in the financial system through the regulatory supervisory network tends to distort financial markets, adversely affecting the savings and investment decisions of market participants and also leading to the fragmentation of financial markets and financial dis-intermediation. The result is a financially repressed economy. The extent to which this has occurred varies from country to country but certain adverse consequences common to all countries are discernible.

Before liberalisation, the practise of dictating interest rates for lending and deposit taking reduced the scope of price competition among existing firms, thus contributing further to a deterioration in efficiency. According to Fry (1988), existing firms resorted to non-price competition; for example, by branch expansion, the construction of impressive buildings and massive advertising campaigns which thereby inflated the administrative costs, driving a wedge between loans and deposit rates of interests which meant that borrowers had to pay higher rates and depositors had to receive lower interest than that would have been the case with free competition. The state dictated lending priorities for lending institutions which then resorted to lax practices in loan appraisal in order to achieve their loan target levels, and this eventually led to substantial non performing loan positions in their asset portfolios. High default costs added to the real margin between lending and deposit rates, further inflating the intermediation costs and also causing the amount of loanable funds to dwindle. Central Banks often provided refinance to priority sectors against these loans to cover the shortages. In addition, the government often gave special privileges to the public sector banks which were lending to priority sectors indicated by the government: the exclusive privilege of handling the transactions of all public sector enterprises, for example, these protective covers and the attitude of these banks added further to the laxity of their management and hence to inefficiency.

Interest rate controls in the form of ceilings on the deposit and loan rates of commercial banks were pervasive in Malaysia, Thailand, the Philippines and Indonesia prior to the 1980's (Tseng and Corker, 1991). Before October 1978, Bank Negara Malaysia (BNM), the Central Bank of Malaysia, determined the maximum deposit rates and the minimum lending rates of commercial banks. The interest rate policy of the Central Bank did not adversely affect the level of interest rates in real terms owing to the low inflation rate in Malaysia at that time. In Indonesia, there were ceilings on interest rates on the deposits and loans of eight state banks, which accounted for almost 40 percent of total gross financial assets. The distortion in the structure and level of interest rates paid by the state and non-state banks was a consequence of the restrictions on interest rates paid by the state banks (Adamos, 1992). Prior to reform, the domestic interest rate structure of the Thai financial system was characterised by rigidity. According to Lian (1994), the two main causes of this rate rigidity were the rate ceilings imposed by the Bank of Thailand (BOT) and the oligopolistic pricing of interest rates. The former was a corner-stone of the credit selection policy; and the latter was the key to supernormal profits enjoyed by oligopolistic banks and any attempt to eliminate such profits overnight was met with strong resistance, often in the form of political pressure on the Thai authorities. Meanwhile, in the Philippines, during the period 1974-1980, the Monetary Board prescribed the maximum deposit and lending rates. Although the rates were often adjusted to reflect the prevailing market conditions, nominal interest rates were fixed below market levels and were mostly negative in real terms. The differentials between short and long term rates did not encourage term transformations of maturities by the commercial banks. However, the interest rates in the money market were not regulated and prospered until they collapsed in 1981 (Adamos, 1992).

With the exception of Singapore, where the government has never pursued a selective credit policy, another characteristic of the ASEAN-5 banking markets before liberalisation was credit ceilings and control. This is a form of direct control to regulate both the aggregate supply and selected allocation of credit. These controls typically involved ceilings on the level of growth of bank credit and directed credit schemes. According to Fry (1988, page 305), credit ceilings reduce efficiency in two ways. 'First, they limit all banks equally and hence impose an uneven rationing criterion because of the customer-market nature of bank credit. Secondly, credit controls reduce efficiency by destroying the competition for deposits'. These restrictions can be a direct cause of financial dis-intermediation, as savers and investors seek alternative sources of funds. Also banks often attempt to maintain their profits by imposing compensating balances and various fees and charges that are not subject to distortion in the provision of financial services.

In Indonesia, for example, there were credit ceilings on individual banks including the private and foreign banks; and within the overall credit ceilings there were sub-ceilings differentiated by various categories of loans. Liquidity credits were given at subsidized interest rates to banks to refinance low interest rate loans to priority sectors and ethnic pribumi (non-Chinese). Refinancing was automatic but the subsidised rates and the proportion of refinanced credits varied according to the type of loan. Malaysia also had selective credit programs since 1976 as part of a new economic policy to support small scale enterprises. This credit was estimated at 30 percent of the total bank credit; but the subsidy involved was small. Coincidently, ethnic criterion were used in Malaysia and Indonesia in their selective credit policies and these criteria were clearly concerned with wealth and income redistribution rather than economic growth. The Philippines had various directed credit programs until the early eighties. In addition, the government influenced the allocation of credit of two major government owned banks: the Philippine National Bank and the Development Bank of the Philippines (Adamos , 1992). Meanwhile in Thailand, commercial banks were directed to allocate a minimum of 13 percent of their total lending to agriculture. This requirement could be satisfied by depositing the funds at rates below the market rates of interest with the Bank of Agriculture and Agricultural Cooperatives.

Restrictions on the entry of new firms, particularly into specific activities, limited competition and invited inefficiency. This situation prevailed in Indonesia, Malaysia, Thailand and the Philippines. New firms, especially foreign firms, were extensively regulated or even prohibited. The most widely cited reason was caution on the part of the government. Even the activities of foreign banks where allowed were restricted. Since 1977 up till now, the Bank of Thailand did not granted any branch licence to new foreign bank although however is liberal in granting licences to representative offices. The Malaysian government policy on bank entry between 1976 and 1986 was to restrict the issue of licences to new commercial banks and merchant banks. The Philippines, on the other hand, under the General Banking Act did not specifically prohibit establishment of foreign bank branches in the country, except for the limitation which prohibited new foreign banks from accepting deposits. This might have discouraged foreign banks from opening branches there. Meanwhile, from 1976-1986, the Indonesian government prohibited foreign banking operation outside Jakarta.

The presence of foreign banks can be useful in several respects, especially relating to the development of trade and foreign investment. According to Putong (1992), they can help stimulate trade flows and facilitate the entry of direct foreign investments. Foreign banks are likely to have experience, expertise and superior technology in conducting international operations. On the other hand, the presence of foreign banks can be a threat, especially to small and weak domestic banks. Indeed, if there is stiff competition, local banks may not be able to compete with the more efficient and experienced foreign banks. There may also be the danger of capital transfer which will not only harm the banking system but the economy as a whole.

Government ownership in the banking sector is still pervasive in Malaysia, Thailand, the Philippines and Indonesia but has always been predominantly private in Singapore. In the Philippines, for example, the government owns the Philippine National Bank and the largest deposit-taking financial institutions, holding about one-third of the total bank assets of the Philippines. In Indonesia, state-owned banks have dominated the banking system as well as the entire financial system.[16] Meanwhile, in Malaysia, the government holds a majority stake in the country's two largest banks: Bank Bumiputra Malaysia Berhad, and Malayan Banking Berhad. At the end of 1995, the government of Thailand owned 18.5 percent share of the total assets of the financial system (Bank of Thailand, 1995). Though banking in Singapore is privately-owned, the government still owns the POSbank, a saving institution holding about 7 percent share of the total assets.

16 Particularly Bank Negara Indonesia, Bank Rakjat Indonesia, Bank Bumi Daya and Bank Dagang Negara are very large. However, there have been significant inroads into this dominations particularly in the period following PAKTO 27 introduced in October 1988 (Cole and Slade, 1995).

3.4.2 Financial Liberalisation in the 1980's and the first half of the 1990's

The 1980's saw serious financial problems in Malaysia, the Philippines, Thailand and Singapore (See Table 3.13). In Malaysia for example, the failure of one deposit taking cooperative (DTC) in 1986 caused runs on 32 out of 35 DTCs in the country. In addition, four commercial banks and four finance companies were also in distress and the government had to rescue 24 insolvent cooperatives and consolidate and merge weak finance companies. Bank Negara Malaysia had to inject fresh equity capital and replaced the management of some banks. In Thailand, the government had to liquidate 24 finance companies and to merge another 9 and the Bank of Thailand took over the other 17 and sold them to new investors. It was estimated that the government incurred a cost of US$190 million or 0.48 percent of the GNP as a result of bailing out 50 finance companies. In 1982, the domestic commercial banks' non-performing loans in Singapore rose to about US$200 million or 0.63 percent of the GDP (World Bank, 1993). Meanwhile, between 1981 and 1987, in the Philippines,161 smaller institutions, holding 3.5 percent of the total financial assets of the financial system, closed down. The authorities had to intervene in two large government and five private banks. The government banks were liquidated in 1986, and their largest non-performing loans were transferred to the national government. The private banks remained in varying stages of Central Bank supervision.

As elsewhere in the world, financial reforms were introduced into these countries following the realization by the authorities that the efficiency of their financial systems could be improved as a result. The key features of the liberalisation programme included, among other things, the deregulation of interest rates and reducing controls on credit, accompanied by the strengthening of the supervisory framework, with a view to promoting

Table 3.13

Nature, Causes, and Resolution of Bank Crises in ASEAN

Country	*Nature of Bank Crises*	*Causes*	*Nature of Bailout or Rescue*
Malaysia 1985-1988	The failure of one DTC in 1986 caused runs on 32 (of 35) others. In addition 4 (of 38) banks and 4 (of 47) finance companies were also in financial distress. Overall, 10.4 percent of banking system deposits were affected.	- Fraud and speculation in real estate and stocks. - Deterioration in terms of trade	The government rescued 24 insolvent cooperatives and consolidated and merged weak finance companies. The BNM injected fresh equity capital and replaced management of some banks
Thailand 1983-1987	Government's cost to bail out 50 finance companies was estimated at US$190 million, or 0.48 percent of GNP. Five commercial banks accounting for 24 percent of commercial bank assets were in financial difficulties in 1986-87.	Fraud and speculation on real estate and exchange rate transactions.	The government liquidated 24 finance companies and merged another 9, and the central bank took over the other 17 and sold them to new investors (including other banks).
Singapore 1982	Domestic commercial banks's nonperforming loans rose to about US$200 million, or 0.63 percent of GDP.	Macro-economic reasons.	The government worked out a two-year write-off period (using tax breaks).
Philippines 1981-1987	161 smaller institutions holding 3.5 percent of total financial system assets were closed. Problems in 2 large government banks and 5 private banks. The government banks caused the authorities large bad assets (approximately 30 percent of banking system's assets)	Macro-economic factors. Inadequate supervision and mis-management	The government bank was liquidated and their bad debts were transferred to the national government. The private banks are in varying stages of Central Bank supervision, and are up for privatisation.

Source: World Bank (1993), Central Bank of the Philippines, Review (1992) growth and deepening financial markets. The liberalisation of domestic financial systems was also accompanied by a relaxation of the restrictions on international capital flows and a shift towards a more flexible exchange rate arrangement.

The implementation of financial liberalization varied widely across these countries in terms of both the pace and the scope of reforms (Tseng and Corker, 1991). Singapore, for example, largely liberalised its financial system and abolished capital controls in the mid-1970s. However, since Singapore already had a relatively developed financial sector, the government reforms of the 1980s focussed mainly on improving the existing financial institutions and markets. Malaysia embarked on financial reforms towards the end of 1978, as did the Philippines in 1980, Thailand in 1981 and Indonesia in 1983. The main elements of the reform programmes are described below.

i. Liberalisation of Interest Rates

The liberalisation of interest rates has been a prominent feature of the financial reforms implemented by the ASEAN-5 countries, the main objectives being to promote savings and investments and to deepen the financial markets. In 1981, the Central Bank of the Philippines deregulated all bank interest rates except for short-term lending rates. In July 1982, administrative ceilings on all interest rates on deposits were lifted followed by the removal of those covering medium and long-term lending rates. By the end of 1982, deregulation was completed with the removal of the remaining ceiling on short-term lending rates (BSP, 1995).

The full market orientation of interest rates was pursued primarily to encourage more savings in banks, to improve domestic resource allocation and to deepen financial markets. In Thailand, the Bank of Thailand moved towards freeing control on interest rates. For the period between January 1980 and May 1989, the ceiling rates of bank deposits and loans were revised frequently to ensure both a positive deposit rate and a more competitive loan rate environment. The year 1989 was significant because the Thai authorities moved decisively towards a completely liberated interest rate regime. In June 1989, the Bank of Thailand removed the ceiling on long term deposits and in March 1990, ceilings on all types of deposits were abolished. Finally in May 1992, the ceilings on loan rates was removed (Lian, 1994). In late 1981, Malaysia introduced a new interest rate mechanism using a base lending rate (BLR). The commercial banks subsequently shifted away from the use of the prime rate, which was controlled by the monetary authority during 1978-1981. From November 1, 1983, the interest rates of every bank and finance company (except for those charges to priority sectors) were linked to the BLRs of the respective banks which was based on the cost of funds, after providing for the cost of statutory reserves, liquid assets requirements and overheads. Effective from February 1991, the BLR of the banking institutions was completely freed from the administrative control of the Central Bank (BNM, 1994). Each commercial bank and finance company was free to declare its own BLR on the basis of its own cost of funds, including the cost of holding statutory reserves, meeting the asset requirement, and managing the administrative and overhead costs but excluding the cost of provision for bad and doubtful debts. In Indonesia, the removal of interest rate ceilings which were applicable only to the state banks - the dominant institutions in the banking system - was introduced in June, 1983 to expand activity, improve the efficiency of banks and to compete vigorously with the private banks.

ii. Removal of Entry Barriers

Efforts were made by the five ASEAN countries to enhance bank efficiency by increasing competition, reducing obstacles to competition and market segmentation and relaxing the activities of foreign banks. Before the reforms, there were four foreign banks operating in the Philippines; namely: the Bank of America, Citibank, the Hong Kong and Shanghai Banking Corporation and the Standard Chartered Bank. In May 1994, the entry and scope of operations of foreign banks was liberalised. Under the new law, foreign banks are allowed to enter, provided that the new foreign banks were of sufficient size, experience and be among the top 150 international banks or the top five banks in their domestic market. By the end of 1995, there were 10 new foreign banks operating in the Philippines.[17]

At present the Malaysian government does not encourage foreign banks to open branches anywhere in the country. However, in compliance with Section 4 of the Banking and Financial Institutions Act, 1989 (BAFIA), which requires that only public companies can be licenced to conduct commercial banking business, by October 1,1994, the foreign bank branches operating in Malaysia had become locally incorporated, fourteen of these foreign banks transferred their branch operations in Malaysia to their locally incorporated subsidiaries, which were permitted to remain wholly-owned by the respective foreign banks. The two remaining foreign banks sold their Malaysian branch operations to Malaysian interests. As a result, as of December 31, 1994, there were 37 locally incorporated commercial banks in the country, excluding the Bank Islam Malaysia Berhad,

17 These include The Bank of Tokyo Limited, Korea Exchange Bank, The Fuji Bank Limited, The International Commercial Bank of China, International Nederlanden Groepe Bank, Deutshe Bank AG, Bangkok Bank Public Co. Ltd., Chemical Bank, Australia and New Zealand Banking Group (ANZ), and Development Bank of Singapore (BSP Review, 1995).

of which 14 were wholly owned by foreign banks (BNM, 1995).

Since 1977, up till now, the Bank of Thailand has not granted any branch licence to new foreign banks. The bank is however liberal in granting licence to representative offices. The package of reforms introduced by the Indonesian government on October 1988, encourages foreign bank entry into the country's domestic banking system in the form of joint ventures with the national banks. Foreign banks may also own up to 85 percent of the outstanding equity share of joint venture banks. However, they can open branches in only seven states namely; Jakarta, Surabaya, Semarang, Bandung, Medan, Denpasar and Ujung Pandang. They are required to extend export credits to the outstanding level which should reach 50 percent of the total credits of the branch. Only those foreign banks in countries where Indonesia has reciprocal arrangements are allowed to establish branches. This is in contrast to Singapore, where foreign banks (including offshore banks) make up 91% of the total number of commercial banks. The significant number of foreign banks compared to its local counterparts is attributed to the highly open economic policy and liberal exchange rate policy exercised by the Singapore government.

The entry of more foreign banks into the local mainstream of the five ASEAN countries is expected to open the gateway to new financial instruments and services, to introduce new technology and to provide competition for the domestic banks. The removal of entry is not only confined to the foreign banks. In Thailand, for example, the government decided to open up the banking system to new entrants in its five-year Financial System Master Plan, from 1 March 1995 to 29 February 2000, and in the General Agreement on Trade in Services (GATS) (The Banker, 1996).

iii. Reductions in Credit Control

Overall, direct credit controls on bank lending have been largely reduced or eliminated in Indonesia, Malaysia, Thailand and the Philippines. In June, 1983, bank credit ceilings were also abolished in Indonesia. Moreover, in January 1990, Bank Indonesia's subsidized refinancing facilities, which gave credit to banks at below market interest rates from 3% to 14.5%, and which then lent to priority sectors at below-market interest rates, were abolished (Cole and Slade, 1995).

iv. Improved Supervision of Banks

During the liberalisation period, all the ASEAN-5 countries implemented measures to restructure failing financial institutions and to strengthen the supervision of other financial institutions. The governments of the ASEAN-5 countries have imposed several regulations to enhance the solvency of financial institutions. These include strengthening prudential regulations and supervision and restructuring ailing institutions in the financial sector. The Bank of Thailand has been assuming a more active supervisory role focussing on bank capital adequacy which would be brought into levels recommended by the Bank International for Settlements (BIS). In Malaysia, the Banking and Financial Institutions Act of 1989 (BAFIA) came into force on October 1989.[18] Thus BAFIA has effectively replaced the Banking Act of 1973 and the Finance Companies Act of 1969 and represents a consolidation and review of previous banking legislation, having incorporated all the past experiences of Bank Negara and also having rectified weak areas in the law to provide a

18 BAFIA does not however affect Islamic Banking Act 1983. BAFIA provides a framework which enables the Central Bank to supervise three broad group of financial institutions namely; licenced institutions, scheduled institutions and non-scheduled institutions (BNM, 1994).

comprehensive framework governing the operation of the financial system. A major reform in the Philippines was made in 1993 with the signing of the law, creating an independent central monetary authority, the Bangko Sentral Ng Pilipinas (BSP) to replace the old Central Bank of the Philippines (CBP). This reform is aimed at granting BSP greater fiscal and allowing administrative autonomy, allowing it to conduct its monetary policy with greater effectiveness.

v. Divergence of Bank Ownership

With the exception of Singapore, banks in the Philippines, Thailand, Malaysia and Indonesia have been characterised by a high degree of government involvement, either directly, through government owned banks and other financial institutions, or indirectly, through extensive regulations and administration controls on the extension of credit and interest rates. The need to dilute the concentration of bank ownership was seen as a necessary step to weaken the oligopolistic banks. In Thailand, the first attempt came with the passage of the Commercial Banking Act (1979) which gave the banking system five years to comply with the ruling that an individual shareholding in a commercial bank cannot exceed 5 percent of the shares outstanding. According to Lian (1994), the purpose was to change Thai commercial banks from family controlled institutions into investor-controlled entities. In Indonesia, with the introduction of new regulations following PAKTO 27 which was introduced in 1988, the power's structure of the state banks changed considerably (Cole and Slade, 1995).

3.5 Conclusion

The reason why different financial systems have emerged in the various global economies lies not only in historical precedents, but also in the differences in prevailing macroeconomic and institutional situations and the stage of financial development as well as the regulatory environment. In the case of Singapore, for example, which is characteristic of economies which are not endowed with abundant natural resources, which have small domestic markets and a small population, the financial sector is promoted as a key growth sector of the economy. The importance of the financial sector can be clearly seen when we look at the per capita bank deposits, which stood at US$ 21,770 in 1995 compared to US$3,247 in Malaysia, US$2,013 in Thailand, US$455 in the Philippines and US$444 in Indonesia. Singapore has established itself as an important regional financial sector particularly in the area of international banking and foreign exchange markets. A key strategy was been the liberalisation of the sector in order to attract international banks and other financial institutions to operate in Singapore's domestic financial markets. In view of the high contribution of the financial sector to economic growth, the development of the sector remains important.

Meanwhile, countries like Malaysia, Thailand and the Philippines have also experienced significant growth, which is clear from the fact that the share of the financial sector in GNP has more than doubled in the past two decades. Other indicators such as total financial assets point to significant financial deepening and broadening in the region. The impetus for this financial sector development has been mainly come about through the conscious efforts by the government to liberalise and develop the sector to complement the broad economic and structural adjustment programmes. This is to ensure that the domestic financial sector will be able to develop and serve the changing needs of the expanding global economy. Furthermore, adequate prudential and supervisory frameworks have been put in place to strengthen the financial systems and to ensure the effectiveness of the supervisory role of governments.

With regard to market structure, by 1995, the banking market in Indonesia was more highly concentrated than others, whereas market concentration in Malaysia was significantly lower. Moreover, there appears to have been an increase in the concentration of the banking markets of Singapore, Malaysia and the Philippines whereas the opposite is true for Thailand and Indonesia though the difference is marginal.

All the ASEAN-5 countries have taken gradual, phased and continuous steps to liberalise their domestic financial sectors with the intention of allowing for smooth adjustment to the new financial sector environment rather than comprehensive liberalisation. The ultimate aim has been to promote efficiency in mobilising and allocating funds for economic development through market-oriented financial systems.

CHAPTER 4

STRUCTURE, CONDUCT AND PERFORMANCE IN BANKING

4.1 Introduction

This chapter contains an overview of the theoretical concepts of market structure and bank performance. Section 4.2 focuses on the definitions of market structure and bank performance and Section 4.3 discusses the relationship between the two. Some of the measures of market structure and performance which have been used in the banking literature are examined in the following sections, Section 4.4 and 4.5. To understand clearly the relationship between market structure and performance we examine the hypotheses relating to this relationship in Section 4.6. Finally section 4.7 offers some conclusions.

4.2 Definitions of Market Structure, Conduct and Performance

Before we go into further details of the relationship between market structure and performance, perhaps some definitions of the terms market structure, conduct and performance are important to aid our understanding of the link between market structure and performance. This will be discussed in the following subsections.

4.2.1 Market Structure

A market is defined as a mechanism through which buyers and sellers exchange goods and services with the desired terms of sale. Shepherd (1985) defines the market as a group of buyers and sellers exchanging goods that are highly substitutable. Close substitutes are in the market; other goods are outside it. Substitutability may be measured in terms of cross-elasticity of demand, which shows how sharply a price change for one product will cause the quantity sold of another product to change. Cross-elasticity of demand would be expected to be high between products within the market and low against the products of other markets. Houck (1984, page 356) defines a market as:

> A collection of actual or potential buyers of a specific good or service. This collection has two characteristics: (1) none of the buyers has the option of purchasing the item from sellers outside this collection and (2) none of the sellers has the option of selling the item to buyers outside this collection. The interaction of these buyers and sellers generates a set of interrelated prices and conditions of sale or use. The principles or facts determining which buyers and sellers are in this collection identify the market spatially, temporally, and politically.

In the context of banking, it is rather difficult to delineate the boundaries for banking market. The cross-elasticity of demand mentioned above, defines market from the point of view of the suppliers whereas it is important to include both the customers and banks when market is defined. According to Rose (1987), banking markets may be viewed in terms of the 'transaction costs' [19] between buyers and sellers. What shape the boundaries is the magnitude of marginal transaction costs relative to the benefits received by both customer and bank in searching the market. For example, checking accounts for the household is considered local banking services because the benefit (*i.e*, the expected profit) to a bank from selling each additional deposit unit and the marginal benefit (*i.e.*, expected savings) to a customer in searching alternative sources of deposit supply are low relative to the marginal transactions costs that must be incurred. On the other hand, the market for mortgages is broader in scope because the additional benefits from identifying the optimal mortgage loan term are great (to borrowers) relative to the additional transactions costs involved.

Rose (1987) also observes that, in defining the banking market, customer and size of bank are also other factor that influence the dimensions of a banking market. As a general rule, the larger the customer (in terms of sales or income) and the larger the bank, the larger will be the market. For example, loans to large companies are traded in national or international markets whereas personal loans to households are predominantly the services of the small local banks.

The problem of defining the scope of banking markets is more complex when considering banking as a multi product industry. A similar bank may compete for both the local market and in national and international market. For this reason, banking markets in the US have been approximated by the Standard Metropolitan Statistical Area (SMSA) or by some counties.

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19 Transaction costs include the time and expense incurred in searching for information concerning the availability of product and prices, the costs of communication and delivery and commissions or fees needed to enlist the services of a broker or dealer.

Structure, on the other hand, describes the characteristics and composition of markets and industries in an economy. Structure can also refer to the number and size distribution of firms in the economy as a whole and also relates to the importance and characteristics of individual markets within the economy. In the context of banking, Rose (1987) defines structure as the number of banks and competing nonbank financial service firms serving in a given market, the particular services they offer in that market, the size distributions of banks and bank customers, the barriers to market entry, and the geographic dispersion of both banks and their customers. Greenbaum (1971) points out that the structure of banking also relates to aspects of organization and control of the banking industry. Thus, structure may also be described by the type of ownership, the number of bank offices and other properties.

There are several types of markets which describe the structures of the firm, from markets with many firms which are equal in size with competitive rivalry to markets where there is only one supplier of financial services. The various categories of market, as presented in Table 4.1, have been defined to reflect the degree of competition. At the extremes are *pure monopoly* with just one firm and *pure competition* in which there are many competitors, none having any significant influence on the market.

There are two main 'internal' elements of market structure: market share and concentration. The *market share* ranges from 100 percent down to nearly zero - *i.e.*, from pure monopoly to a small share that, in itself, prevents complete monopoly power. *Concentration*, on the other hand, is measured in terms of the combined market shares of the largest firms in the market.

A further aspect of market structure is 'external': the existence of barriers to entry. For

Table 4.1

Types of Market

MARKET TYPE	MAIN CONDITION	FAMILIAR INSTANCES
Pure monopoly	One firm has 100 percent of the market	Electric, telephone, water, bus, and other utilities
Dominant firm	One firm has 50-100 percent of the market and no close rival	Soup(Campbell), razor blades (Gillette), newspapers (most local markets), film (Eastman Kodak)
Tight oligopoly	The leading four firms, combined, have 60-100 percent of the market; collusion among them to fix prices is relatively easy	Cooper, aluminium, local banking, TV broadcasting, light bulbs, soaps, textbook stores
Loose oligopoly	The leading four firms, combined, have 40 percent or less of the market; collusion among them to fix prices is virtually impossible	Lumber, furniture, small machinery, hardware, magazines
Monopolistic competition	Many effective competitors, none with more than 10 percent of the market	Retailing, clothing
Pure competition	Over 50 competitors, all with negligible market shares	Wheat, corn, cattle, hogs, poultry

Source: Adapted from Shepherd (1985, page 4)

instance, in a particular market there may exist a potential competitor ready to enter the market and likely to increase rivalry in the market. Anything that decreases the likelihood (or slows down the process) of these potential competitors coming into the market is a barrier to entry. In contrast, the entry of firms into the market is considered as a catalyst to competition, and theory suggests that, if the number of firms in the market increases, it will become more competitive and therefore less concentrated.

Thus a market's structure is comprised mainly of the market shares of its firms and, to a lesser extent, any barriers against new competitors. Each market's structure is somewhere in between monopoly (a high market share and entry barriers) and pure competition (a low market share and low barriers).

4.2.2 Conduct

Conduct, according to Ferguson (1988) refers to the behaviour (actions) of the firms in a market, to the decisions these firms make and also to the way in which these decisions are taken. It therefore focuses on how the firms set prices, whether independently or in collusion with other firms in the market. It also influences the way the firms set policies on advertising and other matters such as research and development.

Different types of market structures will influence the conduct/behaviour of the firms. For example, under pure competition, each firm is a price taker and has no significant influence on price. Under imperfectly competitive market structures such as monopoly, each firm in the market believes that it can influence the price by changing the quantity of goods or services it produces.

How the conduct/behaviour of the firms influences the firm will be discussed in Section 4.3.

4.2.3 Performance

Profitability, performance and efficiency are all interrelated in one way or another. Profitability measurement assesses the relationships among different components of cost and revenue and provides a common basis for evaluating financial performance across businesses. It often emphasizes the bottom line and the profitability of an activity. More specifically, performance measurement is the quantitative assessment of efficient progress towards achieving a particular goal. In general, therefore, performance can be divided into two elements: profitability and efficiency. Profitability is the main index of a firm's economic performance. Efficiency on the other hand, refers to how well a firm can yield a maximum value of outputs from a given total of inputs. For the market as a whole, efficiency refers to the efficiency of the market in utilizing scarce resources to meet consumers' demand for goods and services; that is, how well they have contributed to the optimization of economic welfare. The concept of efficiency will, however, be discussed in more detail in the Chapter 5.

In the case of banks, performance may be particularly affected by factors such as concentration in the local market, asset and liability management and the structure of branching. Moreover, like other firms, the structure and the behaviour of banks will affect their market performance. This link will be discussed in the following section.

4.3 The Relationship Between Market Structure, Conduct and Performance

It has been suggested that a bank's market structure influences to some degree its behaviour and performance. In other words, there exists a relationship between structure, conduct/behaviour and performance. Structure can be considered as a major determinant of the degree of competition and the resultant performance in a particular market. The general view is that competition in a more concentrated market will be less vigorous as compared to a less concentrated market and, as expected, the performance of more concentrated markets may be less desirable in social terms.

The theory of markets focuses on those aspects of market structure which have an important influence on the behaviour of firms and buyers and on market performance. Market performance is in turn determined by the interaction of market structure and market conduct while market performance has an effect on market structure and conduct. This is best illustrated by the descriptive model in Table 4.2, which has been widely used in studies of industrial organizational structure.

Table 4.2

The Structure-Conduct-Performance Model

External Factors	*→ Structure*	*→ Conduct*	*→ Performance*
Available technological methods for the production and delivery of financial services			
Regulatory supervision by federal and state authorities			
Economic conditions (level and growth of production availability and cost of productive resources, elasticity and growth of demand, and the price and availability of substitute products and services) →	Structure of banking markets (number and relative sizes of competitors supplying and demanding banking services, entry barriers, and geographic dispersion of suppliers and demanders) →	Bank management strategy and objectives(including pricing behaviour, marketing programs and goals, new service innovations, and the development of new production and delivery systems) →	Price, quantity, and quality of financial services offered to the public
Demographic factors (distribution, growth, and social profile of the population to be served)			

Source: Adapted from Rose (1987, page 36)

A market structure involving many firms of equal sizes is often assumed to generate superior performance. In this highly competitive market, excess profits above a normal return are quickly eliminated by the existing and new competitors. In the end, no one firm is likely to dominate the market. As Scherer (1982) points out that in the SCP model, markets that are characterised by one or a few firms with significant size disparities are more likely to be characterised by coordination of policies and collusive agreements. This will in turn lead to inferior performance in terms of the quality and the quantity of the services offered, higher prices, and profits that exceed a normal return.

4.4 Measures of Market Structure

A major problem associated with structure-conduct-performance studies in banking relates to a seemingly simple but controversial issue; namely, how do we measure bank structure and performance. Generally, as mentioned above, banking structure will refer to the number, size and location of banks in a market, but the problem of characterising banking structure by size and concentration involves setting criteria for size, choosing a method of determining significant market areas, defining products and taking into account the influence of all competitors upon these markets.

Cameron (1972) identifies two measures of banking structure: (1) quantitative measures such as density, measured as a ratio of the number of bank offices to either population or area; the size of the banking system relative to the total economy; the size distribution of banks within the system; and, the geographical concentration or dispersion of bank offices, and (2) non quantifiable aspects such as the legal status of banking which may range from absolute prohibition to free banking.

Three major problems may arise when measuring the structure of a banking market. These are: (1) defining the scope of the banking industry; for example, whether or not to include all the financial institutions; (2) ascertaining whether the market is exclusively national or whether it extends to international banking and; (3) choosing a method of measuring the size of the institutions.

In defining the scope of the banking industry, the majority of US researchers include only the commercial banks in their studies; for example, Edwards (1964), Fraser and Rose (1971), Smirlock (1985) and Evanoff and Fortier (1988). On the other hand, Goldberg and Rai (1996) include commercial and saving banks in their study on 11 European countries, and Molyneux and Teppet (1993), Lloyd-Williams *et. al.* (1994), and Molyneux and Forbes (1995) include all relevant financial institutions in their research design.

The majority of US studies focus on the local domestic banking markets, usually defined as the Standard Metropolitan Statistical Areas (SMSA) but sometimes as rural counties, while studies such as those undertaken by Short (1979), Bourke (1989) and Goldberg and Rai (1996) focus on national banking markets, thus treating each single country as a market and eliminating the kind of problem that arises in defining local areas for each country.

In measuring size, the use of total assets is far from ideal, either for measuring concentration or for acting as a denominator of various other ratios. Another measure of size is total deposits but its shortcoming is that it includes both domestic and international deposits. In addition, the term total deposits can be defined in a number of ways; including or excluding interbank; foreign currency and non-resident deposits. Size can also be measured using the shares of demand deposits in differing size categories; for example, segregating customers according to size of accounts. Yet another measure for size is in terms of the total credits of the banking firm. However, this measure is seldom used empirically.

The degree of concentration of banking resources can be categorised into static and dynamic measures. Static measures define concentration at a *single point of time* whereas dynamic measures examines focus on *changes* in concentration across time.

Static Measure

The traditional measures of static market concentration include the number of firms serving the market as of a given date and the percentage of financial resources such as assets, deposits and loans, controlled by the one, two,......*k* largest bank in the market.

The first static measure commonly used in the banking studies is simply the number of banks (*N*) in the market area. This method has a disadvantage in the fact that it ignores the relative size distribution of competing firms in the market.

The second static measure is the concentration ratio. The concentration ratio shows the share of the total market (*e.g.* measured by employment, sales, assets, deposits, and credits) that is accounted for by relatively few of the largest firms in that particular market. The fewer the number of firms and/or the more disparate their sizes, the more concentrated (and less competitive) the market. For example, one, two,.....*k* concentration ratios measure the proportion of banking sector assets or deposits controlled by the one, two,....*k* largest banks in the markets. The calculation of concentration ratio is as follows;

$$CR_x = \sum_{i=1}^{x} S_i \qquad \textbf{4.1}$$

where *CR* is the *x* firm concentration ratio, and *S* is the percentage market share of the *i*th firm. *x* can be taken as any value, one, two, three, or five being the most usual in empirical research in banking. A value which is close to zero would indicate that the largest *x* firms supply but a small share of the market, whereas 100 percent would indicate a single supplier. However, using the concentration ratio has its disadvantages: the selection of the number of firms to be included is highly arbitrary and ignores the structure of the remaining firms in the market, *i.e.*, the medium-sized and small firms.

However, these shortcomings mentioned above may be partially corrected using an alternative measure of market concentration such as the Herfindahl-Hirschman index (HHI), entropy, Lorenz curve, Hall-Tideman Index and the dominance index developed by Kwoka (1977).

The Herfindahl-Hirschman index (*HHI*) by Hirschman (1964) takes into account the number and market shares of all firms in the market .[20] It is calculated by summing the squared market shares (in percentage terms) of all firms as follows:

$$HHI = \sum_{i}^{n} \left[\frac{s}{j} \right] \qquad \textbf{4.2}$$

where *n* is the number of firms in an industry and *S* is the percentage of deposits or assets controlled by the *i*th firm and *j* is total market share. The index can vary between the value of zero (where there are a larger number of equally sized firms) and one (where there is only one firm). The higher values of the index indicate a more concentrated

20 To illustrate some of the advantages of the Hefindahl Index over the concentration ratio, see for example, Smith (1966).

market which presumably is less competitive and may generally generate less desirable performance from the social point of view. This index is often referred to as the 'number equivalent' measure of concentration. For example, say the HHI gives a value of 0.2; taking the reciprocals shows that this is the value that would be obtained if the market were made up of *five* equal-sized firms.

Hall and Tideman (1967) pointed out that the Herfindahl-Hirschman (HH) index has a major shortcoming in that, since the HH index weights each firm by its relative share, it implies that the relative sizes of firms are more important than the absolute number of firms in determining firm concentration but one could argue that the absolute number of firms in the industry should be stressed in a measure of concentration. To counteract this problem, they weighed each firm's share by its industry rank thus giving emphasis to the absolute number of firms in the market. The Hall-Tideman index is as follows;

$$TH = 1 / (2 - \sum_{i-1}^{n} iS_i) - 1 \qquad \textbf{4.3}$$

where n is the number of firms in the market area; i is the industry rank of each firm; and S_i is the percentage of deposits or assets controlled by the ith firm. TH has a range of zero to unity.

Another static measure favoured by the researchers is the entropy coefficient which is an inverse measure of relative concentration. It weights each firm's share by the logarithm of its reciprocal. It is defined as;

$$E = \sum_{i=1}^{n} S_i \log_2\left(\frac{1}{S_i}\right) \qquad \textbf{4.4}$$

This index measures the degree of disparity between the firms in the market. If all firms have an equal share, entropy is at a maximum and concentration at a minimum. If there is only one firm in the market, entropy is at a minimum (*E=0*) and concentration is at the maximum. The advantage of this measure is that it can be decomposed to show how different sub-groups contribute to the overall level of concentration.

Another alternative measure is Lorenz curve, a graphical technique which shows, as a continuous function, the percentage of, for example, total industry sales accounted for by any given fraction of the total company population, with the firms ranked in order of market share or size. These Lorenz curves can be characterised numerically by means of the Gini coefficient, which measures the departure between the Lorenz curve actually observed and the curve that would appear if all firms had equal market shares or sales. The Gini coefficient ranges from 0 (indicating perfect equality of firm shares) to 1 (indicating total inequality).

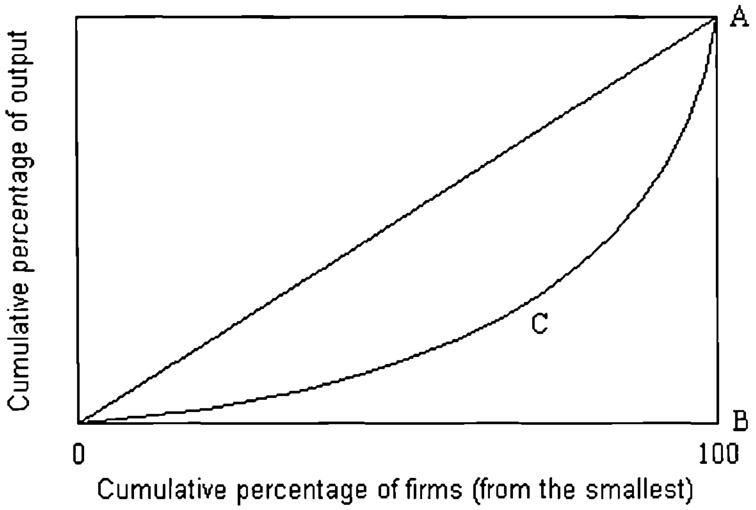
Figure 4.1 explains graphically the deviations of the Gini coefficients from the Lorenz curve. The figure shows a Lorenz curve for a given industry. The firms are ranked by size and cumulated from smallest to largest as a percentage of the number of firms in the market. This is plotted against the cumulative percentage of output. The greater the deviation of this curve from the diagonal line, the greater the inequality of firm sizes. Thus, the Gini coefficients summarises this information, *i.e.*, is the shaded area OAC divided by the triangle OAB. As mentioned above, the coefficients can vary between zero, when all firms are of eqaul size (*i.e.*, when the lorenz curve completes the area OAB).

However, the Lorenz curve has two main disadvantages:

(1) It may suggest paradoxical inferences when an industry is occupied by a small

Figure 4.1

Derivation of the Gini Coefficient from the Lorenz curve



Source: Ferguson (1988, page 27)

number of evenly matched firms. The Gini coefficient for duopolists or triopolists with equal market shares is zero, but one could hardly conclude that monopoly power is absent in such cases.

(2) The shape of the Lorenz curve and the value of the Gini coefficient are quite sensitive to errors in defining the number of firms in the industry. The more borderline firms are included, the higher the indicated degree of inequality tends to be.

Finally, another static concentration measure is the dominance index developed by Kwoka (1977) which is:

$$D.I = \sum_{i-1}^{n}\left[\frac{S}{\sum S_i} - \frac{S_{i+1}}{\sum S_{i+1}}\right]^2 \qquad 4.5$$

where the differential market share between successively chosen firms is ranked by firm size. This index ranges between 0 and 1 with a value of unity denoting a monopoly.

Dynamic Measure

Traditionally, the dynamic concentration measure is based on the first differences (changes) in any of the other static measure mentioned above between a given initial year (t) and any future year (t+1) as follows:

$$\Delta C = \Delta C_{t+1} - C_t \qquad 4.6$$

Superior measures of dynamic market structure include the Share Stability Index developed by Prais (1958) and Dynamic Concentration Index developed by Grossack (1965) and Salley (1972) and Dynamic Herfindahl Index.

The Share Stability Index relates the market share held by a bank in a given base year with its share at the end of the period under study. Hymer and Pashigan (1962) developed this model in the form:

$$I = \sum_{i}^{n}\left|S_{i,t} S_{i,t+1}\right| \qquad 4.7$$

This Index (I) increases with greater changes in market share over the period from point

t to $t+1$: the more unstable market shares are over the period, the higher the index.

The Dynamic Concentration Index is obtained through a linear regression of market shares for all firms in a given market at the end of the period upon their market shares at the beginning of the study period. Rose and Fraser (1976) developed this model in the form of the geographic mean of the regression of the terminal-year market share against the base year market share and the reciprocal of the regression of the base-year against the terminal-year share.

Finally, the Dynamic Herfindahl Index which calculates the change in the level of the Herfindahl Index between base and terminal years as follows:

$$D.H.I = HI_t - HI_b \qquad \textbf{4.8}$$

A positive of the index shows that concentration has increased and a negative value implies that concentration has decreased.

In a review of 73 US SCP studies from 1961 to 1991, Molyneux *et. al.* (1996) summarize the market structure measures as in Table 4.3 below.

It can be seen from the table that the most frequently used measure of market structure is the 3-firm deposits concentration ratio which is used in 37 studies out of the 73 studies covered in the study. The second most frequently used is the Herfindahl Index with 17 times; this is followed by the number of firms in the market.

Table 4.3

Market Structure Measures Used in the US SCP Literature

Measures of market structure	Number of times the respective market structure measures have been used in the SCP literature
Concentration ratios	
5-firm deposits	2
3-firm deposits	37
2-firm deposits	3
1-firm deposits	9
Herfindahl Index (H) deposits	17
Numbers equivalent (1/H)	2
Number of firms in the market	16
Gini coefficients	2
Entropy	2
Hall-Tideman index	2
Dummy variables for markets with relatively high 1-firm or 3-firm concentration ratios	1
Herfindahl index (H) multiplied by a dummy variable for markets with relatively low H	1
Change in H	1

Notes*:* These market structure measures were found to be used in a review of 73 SCP studies.
Source: Molyneux *et. al.* (1996, page 102)

4.5 Measures of Performance

As mentioned in the earlier part of this chapter, market performance refers to the efficiency of markets in utilizing scarce resources to meet consumers' demands for goods and services. A question of interest perhaps is 'how do we measure performance?' Are firms making large profits considered to perform well or *vice versa*?

Earlier studies on the relationship between market structure and bank performance used two measures of performance: profitability, and the price of a particular product or services. The most commonly used profitability measures have been return on assets and return on capital whereas the price measures include such variables as: the interest rates charged on business loans, the interest rates charged on residential mortgages, the average interest rates charged on all loans, the average interest rates paid on time and saving deposits, and the ratio of loans to total deposits or assets.

Fraser and Rose (1971) point out that bank operating performance is difficult to measure because of the diversity of bank output, ranging from trusts and corporate accounting to the underwriting of home construction and municipal expansion.

> Thus, bank performance cannot be adequately proxied by any simple production function with, for example, total loans or total deposits as the sole index of bank output (Fraser and Rose, 1971, page 602).

Accordingly, Rose and Fraser (1976) use profitability and price measures which include average loan rates, average saving rates and ratio of net current operating earnings to average total capital. Edwards (1964), Flechsig (1965), Kaufman (1966) use interest rates charged on business loans as the measure of bank performance. Short (1979), Kwast and Rose (1982), Rhoades (1985), Evanoff and Fortier (1988) and Berger (1991) use profitability measures such as return on assets and return on capital to measure the performance of banks.

In assessing the performance of banks in developing countries, Fry (1988) argues that bank performance, the implementation of monetary policy and bank examination are interrelated in various ways. Monetary policy determines the constraints under which banks must operate, and in order to assess the performance of banks and implement monetary policy, it is necessary to obtain information on the activities of banks.

In a review of 73 studies on bank structure and performance in the US, Molyneux *et. al.* (1996) find that there are three categories of performance measures: firstly, price measures, secondly, profitability measures, and, thirdly, other measures. Table 4.4 presents a summary of the performance measures used in the literature of the banking industry. Of the price measures, such as loan interest rates, deposit interest rates and service charges, the most commonly used were loans and fees on loans divided by total loans; interest payments on time and savings deposits divided by total time and saving deposits; and revenue from service charges on demand deposits divided by total demand deposits. These occurred 19, 16 and 14 times, respectively.

However, the use of price measures received many criticisms by authors such as Evanoff and Fortier (1988), who note that since banking is a multi product industry, using individual prices may be misleading. This is because of the fact that banks may have different pricing strategies, thus perhaps charging low loan rates but also paying relatively low deposit rates. For example, Gilbert (1984) concludes that, using average interest rates and average service charge, rates are poor measures of bank performance. One reason for this is the fact that average measures combine flow variables; the numerator measures annual flow and the denominator is a balance sheet item recorded at a point of time, which may be different from the average loan or deposit balance over the year.

A major problem with using the average interest rate paid on time and savings deposits is the effect of Regulation Q, especially for periods when at least some of the deposit ceiling rates were below market rates . Thus,

> The average interest paid on time and savings deposits is more likely to be a function of the maturity distribution of a bank's deposits and their denomination than a function of market structure' (Gilbert, 1984, page 632).

Table 4.4
Measures of Performance in the SCP Literature[a]

Performance measures	Number of times the respective performance measures have been used in the SCP literature	Number of finding the performance measure to be unambiguously significantly related to market structure [b]
Loan interest rates		
Interest and fees on loans/total loans	19	7
Interest rate on business loans	6	3
Interest rate on new car loans	3	2
Interest rate on residential mortgages	2	2
Total	**30**	**14**
Deposit interest rates		
Interest payment on time & savings deposits/total time & savings deposits	16	5
Interest rates on money-market deposit accounts	2	2
3, 6, 12 and 30-month CD rates	2	1
Interest rate on Super-NOW accounts	1	1
Interest payment on time deposits total time deposits	1	1
Interest rate on time deposits	1	0
Interest rate on passbook savings	1	0
Interest rate on $1000 CD	1	0
Total	**25**	**10**
Service charges		
Revenue from service charges on demand deposits total demand deposits	14	3
Revenue from service charges on demand deposits	5	2
Monthly service charge on demand deposits	1	1
Charges for returned cheques	1	0
Service charges on a standardised account	1	0
Total	**22**	**6**
Profitability measures		
Return on assets	24	12
Return on capital	14	8
Total	**38**	**20**
Other measures		
Lerner index	2	0
Elasticity of loan demand	2	1
Number of bank employees	1	0
Standard dev ation of return on equity	2	2
Concentration measures	1	0
Market share stability indices	2	2
Portfolio selection	2	2
Senatorial votes	1	0
Service quality measures	1	1
Labour expenses	2	2
Other expenses	2	2
Total	**133**	**62**

Notes: [a] These performance measures were found to be used in a review of 73 US SCP studies
[b] Many studies use a variety of performance and market structure measures covering different time periods Figures included in this column relate to those studies that find regression coefficients on measures of market structure with t-statistics greater than 1.95 and which unambiguously report a significant result

Source: Molyneux *et. al.* (1996, page 98 and 99)

Bank profit rates are generally regarded as the most appropriate measure of bank performance. For instance, Gilbert (1984, page 632) states:

> The only measures of bank performance derived from the report of income and report of condition that do not have major measurement problem are bank profit rates. If banks in areas with higher market concentration charge higher interest rates on loans, set higher service charges on demand deposits, and pay lower interest rates on deposits, these effects will be reflected in the pattern of bank profit rate, even though it may not be possible to measure accurately the effects of market concentration on interest rates and service charges with data from the report and report of condition.

One of the main advantages of using the profitability measure is the fact that it is simple and readily available. Moreover, as banking is a multi product business, it consolidates information into one single figure. On the other hand, its main disadvantage is that it combines a flow variable (*i.e.*, profits) with a stock variable (*i.e.*, assets or capital).

In Table 4.4, from a summary by Molyneux *et. al.* (1996), we find that the two profitability measures most commonly used in the literature are return on assets and return on capital. Other measures that are less commonly used in the literature included among others, the Lerner Index, elasticity of loan and demand, concentration measures and market share stability indices.

4.6 Theories Describing the Relationship Between Market Structure and Performance

The relationship between market structure and performance in banking could be better explained by the hypotheses relating to this relationship. These can be categorised into three main theoretical approaches: the 'Quiet Life' Hypothesis, the Structure-Conduct-Performance Hypothesis, and the Efficient Structure Hypothesis, each of which is described in the following sections:

4.6.1 The Quiet Life Hypothesis

This hypothesis was developed by Hicks (1935). He suggests that a bank with greater market power will be more risk-averse, and thus will be able to achieve some combination of both higher returns and lower risks than firms possessing lesser power in the market. Hicks (1935, page 8) notes:

> It seems not at all unlikely that people in monopolistic positions will very often be people with sharply rising subjective costs; if this is so, they are likely to exploit their advantage much more by not bothering to get very near the position of maximum profit, than by straining themselves to get very close to it. The best of all monopoly profits is a quiet life.

In this concept of a quiet life, there is tendency to which firms will utilise the greater efficiency that they possess by way of expense preference behaviour to relax the strict adherence to cost minimisation, and thus weaken the relationship between firm profits and structure. With this, it implies that there will be a negative relationship between efficiency and market structure variables. Higher degrees of efficiency will be found in markets with low concentration and in firms with a smaller market share.

4.6.2 The SCP Hypothesis

According to the Structure-Conduct-Performance hypothesis, the degree of competition among firms in the market is influenced by the degree of concentration among a few relatively large firms, since a more highly concentrated market structure is assumed to be conducive to more effective collusion. At high levels of concentration, 'effective monopoly' exists through the recognition of mutual interdependence, and market participants are able to achieve the monopoly price-output configuration that maximises industry profits. Prices, therefore, are unlikely to increase any further in response to further increases in concentration. A positive relationship between market concentration and performance is interpreted by the SCP advocates as evidence that banks are able to extract monopolistic rents in concentrated markets through their ability to offer lower deposit rates and to charge higher loan rates. In summary, the SCP hypothesis is derived form the model of oligopolistic behaviour of firms which implies that collusive arrangements are less costly to maintain in concentrated markets (Stigler 1964).

4.6.3 The Efficient Structure Hypothesis

A challenge to SCP in the form of an 'efficient structure' hypothesis was made by Demsetz (1973) and later by Brozen (1982). Demsetz (1973) argues that a positive relationship between profit rates and concentration may reflect the differential efficiency of the largest and smallest firms in various markets, rather than necessarily reflecting more effective collusion in the more concentrated markets. In other words, to explain the links between market structure and performance, the efficient structure hypothesis proposes that an industry's structure arises as a result of superior efficiency by particular firms. Thus, a positive relationship between firm profits and structure can be attributed to the gains made in market shares by more efficient firms, leading in turn to increased concentration. Hence, increased profits are assumed to accrue to these firms as a result of firm-specific efficiency and not necessarily because of collusive behaviour.

Berger (1995) substantially refines this debate by differentiating various market power and efficient structure hypotheses. He identifies two market power hypotheses: the traditional SCP and the Relative Market Power (RMP) hypotheses. The RMP hypothesis asserts that only firms with large market shares and well-differentiated products are able to exercise market power in pricing these products and thus earn super normal profits. He also argues that there are two other explanations of the profit-concentration relationship in banking, relating to the efficient structure hypothesis. The first is what may be generalised as the Relative Efficiency (RE) version the efficient structure hypothesis, which asserts that firms gain higher profits because they possess equally superior management and production technologies and therefore they can produce output at a lower cost. These firms also gain large market shares that result in higher concentration. (This is similar to the original efficient structure hypothesis described above). The second explanation is the Scale Efficiency (SE) version of the efficient structure hypothesis, where some firms can produce on a more efficient scale than others with equally good management and technology, *i.e.*, produce at lower cost because of local circumstances and therefore gain higher prof ts. Again, these firms are assumed to have larger market shares which results in higher concentration.

4.7 Conclusion

This chapter has examined the theoretical concept of market structure and performance. We have looked at the definition of market structure, conduct and performance and how these are interrelated. The theory has suggested that a firm's market structure influences to some degree its behaviour and performance. External factors such as technology, regulation, price, and demographic factors influence the structure of banking markets and also the conduct of banks with regard to strategy and objectives, and these in turn influence performance in the banking markets.

The traditional SCP hypothesis suggests that the positive relationship between market structure and performance can be interpreted as the ability of banks to extract monopolistic rents in concentrated markets as a result of being able to offer lower deposit rates and charge higher loans rates. On the other hand, the efficient structure hypothesis asserts that the positive relationship between firm profit and structure can be attributed to the gains made in market shares by more efficient firms resulting in increased concentration. Berger (1995) refines the debate concerning the relationship between market structure and bank profitability by proposing four categories within two alternative explanatory frameworks, as follows:

Market Power:	*Efficient Structure:*
- Structure-Conduct-Performance (SCP)	- Relative Efficiency (RE)
- Relative Market Power (RMP)	- Scale Efficiency (SE)

In fact, Berger uses the term X-Efficiency, rather than Relative Efficiency. In this thesis, however, the generalised term is preferred, allowing the introduction of a basic measure of cost efficiency alongside the more developed stochastic estimate known as X-efficiency.

CHAPTER 5

EFFICIENCY, ECONOMIES OF SCALE AND ECONOMIES OF SCOPE IN BANKING

5.1 Introduction

The theoretical concepts of efficiency and economies of scale will be examined in this chapter. It has be seen that the issues of structure and performance are interrelated in one way or another and that the issues of efficiency in the financial services industry have been the focal point for researchers, bankers and also policy makers. Thus, this chapter will emphasise the conceptual aspects of efficiency, including an examination of cost structure in the banking industry. Next, we will discuss various approaches undertaken to measure efficiency, including the use of simple financial ratios and parametric as well non-parametric approaches. Section 5.2 of this chapter focusses on the definition of efficiency in relation to the performance of banks. Section 5.3 describes the concept of economies of scale followed by economies of scope in Section 5.4. The concept of managerial efficiency or X-efficiency will then be discussed in Section 5.5 and problems related to the study of bank efficiency in the following section, Section 5.6. Section 5.7 discusses the various approaches to estimating efficiency and Section 5.8 provides some conclusions to the chapter.

5.2 Definition of Efficiency

Before discussing the concept of efficiency, it is important to consider the reasons for focussing attention on efficiency in the banking industry. The financial services industry today is faced with stiff competition from within internal markets but also from outside. Globalization and increased competition from the non-bank financial institutions have put strong pressure on banks to improve their earnings and to control costs. Expansion into new markets has put more pressure on banks to determine cost and revenue efficiency. The process of integration in the EU markets and cross border consolidation, for example, has brought about more intense competition.

In Asia, especially in the far east, the global trend towards liberalisation in banking has led to the blurring of demarcation lines separating activities of the different groups of financial institutions and the removal of artificial barriers to competition. Similarly, deposit-taking, credit granting, investment, insurance and financial advisory services are being bundled into one financial conglomerate or financial 'supermarkets'. The integration of financial markets within and across borders, as well as mergers among banks, reflect attempts to increase financial industry efficiency. Thus, understanding the concept of efficiency with respect to financial institutions will help in evaluating the present situation and in finding ways and means to improve efficiency, in controlling costs and maximising revenues.

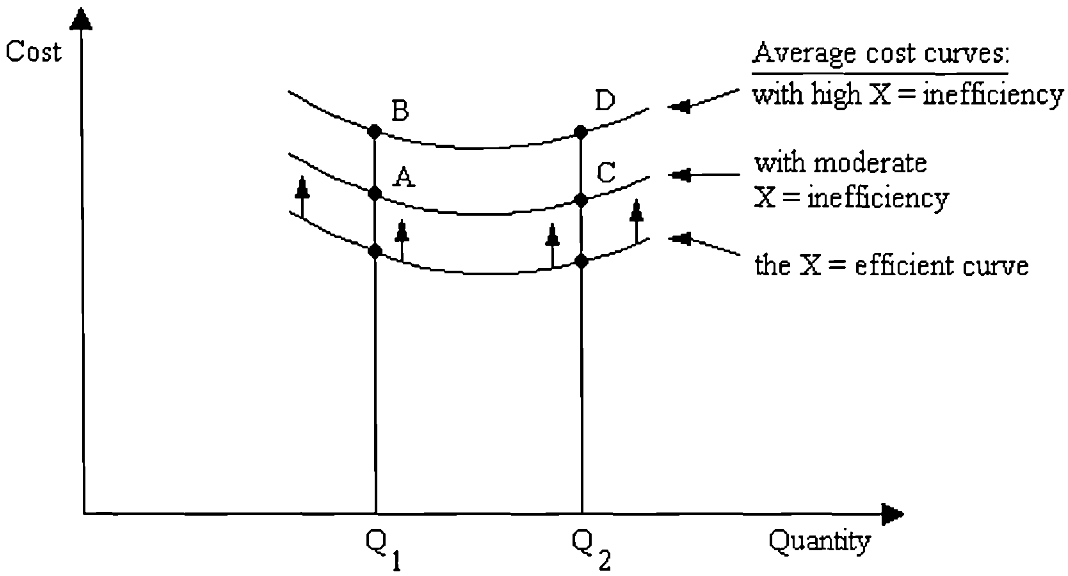
To put it simply, efficiency means the maximum output that can be produced from any given total of inputs. This refers to the efficiency of a firm which allocates resources in such a way as to produce the maximum quantity of output. In the context of efficiency of resource allocation, Shepherd (1985) pinpoints two categories: internal efficiency and allocative efficiency. Internal efficiency refers to effective management within the firm itself; for example, the ways in which management inspires the staff, controls costs and keeps operations lean. However, when a company is large and profit flows are also large, management tends to become less than fully effective. Such shortcomings in management are known as 'X-inefficiencies' and can be attributed to the excess of actual costs over the minimum possible costs. In other words, X-inefficiency may be measured as excess costs divided by actual costs. The 'X-efficient' and 'X-inefficient' cost curves can easily be illustrated, as in Figure 5.1. The excess costs are shown by points A and B for output Q_1 and C and D for output Q_2.

Allocative efficiency, on the other hand, refers to a set of general equilibrium conditions which occur when output is at the level where marginal cost equals price for each product of each firm. In the long run, in the absence of allocative inefficiency, price will also equal the minimum possible level of average cost. In this context, the consumers' surplus is maximised which means that consumers' surplus is achieved when consumers receive more value for consuming goods than the money value they must pay to the seller. In other words: the lower the price, the larger the consumers' surplus and *vice versa.*

The efficiency of firms may also be attributed to three factors: (1) X-efficiency, in which some firms have superior skills in management and technologies which enable them to minimize costs of producing any given output; (2) Scale efficiency, in which some firms simply produce at a more efficient scale than others and therefore have lower unit costs

Figure 5.1

X-efficient and X-inefficient Cost Curves



Source: Shepherd (1985, page 19)

and higher unit profits; and (3) Scope efficiency, in which the joint production of two goods by one firm is less costly than the combined costs of production of two specialised firms. This will be discussed in greater detail later in this chapter.

Our next question is why the concept of efficiency is important in understanding the performance of banks? According to Kolari and Zardkoohi (1987), the study of the economic efficiency of banking is important for three reasons: first, an improvement in cost efficiency means achieving higher profits and increasing the chance of survival in deregulated and competitive markets; secondly, customers are interested in knowing the prices and the quality of bank services as well as new services that bank could offer; and, thirdly, an awareness of economic efficiency is important to help the policy makers formulate the policies that will affect the banking industry as a whole.

Berger and Humphrey (1997, page 175), on the other hand, observes that the information obtained from the evaluation of bank performance can be used:

(1) to inform government policy by assessing the effects of deregulation, mergers or market structure on efficiency;

(2) to address research issues by describing the efficiency of an industry, ranking its firm, or checking how measured efficiency may be related to the different efficiency techniques employed; or

(3) to improve managerial performance by identifying 'best practices' and 'worst practices' associated with high and low measured efficiency, respectively, and encouraging the former practices while discouraging the latter.

As Berger *at. al.* (1993, page 221) note:

For financial institutions, efficiency would imply improved profitability, greater amounts of funds intermediated, better prices and service quality for consumers, and greater safety and soundness if some of the efficiency savings are applied towards improving capital buffers that absorb risk.

As mentioned above, from a theoretical perspective, efficiency can be broadly divided into three types: economies of scale, economies of scope and X-efficiency. The implications for understanding the efficiency of financial institutions will be discussed in the following sections.

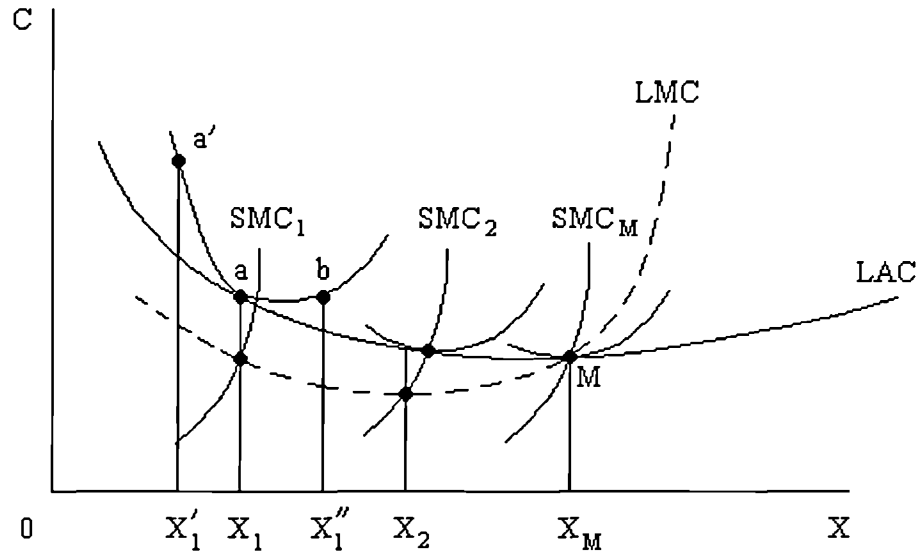
5.3 Economies of Scale

Economies of scale or, alternatively the return to scale, refers to changes in output as factors of production change by the same proportion (constant return to scale) or by different proportions (increasing or decreasing returns to scale). Generally, economies of scale are achievable only in the long run, changes in the factors of production resulting in increased output. Thus, the concept of economies of scale or return to scale is based on an average cost curve. Costs can be divided into short run costs and long run cost, with short run costs covering a period of time during which some factors of production are fixed, whereas the long run costs cover a period long enough to permit change in all factors of production. Therefore, in the long run, all factors of production become variables.

The concept of the average cost curve is illustrated by referring to Figure 5.2 below. The figure shows a series of short run marginal costs curves, (SMC), a long run marginal cost (LMC) curve and a long run average cost curve (LAC). The average cost is simply the average cost per unit of output, whereas the marginal cost is the change in total costs resulting from producing an extra unit of output. The long run average cost curve is derived from the short run cost curves, where each point of the LAC corresponds to a point on a short run cost curve which is tangential to LAC at that point. It can be seen from the figure that the LAC curve declines to output level X_M at the point M where the LMC intersects the LAC. Beyond point M, the LAC begins to rise and any increase in output will increase costs. Thus, at point M, $SAC_M = SMC_M = LAC = LMC$. The U shape of the LAC reflects the law of returns to scale or, alternatively economies of scale in which, accordingly, the unit costs of production decrease as firm size increases. Economies of scale exist only up to a certain firm size also known as optimum firm size, beyond which

Figure 5.2

Cost Curves and Economies of Scale



Source: Adapted from Koutsoyiannis (1979, page 114)

diseconomies of scale exist. Thus, referring back to the LAC curve, where LAC falls, the firms are not working to full capacity; where LAC rises, the firm's resources are overworked; only at the minimum point M are the (short-run) firm's resources optimally employed.

Economies of scale are measured in terms of percentage changes in output. As a firm expands its scale operation, economies of scale occur if the firm is able to reduce costs per unit of output, if all other factors hold constant. Thus, returns to scale refer to the relationship between changes in output and changes in input when all other factors are held constant. Economies of scale or increasing returns to scale arise if the level of output increases more than proportionally with the increase in the factors; decreasing returns to scale occur if output increases less than proportionally with the increase in the factors; and constant returns to scale occur if output increases by the same proportion as the input.

Given the following total cost function,

$$TC = f(Q) \qquad \textbf{5.1}$$

where TC is total cost and Q reflects output, then average costs can be derived by

$$ATC = f(Q) / Q \qquad \textbf{5.2}$$

Marginal costs then can be shown as

$$MC = \delta TC / \delta Q \qquad \textbf{5.3}$$

which is simply derived by multiplying the elasticity formula by the TC/Q ratio. The long-run marginal cost curve of the firm will have a negative slope and, by definition, there will be economies of scale which are calculated as follows:

$$SE - \frac{ATC}{MC} = \frac{f(Q)}{Q\ (\delta TC/\delta Q)} \qquad \textbf{5.4}$$

which is the elasticity of cost with respect to output. If $SE \geq 1$, we have increasing returns to scale; if $SE = 1$, the returns to scale are constant; and if SE is less than1, decreasing returns to scale prevail. The derivative of average cost with respect to output is negative, zero or positive, respectively.

Economies of scale in banking are defined in terms of individual bank's production process. As a bank expands its scale operation, economies of scale occur if the bank is able to reduce costs per unit of output, holding all factors constant. The cost of producing bank output (services) is dependant on the production process used by the individual bank. Thus, based on Equation 5.1 above, each bank's output (*O*) is a function of the productive factors (inputs) - labour (*L*), managerial skills (*M*), natural resources (*N*) and real capital (*C*), in the form:

$$O = f(L, M, N, C) \qquad \textbf{5.5}$$

Economies of scale in banking arise when doubling the bank outputs requires less than the doubling of every productive factor. According to Kolari and Zardkoohi (1987), the causes of economies of scale in banking are fourfold: (1) the bank may have unavoidable excess capacity of some inputs; (2) many inputs cost less when they are purchased on a larger scale; (3) relatively large operations allow for greater input and process specialization in production than do small operations; and (4) the law of large numbers accounts for certain economies of scale.

However, scale economies do not continue indefinitely with the expansion of size because as the scale operations increase, there is a point where firm do not usually produce a level of output below a 'minimum efficient scale' (*i.e.*, at point M in Figure 5.2 above) because according to Shepherd (1985), this raises costs and squeezes profits.

5.4 Economies of Scope

Samuelson (1966), defines jointness in production as the ability of one firm to produce a given level of multiple output at a lower cost than a series of separate firms, each of which specialises in the production of single output. Panzar and Willig (1981) redefine this property as economies of scope. Economies of scope refer to cost savings from the simultaneous production of several outputs in the same firm, rather than the production of each output separately in a specialised firm. 'With the economies of scope, the joint production of two goods by one firm is less costly than the combined costs of production of two specialty firms' (Willig, 1979, page 346). In other words, whenever the costs of providing the services of the shareable input to two or more product lines are sub-additive; *i.e.*, less than the total cost of providing these services for each product line separately, the multi product cost function exhibits economies of scope. According to Willig (1979), there are two basic reasons to study multi-product firms; firstly, casual empiricism suggests that there are virtually no single product firms; and, secondly, the technological characteristics called economies of scope may force firms in equilibrium within the industry to produce more than one type of goods.

To illustrate the concept of economies of scope, let us assume that a firm produces two outputs: Q_a and Q_b. To produce separately, their cost function is $C(Q_a)$ and $C(Q_b)$. There are economies of scope over product *a* and *b* if the joint cost of producing the two outputs is $C(Q_a,Q_b) < C(Q_a) + C(Q_b)$, where $C(Q_a,Q_b)$ are the firm's (minimized) costs of producing Q_a units of product *a* jointly with Q_b units of product *b* at a given vector of input prices. Willig (1979) suggests that economies of scope can be measured as follows:

$$SC = \frac{C(Q_a) + C(Q_b) - C(Q_a,Q_b)}{C(Q_a,Q_b)} \qquad 5.6$$

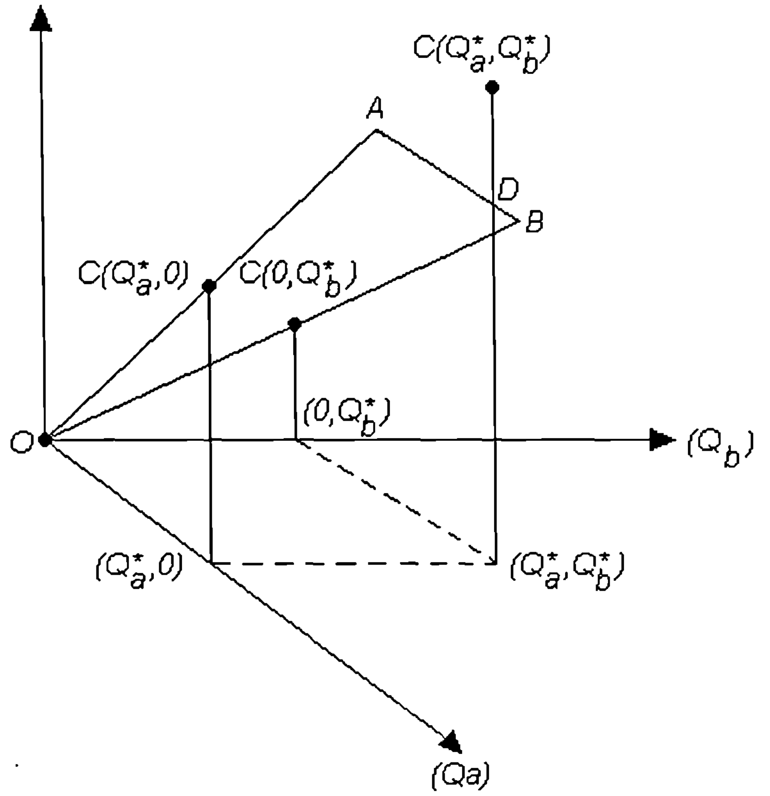
It can be seen that with economies of scope, the cost of adding the production of Q_b to the production of Q_a is smaller than the cost of producing Q_b alone. This advantage of a smaller incremental cost of producing output Q_b is enjoyed by firms with a broader scope of production. If, however, from the equation above the inequality is reversed, there are said to be diseconomies of scope.

Figure 5.3 below illustrates geometrically the economies of scope. The concept of economies of scope involves a comparison of $C(Q_a^*, 0) + C(0, Q_b^*)$, the sum of the heights of the cost surface over the corresponding points on the axes, with $C(Q_a^*, Q_b^*)$, the height of the cost surface at point (Q_a^*, Q_b^*) which is the vector sum of $(Q_a^*, 0)$ and $(0, Q_b^*)$. If $C(Q_a^*, Q_b^*)$ lies below the hyperplane *OAB* which goes through the origin and points $C(Q_a^*, 0)$ and $C(0, Q_b^*)$, then the condition for economies of scope is satisfied. Thus, in Figure 5.3 below, the height of *D*, the point on plane *OAB* above (Q_a^*, Q_b^*), must equal $C(Q_a^*, 0) + C(0, Q_b^*)$ since the hyperplane is described by $C = \alpha Q_a + \beta Q_b$ for some constants α, β. Therefore, $C(Q_a^*, 0) = \alpha Q_a^*$ and $C(0, Q_b^*) = \beta Q_b^*$, and $C(Q_a^*, Q_b^*)$ must be less than $\alpha Q_a^* + \beta Q_b^*$ for economies of scope to hold (Baumol *et. al.* 1988).

Sources of economies of scope in banking can be attributed to various factors (Berger *et. al.* 1987, page 503 and 504): '(1) fixed costs; for example, branch costs or equipment costs may be spread across several products; (2) information economies; for example, information gathered from servicing a customer's deposits and loans may be reused, thus reducing the cost of evaluating default and delinquency on other types of loans and services; (3) risk reduction; for example, the diversification and adjustment of the maturities of loans and deposits can be used to reduce the portfolio and interest rate risks; (4) customer cost economies: for example, customers may enjoy the advantage of being served with several products, such as demand deposits, savings accounts and loan

Figure 5.3

Economies of Scope



Source: Adapted from Baumol *et. al.* (1988, page 72)

services'.

Economies of scope are thus related to multi product firms rather than single product firms. As Baumol *et. al.* (1988, page 73) observes:

> A moment's thought will indicate that when the firms offer many products, even where average costs decline everywhere, the absence of economies of scope may nevertheless preclude natural monopoly. For an industry that enjoys no economies of scope, a multi product firm can be broken up into several specialised firms without an increase in cost and, perhaps, even with some saving. This, in essence, suggests why economies of scope and the concepts related to it play so central a role in the analysis of multi product industry structure.

As noted in the introduction, a characteristic of banks is that they produce many different products, and the banking industry appears to offer considerable economies of scope. For example, a wide range of services such as demand deposits, time deposits and consumer loans (which is produced using the same physical capital, natural resources and management skills) is offered to the same set of customers in that particular market.

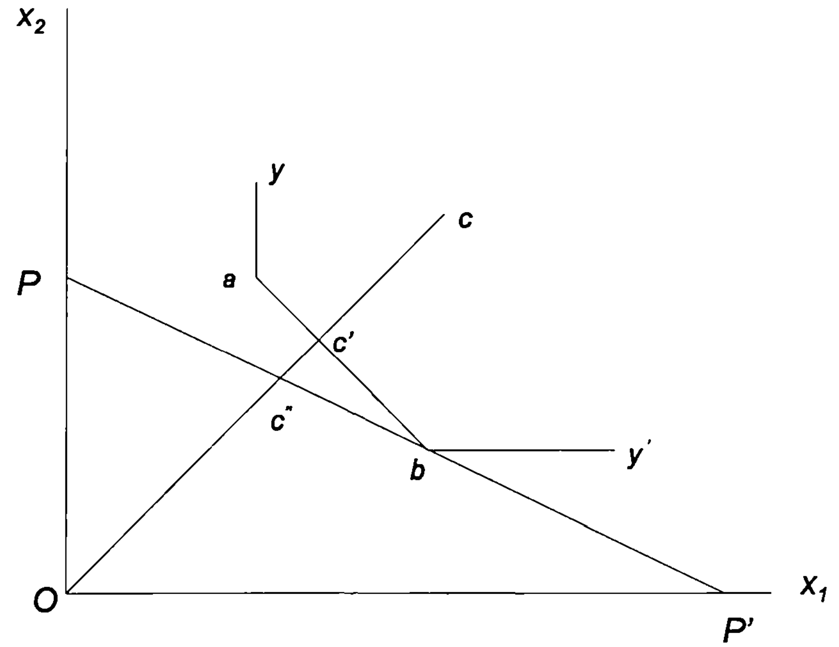
5.5 X-Efficiency

The concept of X-efficiency relates to managerial ability to control costs or to maximise revenues through operating in the most efficient manner possible. This concept is based upon the work of Farell (1957). Leibenstein (1966) identifies the term X-efficiency as the difference between actual and minimum costs, that is, X-efficiency relates to managerial performance in minimising costs. The term X-efficiency, as we have discussed earlier, covers all the technical and allocative efficiencies of individual firms which are distinguished from scale and scope economies. Allocative efficiency exists when firms use the least costly combination of inputs in producing outputs while technical efficiency occurs when firms use less of each input than should be required to produce a given level of output. In other words, an incorrect input mix will lead to higher costs and thus, increase the degree of X-inefficiencies of the firm.

The essential ideas about allocative and technical efficiencies are illustrated in Figure 5.4 below. In the figure, it is assumed that a firm uses two inputs, X_1 and X_2 to produce output y. PP' is the isocost line whereas y and y' represent the production frontier. The production frontier is a set of all combinations of input which can produce the same level of output and any reduction of at least one input may cause output to fall. Firms *a*, *b* and *c* each produce a given level of output. Efficient operation in production (cost minimization) occurs at point *b*. All costs minimising firms are labelled as being *overall efficient*. In terms of Figure 5.4, the overall efficiency for firm *c* is measured by the ratio of distances Oc''/Oc which represents the potential or efficient input to actual input usage.

Figure 5.4

Overall, Technical and Allocative Efficiency



Source: Adapted from Aly *et. al.* (1990, page 212)

The overall efficiency is further decomposed into *technical efficiency* and *allocative efficiency*. A firm is technically efficient if it is operating on the production frontier. From the figure, firms *a* and *b* are regarded as technically efficient whereas firm *c* is considered technically inefficient. The extent of technical efficiency for firm *c* is measured by the ratio of distances *Oc'/Oc*. By reducing the input quantities used by firm *c* by this amount, the firm could move to point *c'* and would be considered efficient. For firm *c*, allocative efficiency is given by the ratio of distances *Oc''/Oc'*. As mentioned earlier, allocative inefficiency arises from choosing the wrong input combinations given input prices, as opposed to technical inefficiency, which is a proportionate overuse of all inputs.

In banking, the study of efficiency of financial institutions has not kept pace with the rapid change in financial industry structure , as Berger *et. al.* (1993, page 222) note:

> While scale and scope efficiencies have been extensively studied, primarily in the context of US financial institutions, relatively little attention has been paid to measuring what appears to be a much more important source of efficiency differences - X-inefficiencies, or deviations from the efficient frontier.

Further, the authors suggest that the relationship of financial institutions may also be related to the scale and scope of operations and this efficiency-scale relationship is important to regulators and other government officials so that they can make proper managerial decisions.

In the study of bank's performance relating to the theory of relative efficiency, some researchers stress the importance of scale efficiency and others emphasise on the importance of X-efficiency. However, Allen and Hagin (1989) found that only a small percentage of increased explanatory power arose from scale efficiencies being included.

In addition, total efficiency is much more driven by X (technical and allocative efficiencies) than by scale efficiencies as evidenced by Aly *et. al.* (1990) who calculated the components of technical efficiency and found that the major source of technical inefficiency was pure technical inefficiency and not scale inefficiency. A study by Berger and Humphrey (1991) has also shown that banks were found to be more technically inefficient than scale inefficient.

Since the introduction of X-efficiency in the 1960's, great efforts have been made to develop techniques to measure it. But, before we discuss the various approaches to measuring efficiency, certain problems relating to the study of efficiency will first be discussed.

5.6 Problems Encountered in Studying Bank Efficiency

The evaluation of bank efficiency creates several problems which arise as a result of the nature and function of financial intermediaries, especially as banks are multi-product firms and they do not produce or market physical products. One of the major problems in the study of bank efficiency is the specification of bank inputs and outputs. There has been long-standing disagreement among researchers over what banks produce. The most debatable issue is the role of deposits and, more specifically, whether they should be treated as inputs or outputs. Some researchers such as Elyasiani and Mehdian (1990), and Lang and Welzel (1996), treat them as inputs, but researchers such as Berger and Humphrey (1991), and Ferrier and Lovell (1990), treat deposits as outputs while other researchers such as Humphrey (1990) and Aly *et. al.* (1990) treat them simultaneously as inputs and outputs.

Generally, there are two ways of measuring bank outputs: the production approach and the intermediation approach. Under the production approach, banks produce accounts of various sizes by processing deposits and loans, and incurring capital and labour costs. Thus, in this approach, outputs are measured by the number of deposits and loan accounts or the number of transactions performed on each type of service provided, and costs are the operating costs needed to produce these products.

Under the intermediation approach, banks are treated as financial intermediaries that combine deposits, labour and capital to produce loans and investments. The values of loans and investments are treated as output measures; labour, deposits and capital are inputs; and operating costs and financial expenses comprise total cost.

The choice of input and output variables thus constitutes a major difficulty which must be addressed carefully. Such a choice, however, will be influenced by a number of factors, such as, the selected concept of the banking firm and the question under consideration. The availability of reliable information also has some effect on the measures used in published research on this topic. Moreover, whether products should be measured in terms of the number of accounts or dollar values depends on the various reasons being considered. For example, Kolari and Zardkoohi (1987), prefer to use dollar values for three reasons: firstly, banks compete to increase the market share of dollar amounts, as opposed to the number of accounts.; secondly, different accounts have different costs; for example, demand deposit accounts might be more costly to maintain than time deposit accounts (although, if these accounts were to have the same costs, then the use of the number of accounts would be equivalent); finally, banks are multi service firms and the dollar amount is the only common denominator; for example, securities investments cannot be measured in terms of number of accounts.

5.7 Approaches to the Estimation of Efficiency

Early research in the banking industry was mainly concerned with estimating the average productivity, using some sort of indices, and with cost comparisons.[21]

Subsequently, researchers tended to proxy efficiency by market share,[22] the assumption being that banks with large market shares may be expected to earn higher profits because they have lower unit costs than banks with smaller market shares. In other words, banks with lower cost structures could maximise profits either by maintaining the current level of prices and size or reducing the price levels and expanding, a positive relationship between firms' profits and market structures being attributed to the gains made by more efficient firms.

Simple financial indicators of operating performance, such as operating costs divided by total assets or the return on equity or assets, have also been used to compare efficiencies, as in studies of bank efficiency before and after mergers by Rhoades (1986), Cornett and Tehranian (1992) and Srinivisan and Wall (1992). However, the use of financial ratios has its limitations. According to Berger *et. al.* (1993), the first problem is that, financial ratios are regarded as misleading indicators of efficiency because they do not control for product mix or input prices. Secondly, using the cost-to-asset ratio assumes that all assets are equally costly to produce and all locations have equal costs of doing business. Finally, the use of simple ratios cannot distinguish between X-efficiency gains and scale and scope efficiency gains.

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21 For more details, see for example, Farrell (1957).

22 See for example, Smirlock (1985) and Evanoff and Fortier (1988).

Recent banking studies have focussed on the direct efficiency measurement of the banking markets including a stochastic component, where the direct efficiency measure is added to the profit equation along with the concentration and market share measures. These efficiency measures differ in the assumptions imposed on the data in terms of: the functional form of the best practice frontier; whether or not account is taken of random error; and, if there is random error, the probability distribution assumed for the inefficiencies (for example half-normal, truncated normal, gamma distribution) used to disentangle the inefficiencies from the random error.

Thus the recent approaches to efficiency measurement differ primarily in how much shape is imposed on the frontier and the distributional assumptions imposed on the random error and inefficiency (Berger and Humphrey, 1997). We will divide the general approach into parametric and nonparametric approaches.

5.7.1 The Parametric Approach

In the research literature, there are three main parametric approaches: the stochastic frontier approach, the thick frontier approach and distribution-free estimates approach. These are discussed below.

5.7.1.1 The Stochastic Frontier Approach (SFA)

The stochastic frontier approach (SFA), sometimes also referred to as the econometric frontier approach (EFA), was developed by Aigner, Lovell and Schmidt (1977), and Meeusen and Van den Broeck (1977). In this approach, the SFA specifies a functional form for the cost, profit or the production frontier and allows for random error. Consider a production function:

$$y_i = f(x_i, \beta) + \epsilon_i , \qquad 5.7$$

for i =1,2,...N, where y_i = output for *ith* firm, x_i= vector of inputs for *ith* firm, β = vector of parameters and ϵ_i is the error term. The error term ϵ_i is composed of two independent components;

$$\epsilon_i = \mu_i + v_i \qquad 5.8$$

subject to $\mu_i \geq 0$ for all $i = 1,2,.....N.$

where μ_i is a one-sided error term representing technical inefficiency and v_i is a two-sided error term representing statistical standard noise (random errors) and $u \geq 0$ ensures that all observations lie on or beneath the frontier.

The SFA modifies a standard cost (production) function to allow inefficiencies to be included in the error term. The predicted standard cost function is assumed to characterise the frontier while any inefficiencies are captured in the error term, which is by construction orthogonal to the predicted frontier. This assumption forces any measured inefficiencies to be uncorrelated with the regressors and any scale or product mix economies derived linearly from these explanatory variables (Ferrier and Lovell, 1990).

Another assumption needed in the SFA is to distinguish the inefficiencies from random components of the error terms. The random components include short term luck which place individual banks in relatively high or low cost positions and measurement error from excluded explanatory variables, mis-specification *etc.* These two components are separated by assuming that inefficiencies are drawn from an asymmetric half-normal distribution, and that random errors are drawn from a symmetric normal distribution. However, it is not possible to decompose individual residuals into inefficiency or random variation; therefore, estimating technical inefficiency by observation is impossible. This is the main weakness of the stochastic frontier model.

The half normal assumption for the distribution of inefficiencies has brought many criticism (Stevenson, 1980 and Greene, 1990). This assumption is relatively inflexible relative to other distributions , such as the gamma and truncated normal and presumes that most observations are clustered near full efficiency, with higher degrees of inefficiency being decreasingly likely. Stevenson (1980) has shown that the half normal and exponential distributions can be generalised to truncated normal and gamma, respectively. However, this method of allowing for flexibility in the assumed distribution of inefficiency may make it difficult to separate inefficiency from random error in a composed-error framework, since the truncated normal and gamma distributions may be close to the symmetric normal distribution assumed for the random error (Berger and Humphrey,1997).

5.7.1.2 The Thick Frontier Approach (TFA)

The Thick Frontier Approach (TFA) has been applied to banking by Berger and Humphrey (1991,1992a). This approach, instead of estimating a frontier edge, compares the average efficiencies of groups of banks. A cost function for the lowest average cost quartile of banks is estimated and banks in this quartile are assumed to have greater than average efficiency and form a 'thick frontier'. Similarly, a cost function is also estimated for the highest average cost quartile and banks in this quartile presumably have less than average efficiency. Differences in error terms within the highest and lowest performance quartile of observations (stratified by size class) are assumed to represent random error, while the predicted cost differences between the highest and lowest quartile are assumed to reflect inefficiencies. This inefficiency residual is then decomposed into several types of inefficiencies.

The TFA thus imposes no distributional assumptions on either inefficiency or random error except to assume that inefficiencies differ between the highest and lowest cost quartile and that random error exists within these quartiles. However, the TFA does not provide point estimates of efficiency for individual observations but rather gives an estimate of the level of overall efficiency. According to Berger and Humphrey (1991), a benefit of this approach is that it requires less specificity in the maintained statistical assumptions, and therefore is less likely to be substantially violated by the data. Firstly, the assumption that the inefficiencies are uncorrelated with the explanatory variables maintained in the EFA is not needed. Secondly, in TFA, any number of exogenous variables may be added to the cost equation without changing the number of comparison firms or necessarily creating a downward bias in the inefficiency estimate. Thirdly, the assumption that the error terms for the quartile satisfy the standard regression properties seems no worse than either the assumptions used in the EFA, that the inefficiencies are drawn from an arbitrary (half normal) distribution, or the assumption used in the DEA approach, that random error is zero. Finally, even if the error terms within the quartile represent inefficiencies, rather than random errors as maintained, the TFA remains a valid comparison of the average inefficiencies of high and low cost banks.

5.7.1.3 The Distribution-Free Approach (DFA)

In the distribution-free approach (DFA), a functional form for the frontier is also specified but inefficiencies are separated from random error in a different way. Unlike the SFA, the DFA makes no strong assumptions regarding the specific distributions of the inefficiencies or the random errors. Instead this approach uses stability over time to distinguish efficiencies from random errors. The identifying assumption is that efficiency of each bank is stable over time, while random errors tend to average out over time. The estimates of inefficiency for each bank in a panel data set is then determined as the difference between its average residual and the average of the bank on the frontier with some truncated measure performed to account for the failure of the random error to fully average out. The truncation procedure is similar to the TFA treatment of outliers.[23] Therefore, the truncation procedure is used to remove some of the effects of the extreme observations by treating all the most efficient firms alike and, similarly, all the most inefficient firms alike. [24] The DFA has been applied to banking by Berger (1993) in the study of the US banking industry. He finds that the frequency distribution of inefficiencies appears to be closer to the shape of a symmetric normal distribution than an asymmetric half-normal distribution.

However, a drawback to this approach is that if efficiency is shifting over time due to technical innovation, regulatory shifts, interest rate cycle and other microeconomic events, the DFA only describes the average deviation of each bank from the best average-practice frontier rather than the efficiency at any one point in time.

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23 In the TFA approach, data are averages within the very highest and lowest average cost quartile.

24 Lang and Welzel (1996) use a fixed effects model where a dummy variable is specified for each bank in a panel data set. Differences in the fixed effects estimated across banks represent bank inefficiencies. Berger (1993) finds that the fixed effects approach (under Method 2) were confounded by large differences in scale.

To summarise, the main similarity in using this approach is that, a cost or production frontier has to be estimated and the main difference lies in the assumption made in separating random errors from efficiencies components. In the Stochastic Frontier Approach, these two components are separated by assuming that inefficiencies are drawn from asymmetric half-normal distribution and that random errors are drawn from symmetric normal distribution. In the Thick Frontier Approach, differences in error terms within the highest and the lowest performance quartile of observations (stratified by class size) are assumed to represent random errors while the predicted cost differences between the highest and lowest quartile are assumed to reflect inefficiencies. On the other hand, the Distribution-Free Estimates Approach uses stability over time to distinguish efficiencies from random errors; efficiency of each bank is stable over time while random errors tend to average out over time.

The main advantage of the parametric approach is that performance comparison among individual production units can be made and efficiency is mainly captured by the residuals. As a result, the residuals in the cost function represent three types of errors; technical inefficiency which relates to overuse of all physical inputs; allocative inefficiency resulting from improper mix of inputs; and random errors which represent exogenous shock such as 'luck factors'.

The main disadvantage is that the parametric approach imposes a particular functional form (and associated behavioural assumptions) that presupposes the shape of the frontier. If the functional form is mis-specified, measures of efficiency may be confused with the specification errors. McAllister and McManus (1993), and Mitchell and Onvural (1996), have shown that estimation using local approximation such as the translog (which forces the frontier average cost curve to have a symmetric U-shape in logs) provides poor approximation for banking data that are not near the mean scale and product mix.

5.7.2 Nonparametric Approaches

Unlike the parametric approach, the non-parametric approach assumes that random error is zero so that all unexplained variations are treated as reflecting inefficiencies. Non-parametric approaches such as data envelopment analysis and Free Disposal Hull, put relatively little structure on the specification of the best-practice frontier.

5.7.2.1 Data Envelopment Analysis (DEA) Approach

Data Envelopment Analysis (DEA) is rooted in the work of Farell (1957), who used the economic concept of the production frontier and the production possibility set to define technical and allocative efficiencies and later proposed measures of relative inefficiencies. DEA was first introduced by Charnes, Cooper and Rhoades (1978) to describe an application of mathematical programming to observed data to locate a frontier which can then be used to evaluate the efficiency of each of the organizations responsible for the observed output and input quantities.

DEA is based on the concept of efficiency that has been widely used in engineering and the natural sciences to measure the amount of work performed by a machine in relation to the amount of energy consumed in the process. The concept of DEA is similar to that of technical efficiency in the microeconomic theory of production. However, the main difference is that the DEA production frontier is not determined by some specific equation;

instead it is generated from the actual data for the evaluated firms.[25] Therefore, the DEA efficiency score for a specific firm is defined not by an absolute standard but relative to the other firms under consideration. This feature differentiates DEA from the parametric approaches discussed earlier which required a specific functional form. DEA also assumes that all firms face the same unspecified technology which defines their production possibility set. The main objective of DEA is to determine which firms are operating on their efficient frontier and which firms are not. If the firm's input-output combination lies on the DEA frontier, the firm is considered efficient; and the firm is considered inefficient if the firm's input-output combination lies inside the frontier.

Consider a general situation where we have n decision making units (DMUs) and each consumes the same m inputs to produce the same s outputs. Precisely, DMU_j uses x_{ij} *(I = 1, 2,.....,m)* of input *i* to produce y_{rj} *(r = 1, 2,.....,s)* of output *r* assuming that $x_{ij} > 0$ and $y_{rj} > 0$ (Seiford and Thrall, 1990). The specific DMU being evaluated has to solve the following optimization problem:

$$Max\ h_0 = \sum_{r=1}^{s} u_r y_{ro} \ / \sum_{i=1}^{m} v_r x_{i0} \qquad \textbf{5.9}$$

subject to the constraints:

$$\sum_{r=1}^{s} u_r y_{rj} \ / \sum_{i=1}^{m} v_i x_{ij} \leq 1,\ u_r \geq 0,\ v_i \geq 0 \qquad \textbf{5.10}$$

for $i = 1,2,....m$; $r = 1,2,....,s$; $j = 1,2,...,n$. where h_o is the ratio of virtual outputs to virtual

25 In DEA, the entities responsible for converting inputs into outputs are known as Decision Making Units (DMUs)

inputs, the u_r's and the v_i's are the variables and the y_{ro}'s and the x_{io}'s are the observed output and input values of the DMU to be evaluated. A set of normalising constraints guarantees that no DMU, including the one evaluated, can obtain an efficiency score that exceeds unity. Thus, DEA establishes a benchmark efficiency score of unity that no individual firm can exceed. If the efficiency score $h_o = 1$, DMU_0 satisfies the necessary condition to be DEA efficient; otherwise it is DEA inefficient.

The basic DEA model (CCR model) implied the assumption of constant returns to scale. This assumption was later relaxed to allow for the evaluation of variable returns to scale and scale economies. Specifically, the efficient frontier may be derived using four alternative returns to scale assumptions; constant returns to scale (CR); variable returns to scale (VR), non-increasing returns to scale (NI); and non-decreasing returns to scale (ND). Yue (1992), defines the followings assumptions. A bank exhibits increasing returns to scale if a proportionate increases in inputs and outputs places it inside the production frontier; decreasing returns to scale if a proportionate decrease in its inputs and outputs places it inside the production frontier; and constant returns to scale if a proportionate increase or decrease in inputs or outputs move the firm either along or above the frontier. A bank which is not on the frontier is defined as experiencing non-increasing returns to scale if the hypothetical bank with which it is compared, exhibits either constant or decreasing returns to scale. A similar definition applies for non-decreasing returns to scale. A firm which is efficient under the assumption of variables return to scale (VRS) is considered technologically efficient; the VRS score represents pure technical efficiency (PT), whereas a firm which is efficient under the assumption of constant returns to scale (CRS) is technologically efficient and also uses the most efficient scale of operation. Aly *et. al.* (1990), suggests that, from the measures of technical (T) and pure technical (PT) efficiency, it is possible to derive a measure of scale efficiency:

$S = T/PT$ or **5.11**

$S = CRS\,/\,VRS$ **5.12**

where $0 \leq S \leq 1$ since $CR \leq VR$. If the value of S equals 1, the firm is scale efficient and all values less than 1 reflect scale inefficiency. If scale inefficiency exists ($S < 1$), the source of inefficiency is the result of operating at either increasing ($NI < VR$) or decreasing ($NI = VR$) returns to scale.

5.7.2.2 Free Disposal Hull (FDH)

Free Disposal Hull is a special case of the DEA model where the points on lines connecting the DEA vertices are not included in the frontier. Instead, the FDH production possibility set is composed of only the DEA vertices and the free disposal hull points interior to these vertices. Because the FDH frontier is either congruent with or interior to the DEA frontier, FDH will typically generate larger estimates of average efficiency than DEA. The FDH approach therefore allows for a better approximation or 'envelopment' of the observed data.

To summarise, the non-parametric approach has a main drawback; generally no random error is assumed; nor is there assumed to be any measurement error in constructing the frontier; there is no luck that temporarily gives a decision making unit better measured performance; and no inaccuracies created by the accounting rules that would make measured outputs and inputs deviate from economic outputs and inputs. If random error does exist, it can have a large cumulative effect on aggregate inefficiency because this measure is determined by comparing the few fully efficient banks on the frontier with all other banks which are not on the frontier.

Despite this disadvantage, this approach has an advantage in that in the non-parametric approach, no explicit functional form has to be specified in advance; instead, the production frontier is generated by the mathematical programming algorithm which allows flexibility and in turn enables multidimensional outputs and inputs.

As can be seen above, it is not possible to determine which of these two approaches dominates the other since we are unable to identify the true level of efficiency. To solve the problem, Berger and Humphrey (1997), suggest adding more flexibility to the parametric approach and introducing a degree of random error into the non-parametric approaches, for example as they note:

> In the parametric approaches, some studies have experimented with specifying more globally flexible forms. To date, this has focussed on specifying a Fourier-flexible functional form which adds Fourier trigonometric terms to a standard translog function. This greatly increases the flexibility of the frontier by allowing for many inflection points and by including essentially orthogonal trigonometric terms that help fit the frontier to the data wherever it is most needed. (Berger and Humphrey 1997, page 179)

5.8 Conclusion

In this chapter, we have highlighted the concept of efficiency in terms of economies of scale, scope and managerial efficiency in banking. Various approaches used to measure the efficiency of financial institutions can be found in the research literature, differing primarily in the assumptions imposed on the data in terms of the functional form of the best-practice frontier, whether or not account is taken for the random error and, if there is random error, the probability distribution assumed for the inefficiencies which is used to disentangle the inefficiencies form the random error. In general, the two approaches of measuring efficiencies can be divided into parametric and non-parametric approaches, basically stochastic frontier approaches and data envelopment analysis. For the research study presented in the remainder of this thesis which is explicitly cross-national, the parametric approach is adopted on the grounds that innovations may be decomposed into a random component and a component attributable to inefficiency, which allows for a distinction between countries whilst using panel data methods.

CHAPTER 6

REVIEW OF PERFORMANCE STUDIES IN BANKING

6.1 Introduction

In recent years, substantial scholarly effort has been devoted to determining the relationship between market structure and performance within and across countries' banking systems. Apparently, there are conflicting results relating to the statistical relationship between market structure and performance, for various reasons. In Chapters Four and Five, we discussed the theoretical framework surrounding structure, conduct and performance as well as the concept of relative efficiency and the relevance of economies of scale and economies of scope. The main aim of this chapter is to provide an overview of the empirical research literature which tests for the expected relationships both in the US and outside the US. Section 6.2 provides a comprehensive review of prior relevant research in this respect. Then, in Section 6.3, some of the limitations and weaknesses in performance modelling are highlighted, and Section 6.4 concludes.

6.2 A Chronological Review of Selected Studies on Bank Performance

Research relating the structure of the banking industry to bank performance can be traced back to a study by Schweiger and McGee in 1961. Their research was based on automobile loan rates and installment loan rates as the performance measures and the number of banks as the concentration measure. The authors found that rates were higher when they were fewer banks, but their inferences were based on a comparison of average rates, and no econometric analysis was conducted so the significance of differences was not determined.

A seminal study by Edwards (1964), which adopted a more appropriate methodology, was aimed chiefly at testing two hypotheses: (1) that, *ceteris paribus*, business loan rates will be higher where market power is greater and (2) that, *ceteris paribus*, business loan rates are less flexible in markets having relatively high concentration. Flexibility is measured by the absolute change in loan rates during a fixed time period, and the loan rate data were obtained from two Business Loan Surveys conducted by the Federal Reserve Board System in forty nine-metropolitan areas. Of these, 15 were located in unit-banking states, 23 in limited branching states and 11 in state-wide branching states. The loan surveys covered all loans for business purposes for a two separate periods. The measure of market structure used was the percentage of total SMSA deposits held by the largest three banks in each metropolitan area. However, for the 11 state-wide branching areas, two concentration ratios were used. The first was the 'state ratio' which is the percentage of total deposits in a state accounted for by the largest three banks. The second, the 'SMA ratio', was the percentage of total deposits in an SMA (Standard Metropolitan Area) held by the largest three banks when the deposits of the largest banks were deflated by a factor derived from the ratio of total SMA deposits to total state deposits. Other variables included were the percentage change in manufacturing employment for each SMA for the previous five years, the form of bank organization and the size of community. Edward's results indicate that, in the first year examined (1955), business loan rates tended to be higher where concentration was greatest, but not two years later. On the other hand, there existed an inverse relationship between concentration and loan rate flexibility, where loan rates were less flexible in markets with high concentration than in markets with low concentration.

Subsequent work by Flechsig (1965) was based on the work of Edwards (1964), but with the introduction of regional variables. Flechsig tried to relate the degree of concentration of deposits of the largest banks to bank performance. The performance measures were based on the Federal Reserve Board business loan surveys for 1955 and bank rates on short-term business loans five years later in 1960 (49 SMSAs were chosen in the first period and 19 in the second). The banks included were the largest in each city and ranged in size from assets of about $150 million to $10 billion. The concentration measure for 1955 was based on the relative amount of deposits in the entire standard metropolitan area, whereas for 1960 it was based on the ratio of total deposits in the three largest banks to the deposits of all the commercial banks in the principal counties of the selected metropolitan areas. The average size and maturity of the loans were also taken into consideration. Differences in the supply and demand for bank funds were measured. These were: the percentage change in manufacturing employment from 1950-1957, bank operating expenses per $100,000 in assets, the average loan-deposit ratios, the percentage change in the ratios from 1959 to 1960, the average rate on mortgages held by S&L associations located in 19 cities and the amount of residential mortgages credit.

Flechsig found that, although concentration in metropolitan areas in some instances appears to be directly associated with bank rates on business loans, it is not significantly related to loan rates when account is taken of the differences in loan characteristics and in the supply and demand conditions in local and regional markets. In other words, he concluded that there is no relationship between concentration ratios and the level of interest rates on business loans. Quite surprisingly, this is in contrast to Edwards' (1964) results who used the same data set for the 49 SMSAs' for 1955. Flechsig argued that the conflicting result was due to the inclusion of the deposits of mutual savings banks in the concentration ratio and the exclusion of regional variables in Edward's (1964) initial work.

The introduction of alternative performance measures was made by Kaufman (1966). His study was carried out for the 99 counties of Iowa for the years 1959 and 1960. Five alternative performance measures were specified in the regressions: gross interest rates charged on loans; interest rates paid on time and savings deposits; the ratio of loans to total assets; the ratio of time to total deposits; and net current pretax earnings as a percentage of total assets. For the structure variables, three were included: the ratio of total savings and loan associations assets to total commercial bank deposits; the distance from the nearest major financial centre; and either the number of banks or the percentage of deposits held by the largest bank in the county. The author pointed out that the number of banks, bank concentration and the importance of S&L associations reflect the potential competitive forces from within the county, whereas the distance reflects potential competition from without the county. Five demand variables were also included in the regression equation: family income; population; change in income; change in population; and the ratio of the non agricultural employment to total employment. He reported that those market structure variables were found to be consistently and significantly related to various measures of performance in direction as predicted by economic theory. The regression results also indicated that structure, as in the number of banks in a market and bank concentration ratios do matter. In other words, he found that the fewer the number of banks and or the greater the concentration ratio (the percentage of deposits held by the largest bank): (1) the higher the average rate charged on loans; (2) the lower the average rates paid on time deposits and (3) the lower the ratio of time to total deposits. On the other hand, the greater the bank concentration, the greater were the pretax earnings on assets. Even though the relationship between structure and performance was statistically significant, the effect was not strong; relatively large changes in structure were associated with relatively small changes in performance.

Bell and Murphy (1969) identified three problems posed in earlier studies to estimate the effect of changes in concentration on the prices of various bank services. Firstly, the cost of production of a particular banking service had not been considered explicitly. Secondly, the definition of output was not clear. The authors pointed out that, in most cases, the business loan grouped by dollar size class was the basic measure of output. Finally, earlier studies had not clarified what measures of concentration were to be considered when attempting to assess the impact of market structure on performance. Aware of these problems, Bell and Murphy carried out research to test a model in which a homogenous measure of output was specified, including the cost of production as an explanatory variable. They used several measures of concentration in testing. Output of banks was defined as the average number of deposit accounts and loans processed per year, holding constant variations in the size and activity of accounts. The data were taken from the functional cost analysis for 14 New England banking market areas in 1966. Estimated demand deposit service charges were used as the measure of performance. The cost of production was utilized to obtain the estimated annual marginal costs per standardized account for all banks within these market areas. Measures of three bank concentration ratios were based on different sizes of deposits and number of accounts. The authors measured the share of the largest three banks in dollar volume of accounts which contained less than $10,000, $25,000 and $100,000. In terms of number of accounts, they measured the share of the largest three banks according to the number of accounts containing less than $10,000, $25,000 and $100,000. Since they used eight measures of concentration, eight different equations were fitted and ordinary least squares were applied to each equation after all the variables were transformed to natural logarithms. Their results indicate that there is a consistent, positive and statistically significant relationship between the market share of the largest three banks, however measured, and the prices charged (a 10 percent increase in the concentration ratio results in a 2 percent increase in price). Marginal costs were found to be positive and significant when cost change and perhaps more importantly, there seems to be no difference among the measures of concentration in their influence on price.

Fraser and Rose (1971) used data on 193 insured commercial banks in 78 smaller cities in Texas for two separate years, 1966 and 1967. Price and profits were both used as measures of performance. These include: ratios of revenue received on loans to average loans outstanding; ratios of total interest paid on time deposits to the average amount of time deposits outstanding; ratios of average time to average total deposits; ratios of average loans to average total deposits; ratios of total service charge income to average demand deposits, and ratios of net current operating earnings to average total capital. Banking market structure was proxied by one bank concentration ratio (*i.e.*, the percentage of total deposits held by the largest bank in the city) and the number of banks in the community. Bank debits per capita and the percentage change in bank debits were used as proxies for the economic activity level. A dummy variable to differentiate S & L, as well as other endogenous variables, such as in the form of cost, loan composition and size arguments were also included. Average bank size, both in absolute dollar terms and logarithmic form was employed. The results of the study indicate that, in general, the coefficient of the concentration variable is not statistically significant in its relationship to the selected performance measures. The only performance variable by which banking structure appears to be consistently affected is the ratio of time to total deposit.

In another study, Fraser and Rose (1972) extended the SCP relationship by looking at a fairly homogenous group of banks in a well-defined region and using a substantially large number of performance measures. Their study tried to answer the following question: is the performance of commercial banks different in communities having only one bank than it is in communities where there are two or three banks? Their study suggests that for commercial banks in small cities, there appears to be little difference between bank performance in monopoly situations and performance where competition prevails. The study also finds that the presence of saving and loan associations appears to have a significant impact on the performance of commercial banks in small towns especially with regard to the sources and uses of bank funds.

Fraser and Alvis (1975) compare the performance of one group of banks in highly concentrated markets and another group in highly competitive markets using the 't' test, multiple regression and multiple discriminant analysis. The data for 1972 consists of 74 banks in unit banking states; of these, 38 banks were classified as in highly concentrated markets and 36 were in low concentrated markets. Analyses of results from the 't' test suggest that only a minor number of financial ratios differed between banks in the high and low concentration markets and that these differences centred on profits, cash assets and deposit composition. For example, in each case the rate of return on assets averaged only 1.15 percent for the banks in highly concentrated markets but only .47 percent for banks in the low concentrated markets. The regression results indicate that once locational and economic factors are accounted for, there is no difference in bank profits, bank prices or the quantity of bank output between banks in high or low concentrated markets. On the other hand, the discriminant analysis results suggest that those bank performance ratios are not importantly affected by market structure; exogenous factors are more dominant and that financial performance measures are very much of secondary significance.

Heggested and Mingo (1976) examine the impact of market structure on price and non-price competition for household customers in commercial banking. The authors argue that studies which consider only one price, for example Franklin (1964), Bell and Murphy (1969), may underestimate the total impact of monopoly power on bank performance. Therefore, considering non-price competition implies that the greater the degree of monopoly power in the market, the higher bank prices will be and also the worse, bank services. Their data samples were based on a telephone survey of 332 banks in 69 SMSAs. The performance measures used were: interest rates on passbook savings (PASSI); interest rates on one-year CDs (CDI); monthly service charges on a hypothetical checking account (SCDD); charge for a cheque returned for insufficient funds (RET); total weekly hours' office and/or drive-in or walk-up windows open for business (HRS); interest rates on new car loans (NCLR); yearly charge for a smallest size safety deposit box (CHSAFD); binary variables to represent whether the bank provided overdraft line of credit service or not (OVR); 24-hour service (AUBANK); and trust services (TRUST). These performance measures were regressed against binary variables to represent whether the bank was located at a downtown or suburb location (DTSUB), total deposits of banks (TD), ratio of personal income in 1970 to personal income in 1967 (GR), per capita personal income in 1970 (Y/L), ratio of demand deposit to total deposits (DD/TD), ratio of demand deposit in accounts less than $1,000 to total deposits (dd/TD), and a concentration ratio which is H-index (C) calculated on 1972 total deposits. Their results reveal that the relationship between market concentration and prices or service in commercial banking is statistically significant. With respect of some specific prices and services and, in the aggregate, the concentration-performance relation is curvilinear; *i.e.*, a given increase in concentration will have a greater impact on prices (services) in a less concentrated market. Heggested and Mingo also calculated on the effects of loan rates on mergers of different sizes in concentrated and unconcentrated markets. Two conclusions were drawn from these: firstly, using just one price variable significantly underestimates the total effect of market structure on performance and, secondly that, the expected effect of mergers is higher in relatively less concentrated markets.

A study by Rose and Fraser (1976) was carried out to explore various measures of the structural characteristics of banking markets and to relate these measures to selected indices of the price behaviour of commercial banks. They employed three dynamic measures of market evolution. The first was, the Dynamic Concentration Index (DCI) measured by the geometric mean of the regression for the terminal-year market share against the base-year and of the reciprocal of the regression for the base-year market share against the terminal-year share. The second was, the Share Stability Index, defined as the product-moment correlation between the market share of a firm in some terminal year and the share in some base year. The final measure was the Dynamic-Herfindahl Index, which is simply the change in the level of the Herfindahl Index between the base and terminal years. The performance measures used were average loan rates, average time and savings deposits rate, and average service charges on demand deposit accounts. The data sample was selected from 704 unit banks situated in 90 county-wide banking markets in Texas. The sample banks ranged in size from less than $1 million to more than a billion dollars in total deposits. Measures of bank prices and a number of explanatory variables were constructed from balance sheet and income data for 1969 and 1970. The terminal year was 1970 and 1961 was used as the base year. Rose and Fraser's overall results suggest that certain measures of bank market structure have a significant impact on bank prices: for example, the Herfindahl Index which measure the current structure, does affect the prices of bank services but the effect is relatively small; an increase in standard deviation in the Herfindahl index would increase the loan rate about 25 basis points, or less than 1% of the mean of this variable. On the other hand, variables measuring the change in the market structure do not appear to be important in influencing the prices of bank services. This suggests that the historical development of markets is not important in determining the pricing policies of banks in these markets.

Another study by Heggested and Mingo (1977) revealed that the structure performance relationship is nonlinear. The authors estimate the degree of competition in local banking markets by analysing a sample of 236 banks in 52 SMSAs by conducting a telephone survey during April 1973. The prices of two specific banking products, interest rates on new car loans and demand deposit service charges, were used. They also estimated the critical concentration ratios for both the measures by dividing the range into seven discrete intervals and estimated the linear relation using dummy variables for the concentration intervals. Quite interestingly, they found that the R^2s for both the loan rates and demand deposits charges were low, but higher than the linear formulation which indicated that the relationship between price and concentration is nonlinear. Service charges were found to be lower where thrift was allowed to compete in the market. The estimates of the critical concentration ratios in the study were found to be .144 for new car loan rates and .099 for demand deposit service charges. These indicated that new car loan rates increase with a Herfindahl index until that index reaches a value of .144 or the number-equivalent of seven banks, and that further increases do not cause an increase in loan rates; as for the demand deposit service charges, the charges increase with the Herfindahl Index until that index reaches .099 or the number-equivalent of ten banks, and that any further increase in concentration does not increase charges in the markets. The implication of these findings is that social costs and benefits of changes are asymmetrical and that major declines in concentration can have important price reduction benefits.

Heggested (1977) attempted to correct the mis specification of earlier tests of the SCP models by including a risk variable in the model. His sample consisted of 238 banks operating in 60 medium-sized metropolitan areas during the years 1960 to 1970. His approach was to estimate a reduced form profit function with the standard deviation of the rate of return on assets, which was included as an independent variable in order to control for interbank differences in risk. Heggested also estimated as additional reduced-form model containing an interaction term between risk and market concentration in order to investigate if there was any systematic interrelationship between market concentration, risk and profitability. His findings as presented in Table 6.1 show that the relationship between market concentration and profitability appeared to be strengthened by including risk as a separate independent variable. He also reported that as risk increases, market power tends to have a greater impact on profitability.

It is worth noting that most of the SCP studies were carried out in the US banking markets as opposed to places outside the US. Thus, beginning with Short (1979), the focus altered towards banking markets outside the US. The 1979 study was Short's second study of bank structure and performance at international levels .[26] His seminal work was based

[26] His first study in 1977 also addressed the issues of international bank profitability.

Table 6.1

Results as reported by Heggested (1977) to test the Structure-Profitability Relationship

Equation	Dep. Variable	Cons- tant	S	T	G	I	C	V	CV	R-bar sq / F
1	*P*	1.090	-0.016	-0.462	-0.111	.065	0.00292			.07
		(2.86)****	(-.90)	(-3.28)****	(1.54)	(1.41)	(2.40)***			3.43***
2	*P*	0.98	-0.010	-0.478	-0.111	.072	.00309	0.376		.08
		(4.10)****	(-.50)	(-3.41)****	(-1.54)	(1.56)	(2.54)***	(1.79)*		3.54***
3	P^*_2	0.94	-0.008	-0.482	-0.110	0.074	.00314			.08
		(4.07)****	(-.39)	(-3.46)****	(-1.55)	(1.61)	(2.60)****			3.91***
4	P^*_1	0.79	0.002	-0.511	-0.109	.083	.00336			.08
		(3.35)***	(.08)	(-3.54)****	(-1.51)	(1.76)*	(2.72)****			4.30***
5	*P*	1.361	-0.005	-0.454	-0.110	.100	-0.0016	-1.166	.0219	.10
		(4.10)****	(-.20)	(-3.20)****	(-1.50)	(1.20)	(-.5)	(-1.2)	(1.67)*	3.46***

Notes: *P*=average of the ratios of net income after taxes to total assets between 1960 and 1970; $P^*_1=P-1.05V$; $P^*_2=P-0.5V$; S=average total deposits of bank, T=average total time and savings deposits tot total deposits; G =ratio of 1970 retail sales in the bank's market to 1960 retail sales; I= 1969 per capita income; C=average of 1964 and 1966 three bank concentration ratio of total deposits; V=the standard deviation of yearly profits to assets for the bank between 1960 to 1970.

*, **, ***, ****significant at the 5, 2.5, 1 and 0.5 percent respectively; t- values in parentheses.

Source. Heggested (1977, page 1214)

on data for twelve different countries in Canada, Western Europe and Japan for 1972-1974. Profit rates were measured by the annual average ratio for 1972-1974 of after-tax profits to total shareholders funds including retained earnings and general reserves. Concentration in terms of deposits by the H-concentration index; its inverse and one, two and three-bank concentration ratios were employed. Explanatory variables were divided to two categories: those which were unique to each country; *i.e.*, discount rates (taken as an average from 1972-1974) and interest rates on long-term government securities; and those which were unique to each banks, *i.e.*, dummy variables to distinguish government-owned banks from private-owned banks, the ratio of total assets to shareholders funds, bank size (converted to US dollars at 1973 year-end exchange rates) to capture economies or diseconomies of scale and the rate of growth of assets. Short's results reveal that the dummy for government ownership, the concentration measures and capital scarcity proxies proved to be superior. The coefficients and the partial correlation coefficients of the concentration ratio in the regression in general, support the view that concentration has some impact on profitability of banks. It appears that a relatively small coefficient of the concentration variables indicates that a relatively large reduction in concentration is necessary to bring about a one percentage point reduction in profit rates.

A study by McCall and Peterson (1980) also finds that the structure performance relationship is nonlinear. They use a switching regression technique which involves a search procedure that yields maximum likelihood estimates of the critical level of concentration and of the coefficients of the concentration-performance relationship in the business loan market. Policies design to limit concentration imply two different notions: one is that if the relationship is linear and continuous in nature the same regulatory policy would be equally effective in low or high concentration; however, if the relationships exhibit a discontinuous shift at some level of concentration then the policy is one that would prevent markets from obtaining a critical level of concentration. If the relationship appears to be different for markets above and below the critical level, policies should therefore be devoted to the structural changes likely to have the greatest impact. The authors' data consists of 155 banking markets in 14 unit banking and limited branching states; 98 of the 155 are county markets; the remainder are metropolitan markets. For the overall markets, the sample consists of 270 banks for 1968.This study is of particular interest because the authors use the Lerner Index (the difference between product price and marginal cost expressed as a percent of price) as a performance indicator. The components of the Lerner index are the loan price, marginal cost of producing and servicing the loan and net marginal cost of funds for the loan. Concentration is measured in terms of the number of equal-sized banks necessary to achieve the level of market concentration as measured by the entropy index per market. The control variables taken into consideration are: dummy variable one to represent concentrated markets with a number equivalent which is less than the critical level and zero otherwise; number of business loans outstanding, per bank; percentage of total business loans that are agriculture loans, per bank; average size of business loans, per bank; total net occupancy expense, per bank; effective buying income per bank, per market, and annual change in effective buying income per bank, per market. The result for the overall markets which assume no critical level of concentration, is as expected. The market concentration is found to be negatively related to bank market power at a significant probability level but the magnitude is relatively small. A unit increase in the numbers equivalent concentration (or a decrease in market concentration) is associated with a 5-basis point decline in the disparity between business loan prices and marginal costs. The results also reveal that the relationship between the Lerner index is greater in the more concentrated markets than in the less concentrated markets indicating the existence of a critical level of concentration. In other words, a change in market concentration has a greater impact on bank performance in more concentrated markets than in those which are less concentrated. When samples are examined for separate county and SMSA sub samples, the linear continuous equation results indicate that the relationship between concentration and performance is more significant in the county than in the SMSA markets. However, the presence and identification of critical levels of concentration become less clear cut when estimated from the separate SMSA and county market samples than from the combined sample. This suggests that the critical level of concentration is very sensitive to the model specification and sample selection.

Rhoades (1981), attempts to refine and extend the earlier findings of the SCP in banking by: analysing the long run SCP relationship; accounting for inter market differences in costs; focussing on the market as the unit of observation; examining the SCP relationship in connection with the general level of interest rates and investigating for non-linearities in the SCP relationship. His study is based on 167 comparable banking markets for each of the seven years from 1966 to1975. Using both profits and price measures as performance measures, as well as the three-firm concentration ratio and other similar variables to proxy for firm and market specific characteristics, his results generally support the SCP hypothesis, indicating that market structure does affect the interest rates on loans, service charges on demand deposits, and rates of returns. His results also find that the three-firm concentration of 75 percent tends to be a 'critical' level of concentration; markets with concentration above that level tend to experience significantly higher prices and profits than markets below that level.

A Study by Kwast and Rose (1982) separates high and low-profit banks when estimating the relationship between bank profitability and two operating performances: pricing and operating efficiency. His samples were based on very large banks (above $500 million in domestic deposits) which were in continuous operation from 1970-1977. The resultant samples include 41 high-profit banks with an average return on assets of 0.94 percent and 39 low-profit banks with an average annual return of 0.56 percent. The pooled annual sample therefore consists of 328 high profit banks and 312 low-profit bank observations. The authors use an expanded least squares cost accounting model, as follows;

$$y = A\beta + L\gamma + (1/ta)\alpha_{1\,+} h\alpha_2 + R\alpha_1 + T\alpha_m + \epsilon, \qquad \textbf{6.1}$$

where y = N x 1 vector of observations on income deflated by total assets,

A = N x K matrix of observations on K asset variables deflated by total assets,

β = K x 1 vector of estimated coefficients,

L = N x J matrix of observations on J liability variables deflated by total assets,

γ = J x 1 vector of estimated coefficients,

($1/ta$) = N x 1 vector of observations on the inverse of total assets,

h = N x 1 vector of observations on the Herfindahl Index of market concentration (*HERF*) associated with each bank observations.

R = N x 4 matrix of binary variables for four regions of the United States.

T = N x 7 matrix of binary variables for seven years of observations.

α_1, α_2, α_i, α_m = estimated coefficients (i=3,..., 6; m=7,..., 13).

In their analysis, Kwast and Rose used three performance measures: total gross operating income divided by total assets; net operating income divided by total assets; and net income divided by total assets. The H-index of market concentration (HERF) was included as a measure of market structure. Market demand and supply factors such as per capita income, the rate of economic growth, and the cost of the non- financial factor inputs were included in the equation. Eighteen balance sheet variables were also included of which 11 were from assets items and 7 items were from the liabilities side. Ordinary least squares' regressions were run separately for high-earning banks and low-earning banks and the pooled sample of both sets of banks. Kwast and Rose found that after allowing for regional supply and demand factors, the high and low earning banks were estimated to earn equal market rates of return on individual assets and liabilities and that no evidence persisted for differential prices as an important discriminator between these banks. Some evidence was also found that the high-profit banks experienced lower operating costs on some liabilities and high operating costs on selected asset items. But these differentials disappeared after taxes were taken into account. A positive and significant coefficient for HERF in the low-profit banks' equations suggested that market concentration is directly related to total income for this set of banks. The authors also found that both groups of banks experienced constant returns to scale and both could profitably be exploited in concentrated markets. Overall, they concluded that there is no compelling evidence that high-earning banks are characterized by greater operating efficiency than low-earning banks.

Rhoades (1985) argued that high profits made by market leaders are a result of some form of market power and he questioned the Demsetz (1973) views that profits gained by leading firms are due to greater efficiency. In this seminal work, his main objective is to investigate the proposition that firms having a large market share (in high as well as low concentration markets) enjoy a unique form of market power which he termed as 'inherent product differentiation'. Multiple regression analysis based on the following model was used:

$$ROR = f\,(MP,\ TA,\ TL/TA,\ LTI/TL,\ TCap/TA,\ T/T{+}S,\ OBHC,\ M,\ U,\ L,\ MG); \qquad \textbf{6.2}$$

where *ROR* is the average rate of return on assets (1969-1978), *MP* represents market power share and market power rank. Since the market concentration variable is argued to be highly correlated with the firm market share variable, it is then replaced with a concentration decile assigned to each 6492-sample banks, according to the concentration ratio in the market in which the banks operate. For each of the concentration deciles, the banks are sub-divided into high market share, low market share, high rank and low rank firms. Total assets are taken into account for scale economies with the average capital asset ratio as the bank's risk indicator and the average annual loan asset ratio (*TL/TA*), loans to individuals (*LTI/TL*) and market growth (*MG*) are also included. A set of dummy variables is used in the equation to take into account banks located in statewide, limited, and unit branching states. The data used in the analysis were based on 6492 unit banks operating in 194 SMSAs for the period between 1969 and1978. These were small undiversified banks having an average deposit size of $17 million and similar production functions and which did not rely significantly on explicit product differentiation strategies.

The results of Rhoades' study indicate that the firm rank variable used as an alternative to market shares is generally consistent with results for the market share variable. Therefore, this does not suggest that rank, rather than market shares, is the key to any market power that may be associated with higher returns. From the results, it can be seen that support is found for the hypothesis that the market share is directly related to the rate of return. The market share variable is statistically significant (except for the 30.0 - 39.9% concentration decile), indicating that even when concentration is held constant, high market share firms tend to earn a higher rate of return than firms with lower market shares. The coefficients of market share variables vary systematically from one concentration decile to the next, supporting Rhoades' argument that the influence of market shares on profits is independent of concentration.

While other researchers mentioned earlier find a positive relationship between structure and performance, studies such as those undertaken by Smirlock (1985) and Evanoff and Fortier (1988) find negative results. These authors argued that the major linkage is between performance and market share. Their seminal studies were based on the assertion by Weiss (1974) that, both the market specific and firm specific variables should be incorporated in the regression equation to find their impact on profitability. These authors argued that past studies did not take into consideration proxies for market shares. Once these variables are taken into account, the relationship between concentration and profitability might be quantitatively weak. Smirlock (1985) explained two sources of higher profits, lower costs and higher prices. Because banks with large market shares may have high quality products, this enables them to charge higher prices. He called this scenario the "product differentiation hypothesis". He went on to differentiate the traditional SCP paradigm from efficiency and product differentiation hypotheses in an equation which used prices as performance measures and included both the market share and concentration variables: Smirlock stated that:(1) SCP predicts a zero coefficient on market share and positive coefficients on concentration; (2) the efficiency hypothesis predicts a zero coefficient on both market structure variables; and (3) the product differentiation predicts a positive coefficient on market share and zero on concentration. According to Smirlock, as also shown by past studies, there is a strong indication that a product differentiation hypothesis is unlikely to be the driving force behind the profit market share relationship, but that the efficiency hypothesis is the underlying explanation. He examines a sample of 2,700 unit state banks operating in Colorado, Kansas, Missouri, Nebraska, New Mexico, Oklahoma and Wyoming for the years 1973 and 1978. The estimated equation is;

$$\Pi = \alpha_0 + \alpha_1 MS + \alpha_2 CR + \alpha_3 MSCR + \alpha_4 MKTDEP + \alpha_5 MKTGROW + \alpha_6 ASSET + \alpha_7 DDTODEP + \alpha_8 INDEP + \alpha_9 MULTI, \quad 6.3$$

where:

Π	= rate of return to total assets, capital and rate of return on equity
MS	= total deposits/total bank deposits in the market
CR	= three-bank concentration ratio
$MSCR$	= an interaction term defined as MS multiplied by CR

MKDEP	= total market deposits
MKTGROW	= the percentage growth in market deposits
DDTODEP	= demand deposits/total deposits
ASSETS	= total bank assets
INDEP	= effect of holding company affiliations
MULTI	= effect of multi holding companies

With the restriction $\alpha_1 = \alpha_3 =$ zero imposed, the results are consistent with those of previous studies, which conclude that the traditional hypothesis is valid. With $\alpha_2 = \alpha_3 =$ zero imposed, the coefficient on market shares was positive and significant. On the other hand, if both market-share and concentration variables were included in the regression, strong support was found for the proposition that the relationship was between profitability and market share and not between profits and concentration. In other words, these results support the efficient structure hypothesis. Thus, Smirlock concluded that these provide further evidence that the efficient structure hypothesis is a more accurate description of banking markets than the traditional hypothesis. The results of Evanoff and Fortier (1988) also support the efficiency hypothesis. They find that market structure influences profits positively only in markets with higher entry barriers but the impact is relatively small.

Clark (1986a,b) uses two approaches to test for the market concentration and risk relationship in banking markets. Both of his studies use the same data set, consisting of 1,857 banks located in 152 SMSAs in states permitting either unit or limited branch banking for the ten-year period from 1973 to 1982. In the first study, Clark uses ordinary least squares regression procedures. Risk is measured as the standard deviation of return on equity. His results show that even when controlling for bank size, there is no significant relationship between concentration and risk. Clark (1986a, page 53) concludes:

Thus, it appears that banks located in more highly concentrated banking markets may indeed be trading off portions of their monopoly profit for a reduction in risk.

Apart from finding that his result does not support the efficiency hypothesis, Clark's results indicate that failure of previous studies to control adequately for the existence of a systematic interrelationship between market structure, risk, and profitability may be responsible for the failure of many tests on the SCP studies to find a strong, positive and significant direct relationship between market concentration and bank profitability. In his second paper, Clark (1986b) uses a two-stage least square (2SLS) procedure and compares the results using OLS estimates of structural and reduced form equations. The 2SLS model allows for simultaneity between the bank's profit, risk, and the structure of the balance sheet and for incorporating other variables to capture the effects of the market, regulatory and organizational structures. Clark's results using the 2SLS method are more satisfactory than those using the OLS estimates. He finds evidence to support the traditional structure-performance hypothesis; a ten percent increase in concentration (measured by the average Herfindahl Index) will, *ceteris paribus*, directly increase the average rate of return on equity by approximately 0.53 percent. On the other hand, the results using the OLS to the model's structural equation for bank profits show quantitatively small and statistically insignificant estimated coefficients on the market concentration variable.

Similar to the studies of Smirlock (1985), and Evanoff and Fortier (1988) which use market shares to proxy for firm-specific efficiency, Berger and Hannan (1989), use price (deposit interest rates) instead of profits to estimate the SCP relationship in banking. If SCP is supported, then prices will be less favourable (a negative price-concentration relationship); otherwise, if the efficient structure hypothesis is supported (a positive price-concentration relationship), the consumer will be favoured. The data of this seminal study were based on 470 banks in 195 local banking markets (defined as Metropolitan Statistical Areas or Non-MSA counties) observed quarterly over a two and a half year period (April 1983 to September 1985). The authors employed both the three-firm concentration ratio and the H-index (constructed with and without the inclusion of the S&Ls). The performance measures were the varieties of prices; *i.e.*, retail deposit interest rates (expressed in basis points) paid by commercial banks. These were: the Money Market Deposit Account (MMDA) rate (r_{mmda}), the Super-NOW (SNOW) rates (r_{snow}), and the 3, 6, 12, and 30 month Certificate of Deposit (CD) rate for accounts less than $100,000 ($r_{cd3m}$, r_{cd6m}, r_{cd12m}, r_{cd30m}). Additional variables were included as control variables: these were the growth rate of deposits in the bank's market (1YRGROW), the number of bank branches divided by total bank plus Savings and Loan branches in the local market (BANKPROP), the local per capita income (PCINCOME), the cost factor, wage rates (WAGE), the differences in conditions between metropolitan and rural markets (MSA) , and whether the state in which the bank is located prohibits (UNIT) or limits (LIMIT) branch banks.

Their results suggest that, *ceteris paribus,* banks in the most concentrated local markets in their sample pay MMDA rates that range from 25 to 100 basis points less than those paid in the least concentrated markets. The finding that banks in more concentrated markets pay lower deposit rates indicates the dominance of the structure performance paradigm over the efficient structure hypothesis. Similar results were found for Super-NOWs and shorter term CDs but the effect of concentration on longer term CD rates indicate that longer maturities' CDs are competing on a broader basis than that represented by local banking markets. Even though the inclusion of market shares in the regression is questionable because of its endogeinity, the coefficient is found to be positive. Berger and Hannan argue that this may be due to different levels of quality being offered to customers and higher deposit rates given, thus allowing banks to gain high market shares.

Bourke (1989) focussed on banks in twelve countries in Europe, North America and Australia despite the problem of substantial differences in accounting practices and legal aspects between these banks in various parts of the world. The objective of his study was to further examine the determinants of international bank profitability and to review the relevance of expense preference behaviour theories put forward by Edwards (1977). The twelve countries selected were: Australia, California, Massachusetts, New York, Canada, Ireland, England and Wales, Belgium, Holland, Denmark, Norway and Spain. In contrast to research by Short (1979), who used average data, Bourke's study was based on the financial statements of 90 banks each year in the ten-year period of 1972 to 1981. These banks fell within the top 500 banks (ranked by total assets) in the world in June 1980. He introduced value-added measures to overcome the problem of the variability in accounting standards and reporting which may exist between countries. Value-added is defined as loan interest and other revenue less deposit interest and other non wage expenses. To test the expense preference theory, Bourke used net income before tax plus staff expenses, while net income before tax plus staff expenses plus loan losses were used as proxies for gross margins. The independent variables were; a dummy variable representing government ownership (GOVT), three bank concentration ratios (CONC), the long-term bond rate for each country for each year (INT), the growth in money supply for each country for each year (MON), capitals and reserves as a percentage of total assets (CRTA), cash and bank deposits' plus investment securities as a percentage of total assets (CBINVTA), the percentage increase in a consumer price index (CPI), and staff expenses (SE).

The results of Bourke's study (as in Table 6.2) show that concentration is moderately and positively related to pretax return on assets. In equations where the dependent variables include value added measure, concentration shows an inverse relationship. This implies that there is no support for the expense preference theories. In other words, as concentration increases, staff expenses are squeezed. However, support is found for the Edward-Heggested-Mingo hypothesis; *i.e.*, higher levels of concentration are associated with lower levels of service and presumably lower staffing costs.

Table 6.2

Estimates of the Relationship between Return on assets and Selected Independent Variables [a] as reported by Bourke (1989)

	CRTA	CBINVTA	GOVT	CON	INT	MON	CPI	SE	R^2-adj
BTTA	0.1[b]	0.01[b]	-0.1	0.0[b]	0.029[b]	-	-	-	0.53
BTTA	0.1[b]	0.01[b]	-0.01	0.01[b]	-	-	0.03[b]	-	0.53
BTTA	0.1[b]	0.01[b]	-0.01	0.01[b]	-	-	-	-	0.52
BTTA	0.10[b]	0.01[b]	0.01	-	-	-	-	0.1[b]	0.49
BTTA	0.11[b]	-	-	-	-	-	-	-	0.46
BTSETA	0.12[b]	0.01[b]	0.11	-	-	-	-	-	0.32
BTSETA	0.10[b]	0.01[b]	0.21	-0.02[b]	-	0.02[b]	-	-	0.37
BTSETA	0.10[b]	0.01[b]	0.21	-0.02[b]	-	0.02[b]	-0.00	-	0.37
BTSETA	0.10[b]	0.01[b]	0.23	-0.02[b]	0.04[b]	-	-	-	0.37
BTSEPLTA	0.13[b]	0.00[b]	0.12	-	-	-	-	-	0.28
BTSEPLTA	0.12[b]	0.00[b]	0.21	-0.01[b]	-	0.02[b]	-	-	0.31
BTSEPLTA	0.13[b]	0.00[b]	0.14	-	-	0.02[b]	-0.01	-	0.29
BTSEPLTA	0.11[b]	0.00[b]	0.24	-0.16[b]	0.057[b]	-	-	-	0.32

Notes: [a] Number of observations for each equation: 116 [b] Significant at 5% level - t statistics and constant omitted for space.
BTTA=net profit before tax as a % of total assets, BTSETA=net profit before tax plus staff expenses as a % of total assets, BTSEPLTA=net profit after tax plus staff expenses plus provision for loan losses as a % of total assets.
Source: Bourke (1989, page 77).

Another study using price in the SCP study was carried out by Hannan (1991a). The Structure-Performance hypothesis was tested using commercial loan rates instead of profit data, taken from the Federal Reserve System surveys of banking institutions. These commercial loan rates comprised of unsecured and secured floating rates as well as unsecured and secured fixed rates. The loans were grouped into small (loans less or equal $100,000) and large loans (those exceeding $100,000). A sample of about 260 banks (ranging in size from among the smallest to among the largest, with a median size of $139 million in assets) located in SMSAs for the period of 1984, 1985 and 1986 were obtained. Eight independent variables were selected in the analysis: (1) market concentration as measured by the Herfindahl index; (2) maturity of loans in years; (3) the size of loans in dollars; (4) a dummy variable to differentiate whether the loan was made under commitment or not; (5) total assets; (6) population; (7) average hourly earnings of non supervisory manufacturing employees in the market; and (8) the state's business failure rate, defined as the number of failure per 10,000 businesses.

Ordinary least squares (OLS) residuals were employed to correct the covariance matrix of parameter estimates in order to avoid errors associated with loans originated by the same bank. Hannan's results indicated that the commercial loan rates were local in nature for the three time periods under study. To his disappointment, the result for 1984 is weak; the coefficients of CONC were statistically insignificant except for the case of floating-rate unsecured small loans. However, for 1985 and 1986, there was a strong positive relationship between loan rates and the concentration for smaller loans. He explained that the observed differences in the relationship contributed to greater price rigidity in concentrated markets.

A study by Jackson (1992) on the US market also found evidence of the nonlinear price-profits-concentration relationship. Using a similar model as in Berger and Hannan (1989), Jackson employed data from the same source but excluding banks with less than $1,000,000 in retail deposit. A sample of 221 banks in 104 different local banking markets was observed monthly from November 1983 to November 1985. Jackson used three retail deposit interest rates paid by banks which were expressed in basis points, focussing on Money Market Deposit Accounts (MMDA) rates. The author found similar results to Berger and Hannan (1989), that the coefficient for the MMDA rate was negative and significant for the entire sample but this may not have been consistent across different levels of the observed market concentration. This is tested by ranking the sample into three groups: high concentration; middle concentration and low concentration. The results as presented in Table 6.3 differed across sub samples: the value was negative, large and significant at the 1% level for the low concentration group; small and not significant for the middle concentration group; and positive and significant at the 1% level for the high concentration group. This suggests a nonlinear relationship over the relevant range of a sample. Jackson's findings therefore support the efficient structure hypothesis: high levels of concentration may signal the acquisition of market shares by the most efficient firms and low levels of concentration signal the entry of efficient new firms.

Molyneux and Thornton (1992) replicated Bourke's (1989) methodology using a sample of European banks for the period 1986 to 1988. Their results, in common to those of Bourke, show that there was a positive and significant relationship between concentration and various measures of profitability. In addition, some evidence was also found for the expense preference behaviour.

Table 6.3

MMDA Rate Regressions by Concentration Group as reported by Jackson (1992)

Concentration Group	Constant	CR3	MS	MG	TB6	R^2
Low (N = 1850)	295.88[a] (23.10)	-2.65[a] (-11.97)	0.59[a] (3.47)	0.02 (0.92)	0.71[a] (77.17)	0.77
Middle (N = 1825)	186.37[a] (10.67)	-0.23 (-0.92)	-0.49[a] (-3.24)	0.17[a] (2.69)	0.71[a] (76.72)	0.76
High (N = 1850)	129.96[a] (8.67)	0.67[a] (3.76)	-0.09 (-1.14)	-0.25[a] (-4.57)	0.71[a] (78.04)	0.77
Total (N = 5525)	207.92[a] (35.82)	-0.53[a] (-10.08)	0.02 (0.27)	-0.01 (-0.35)	0.71[a] (131.71)	0.76

Notes: CR3 = 3-firm deposit concentration percentage as of year-end 1984, MS = Individual banks market share percentage as of year-end 1984, MG = 1980-1984 market deposit growth percentage and TB6 = Secondary market monthly average six-month Treasury bill rate.
Source: Jackson (1992, page 374)

Recent studies have added X-efficiency measures to the profitability regressions to test the SCP relationship. For example, beginning with Berger (1991) and Berger and Hannan (1993), the SCP studies in banking have incorporated measures of inefficiencies in order to distinguish the SCP and efficiency hypotheses in the banking markets. (Details of the major approaches to measuring efficiencies in the literature can be found in Chapter 5 of this thesis). These proposals have recently been widely used in the SCP studies in banking.

A study by Berger and Hannan (1993) incorporate different possibilities, including estimates of X-efficiency and scale efficiency. X-efficiency was measured using a distribution-free approach where the key assumption was that cost difference owing to X-efficiency persists over time, while those due to random error average out over time. This study used both profits and price as performance measures and data was based on a ten-year period of the 1980s. The authors found support for the SCP hypothesis using price as the performance measure but when X-efficiency and scale efficiency were accounted for, neither the concentration nor the market share exhibited a statistically significant influence on the profitability measures. However, the R-squared increased from about 3 to 4 percent to about 10 to 13 percent with the inclusion of the efficiency variables in the equations. On the other hand, the coefficients of concentration were negative and significant indicating that, being equal, banks in more concentrated markets were found to offer lower deposit rates. This study also offered evidence that the Quiet Life hypothesis exists, as a negative relationship was found between efficiency and concentration.

Similar to the study undertaken by Evanoff and Fortier (1988), Molyneux and Teppett (1993) examine the structure-performance relationship by testing the SCP and efficiency hypotheses in the EFTA banking market between 1986 and 1989. A sample data of banks from five countries in EFTA; that is, Austria, Finland, Norway, Sweden and Switzerland were obtained from the International Bank Credit Analysis Ltd (IBCA). The data were available for 169 banks in 1986, 258 banks in 1987, 282 banks in 1988 and 270 banks in 1989. The authors estimated the profit equation developed by Weiss (1974) and Smirlock (1985), incorporating both the firm and market specific variables. A five-firm asset concentration ratio was employed to measure the market structure and a market share measure was included to capture the efficiency of the firm. Concentration ratios and market variables were calculated by treating each individual country in the EFTA banking market as a local market. The return on assets; *i.e.*, net income divided by total assets was used as the performance measure. A number of control variables were used to account for other risk (capital to asset ratio and ratio of loans to assets), cost (demand deposits to total deposits), size (asset size), and ownership characteristics. Profits were regressed separately: firstly, using deposit markets share and, secondly, using asset share measures for all the four years.

Molyneux and Teppett reported a substantially high adjusted r-squared than those reported from previous studies. The relationship between profit and concentration was positive and significant for 1986 and 1989, whereas the results for 1987 and 1988 were less clear cut. On the other hand, the market share variable yielded either insignificant negative coefficients or insignificant positive coefficients. However, the results of two equations revealed that both the concentration ratio and market share variables were positive and significant and this indicated that both firm specific efficiency and market structure influence profits. Despite that, the majority of the results indicated support for the structure performance hypothesis which suggests that concentration in the EFTA banking markets has lowered the cost of collusion between firms and resulted in higher than normal profits for all market participants.

Using the same approach, Lloyd-Williams, Molyneux and Thornton (1994) examine the Spanish banking markets for the years 1986 to 1988. The results of their findings indicate that using a pooled sample and yearly data generally supports the traditional interpretation of the SCP paradigm and rejects the efficiency hypothesis.

In another European study, Ruthenberg (1994) tests the structure-performance relationship and estimates the extent of economies of scale in EC and several nonmember banking markets. Unlike previous research, where majority of the studies used a simple multiple regression analysis to relate this relationship, Ruthenberg (1994) employs a transcendental logarithmic function (translog) as a means of estimating the SCP relationship and economies of scale. The data sets, obtained by means of questionnaires, were sent to each individual country, consisted of two samples: (1) the 12 EC countries to which the Single Banking Licence Ruling applies directly and (2) an enlarged sample consisting of 12 EC countries plus several nonmember countries such as Norway, Finland, Sweden, Israel, Australia, Switzerland, Canada, the US and Japan. Ruthenberg focussed on the commercial banking industry for the years 1984-1988. To test the SCP relationship, he used the following performance equation;

$$\pi_{ij} = f\ (H_{ij}, PC_{ij}, NNI_{ij}, R_{ij}, V_{ij}) \qquad \textbf{6.4}$$

where;

π_{ij}	=	Two measures of performance: (1) the Lerner Index (LI); that is the difference between_price (interest rates on loans) and marginal cost (the interest rate on deposits) divided by price, and (2) The interest margin (IM), the difference between interest income derived from loans and other earning assets and the interest paid on deposits / total assets;
H_{ij}	=	The H-index calculated as the sum of the squared shares of the assets of the five largest commercial banks;
PC_{ij}	=	A proxy for entry barriers of which two are, the first is population per number of branches (PNBR) and the second is population per number of bank (PNB);
NNI_{ij}	=	Non interest income calculated as fees and commission less overhead expenses (as percent of total assets);
R_{ij}	=	Measures of overall risks which include: (1) ratio of loans to total assets (LA); (2) ratio of equity to total loans (EQL); (3) ratio of loan-loss provision to total loans (LRL); and (4) standard deviation of the return on equity (after tax profits /capital);
V_{ij}	=	A vector for control variables to account for banking market and/or economy specific characteristics.
D85, D86, D87, D88	=	Dummy variables to reflect changes over time in the characteristics of the

banking systems; and

G = Dummy variable to account for the effect of income on the demand for bank services, zero for countries with per capita GNP of up to \$10,000 and values of 1 otherwise.

Using a translog function, the performance function is specified as follows;

$$\begin{aligned}\ln \pi = {} & \alpha_0 + \alpha_1 \ln H + \alpha_2 \ln NNI + \alpha_3 \ln PC + \alpha_4 \ln R + \alpha_5 \ln V \\ & + \tfrac{1}{2}[\beta_1 (\ln H)^2 + \beta_2(\ln NNI)^2 + \beta_3(\ln PC)^2 + \beta_4(\ln R)^2 \\ & + \beta_5(\ln V)^2] + \tau_1 \ln H \ln NNI + \ldots\ldots \tau_4 \ln H \ln V \\ & + \ldots\ldots \tau_{10} \ln R \ln V, \qquad \textbf{6.5}\end{aligned}$$

where α_0; α_i $i = 1,\ldots\ldots5$; β_i $i = 1,\ldots\ldots5$; τ_i $i = 1,\ldots\ldots10$ are the parameters to be estimated. The findings of the SCP relationship by Ruthenberg, give some interesting results despite the reservations about the nature of the data obtained. The author finds that at the sample means, the relationship between the concentration measure, the H index and the Lerner index is significant when the EC countries are considered but not significant when the larger sample is used. On the other hand, the coefficient of the interactions between the H index and the interest margin is found to be insignificant for both the samples. When they deviate from the sample means of the H index, the findings suggest the existence of the critical level of concentration, supporting the findings that the SCP relationship is non linear in nature which is consistent with the earlier findings by McCall and Peterson (1980). Among the EC banking markets which were consistently above the critical level of H in both the performance measures, are Ireland, Greece, the Netherlands and Portugal, whereas in the enlarged sample, Israel, Finland, Sweden, Canada, and Australia are consistently above the critical level. Ruthenberg also finds that there is potential for cost-reduction in the provision of bank services in the EC, as well as in nonmember countries, with only a limited change in price-cost margins. The conclusion given by Ruthenberg (1994, page 113) is that:

> The empirical results indicate that the expected changes in the structure of the banking systems will have a significant effect only in those countries that are characterised by a relatively high degree of concentration and high entry barriers. Some of those banking systems happen to be located on the extreme upper left side of the U-shaped average cost function, and hence are classified as relatively cost-inefficient. Thus, as far as social welfare is concerned, resources should be diverted toward those banking markets, enabling them to grow and benefit from economies of scale.

Using a similar approach to Clark (1986b), Altunbas and Molyneux (1994) use the three-stage, least squares (3SLS) procedure to estimate the concentration-profits relationship in European banking. This methodology enables them to investigate both the nature of the structural parameters as well as the reduced-form coefficients derived from the structural model. Using the three-stage least-square estimation, both the market concentration variable and market share variable has a positive and significant effect on banks' return on equity which indicates that both the traditional and efficiency hypotheses hold in the European banking markets. On the other hand, the results using the OLS reduced-form parameter estimates derived from the structural model strongly suggest that only the traditional concentration-profits hypothesis holds. The authors conclude that these conflicting results draw attention to the ambiguities which may arise when estimating reduced-form equations which only indirectly test the concentration-profits relationship. Molyneux and Forbes (1995) also show that the SCP approach is supported in the European banking markets for the years 1986-89 in contrast to recent work on the US banking markets which favours the efficiency hypothesis.

The data used in Berger's (1995) study are quite extensive in the sense that he uses thirty separate cross sections' data for each year of the ten-year period from 1980 to 1989 (a total sample of 4,800 banks), obtained from the Call Report and Summary of deposits. Three types of regulatory environment were included: unit banking, limited branching and statewide branching states. The profitability measures of after-tax return-on-assets and return-on-equity are used and local banking markets are defined according to deposits in Metropolitan Statistical Areas (MSAs) or non-MSA counties (as defined by previous studies on US banking markets) when computing market structure variables. Market structure variables are taken as the average for a bank over all the local markets in which it has deposits weighted by the proportion of the bank's deposits in each market. Three concentration measures, the Herfindahl-Index, the three-firm concentration ratio and the three-firm Herfindahl Index were tried in the model. For the computation of bank deposits and loan prices, Berger divides the revenues or expenses for an entire year by the average of three observations on the quantity of the category taken at the beginning, the middle and end of the year. The relative prices are computed in two ways: relative to the industry price [P(I)], and relative to the average price from the local markets in which the bank operates [P(M)], weighted by deposits. Berger also incorporates X-efficiency and scale-efficiency measures in the regression to distinguish between the SCP, Relative Market Power , Relative Efficiency and Scale Efficiency hypotheses. He uses a similar approach to that described in Berger (1993) to calculate efficiency measures; that is, using 'distribution-free' estimates. His findings can be summarised as follows:

- Partial support is found for the Relative Efficiency (superior management of resources) when controlling for the effects of the other three hypotheses.
- Some support is found for the Relative Market Power hypothesis.
- No support is found for Scale Efficiency hypothesis.

- No support is also found for the traditional SCP paradigm.

Berger (1995, page 429) concludes that,

> Despite the limited support found for the two of the hypotheses, it does not appear that any of the Efficient Structure or Market Power hypotheses are of great importance in explaining bank profits. The efficiency and market power variables explain relatively little of the variance of profitability (median R^2 below 10 percent), and that the coefficients of the profitability equations suggest that very large increases in efficiency and market shares would be needed to raise expected profits significantly.

A study by Lucey (1995), on the other hand, investigates the relationships between the structure, conduct, and performance and compares the three main hypotheses: the standard SCP approaches, the Relative Efficiency hypothesis and the Quiet Life hypothesis. Lucey's sample is based on banks and building societies in Ireland for the period 1988-1993 for banks, and 1987-1993 for building societies. The three-firm concentration ratio and Herfindahl Index are used as the market structure variables. The Free Disposal Hull method is used to calculate efficiency for banks and distribution-free estimates for building societies. The number of branches are included to examine the difference between those owned by Irish or otherwise. To check the possibility of the Quiet Life variant of the SCP hypothesis, the author regresses the efficiencies on the structural variables. Table 6.4 below shows the results of his study. Similar to other studies (with the exception of that by Lloyd-Williams *et. al.*, 1994), the degree of the explanatory power as shown by the R-squared is relatively low, ranging from 0.038 to 0.411, a typical range for r-squared results in the SCP literature. The results for banks show that once the efficiency variable is added to the regression model, the explanatory power increases from 0.038 to 0.411. The coefficient for the efficiency variable is significant and positive. The coefficients for the market structure variables (A h-index and 3-firm concentration ratio) and the market power variable (market shares) are not significant, and these change in

Table 6.4

Estimates of the SCP Relationship as reported by Lucey (1995)

	Banks				Building Societies		
Constant	0.0313	-0.0023	0.1086	0.1091	-1.5080	-1.6390	-1.5310
	0.36	*-0.02*	*1.55*	*1.34*	*-1.31*	*-1.50*	*-1.47*
Market Share	0.0096		-0.0081		-0.0126[1]	-0.0105	-0.0036
	0.40		*-0.42*		*-1.71*	*-1.48*	*-0.49*
Herfindahl Index		0.0186		-0.0086	0.08	0.1113[1]	0.0789[1]
		0.45		*-0.26*	*1.26*	*1.88*	*1.44*
3-firm concentration ratio			-0.0037				
			-0.33				
Year	-0.0002	0.0001	-0.0013	-0.0013	0.0008	0.0009	0.0008
	-0.28	*0.06*	*-0.18*	*-1.57*	*1.31*	*1.56*	*1.48*
Number of branches	0.0000	0.0000	0.0000	0.0000			
	-0.71	*-0.74*	*-0.83*	*-0.78*			
Irish owned	0.0313	-0.0003	0.0036[1]	0.0036[1]			
	0.36	*-0.11*	*1.64*	*1.64*			
FDH efficiency metric			0.00227[3]	0.0228[3]		-0.0772[2]	
			5.80	*5.76*		*-2.34*	
Distribution-free efficiency metric							-0.0179[3]
							-3.08
R-squared	0.038	0.042	0.411	0.411	0.117	0.231[2]	0.297[3]
F-statistic	0.43	0.47	6.17[3]	6.16[3]	1.68	2.77	3.91
Number of sample	60	60	60	60	42	42	42

Notes: t-statistics are in italic; 1 = significant at 10 percent; 2 = significant at 5 percent
Source: Lucey (1995, page 9)

the sign (from positive to negative) when efficiency variable is included in the regression.

Lucey concludes:

The correct signing and high significance of the efficiency metric, combined with the lack of power in the other variables, indicates that the Relative Efficiency (RE) paradigm is at least a possible explanatory theory for the Irish banking market (page 8).

As for the building societies, Lucey (1995) finds that the efficiency coefficients are negative and significant; the coefficients for market shares are negative and Herfindahl Index is only significant when the efficiency variable is included in the regression indicating the possibility of the Quiet Life hypothesis. However, further tests show that the Quiet Life hypothesis is not an adequate explanation for the building societies. Thus, Lucey concludes that, that the SCP paradigm does not hold in the Irish banking markets and there is evidence of the Relative Efficiency paradigm.

Using a similar approach to Berger and Hannan (1993), a study by Golberg and Rai (1996) incorporates two measures of efficiency to examine the structure performance relationship for European banks over four year period, 1988 to 1991. Unlike Berger and Hannan (1993) who use deviations from the average cost frontier to represent measures of efficiency, Goldberg and Rai's seminal work estimates the X-inefficiency using a stochastic cost frontier developed by Aigner *et. al.* (1977) under the assumption that the error terms are distributed half-normal. A sample of 303 observations across eleven countries in Europe obtained from the Compustat's Global Vantage is used in the analysis. The banks are large banks, with branching networks spread across the country. Four measures of performance are used: Net Income/Total Assets (ROA), Net Income/Stockholder's Equity (ROE), Net Interest Margin/Total Assets (NIM), and NIR which is (1 + ROA)/(1 + NIM). Two measures of concentration are employed, the three-bank concentration ratio (CR3) and Herfindahl Index (HERF).

The estimates of the CR3 range from 31% to 91% and HERF range from 0.06 to 0.30. Banks are divided into high concentration (a CR3 of .50 and above or a HERF of .12, or above) and a low concentration. The analysis of concentration showed that United

Kingdom, Switzerland, Belgium, Finland, Sweden and Denmark have a high concentration of banks and the rest; *i.e.*, Germany, France, Austria, Italy and Spain have low concentration.

The authors use two measures of efficiency: X-efficiency and scale efficiency in the model. The efficiency measures are obtained using stochastic cost frontier approach which assumes that the total cost deviates from the efficient cost frontier by a random noise, v_i, and an inefficiency component, u_i. The efficient cost frontier is defined as:

$$ln\ tc = f(y_i, p_i) + \epsilon_i \qquad 6.6$$

where,

ϵ_i	=	$u_i + v_i$,
y_i	=	the output i of each bank,
p_i	=	the cost or price of input i,
v_i	=	a statistical noise distributed normal $(0,\sigma_2)$ and
u_i	=	a one-sided inefficiency measure, distributed half-normally .

Thus, u_i represents the individual firm's deviations from the efficient cost frontier and serves as a proxy for both technical and allocative efficiency. Inefficiency measures are derived for each of the four year years for each bank. Unlike Berger and Hannan (1993) and Berger (1995) who used X-EFF in their model, the authors substitute X-INEFF for the efficiency variable.

To estimate the frontier, Goldberg and Rai use a standard translog cost function with two outputs: total loans (y_1) and all other earning assets (y_2), and with three inputs: the price of labour p_1 (staff expenses divided by the number of employees), the price of fixed capital p_2 (defined as capital occupancy expenses divided by fixed assets), and the price of borrowed funds, p_3 (defined as total interest expenses divided by interest-bearing liabilities). When estimating the stochastic cost functions, the share equations are not included and the linear homogeneity conditions are imposed by normalising the total costs, the price of labour and the price of capital with the price of deposits.

Scale efficiency which indicates whether banks with similar production and management technology are operating at optimal economies of scale, are then estimated for each bank at the respective output levels. The measure of inefficiency, S-INEFF is used in the regressions, representing S-INEFF = SCALE -1 if SCALE >1 and S-INEFF = 1 - SCALE if SCALE <1. The control variables used, are selected from those in previous studies to reflect the supply and demand for loans and deposits.

The author's results are not very robust (as is the case of recent SCP studies), and are very sensitive to the measure of performance used. There is evidence of non-linearity in the relationship between market structure and performance, as suggested by MacCall and Peterson (1980) and Jackson (1992). In contrast to the results of Molyneux and Teppet (1993) on European banking markets, who found evidence of anti-competitive behaviour, Goldberg and Rai (1996) find support for the Relative Efficiency hypothesis for banks located in low concentration countries. There is also evidence to support the RMP hypothesis for those located in the high concentration countries when all banks are considered.

Table 6.5

Regression Results of return on equity (ROE) and net interest margin (NIM) on the Herfindahl Index, market share, X-inefficiency, Scale-efficiency and other control variables as reported by Goldberg and Rai (1996)

Dependent Variable = Return on equity			
Variable	All	HC	LC
N	303	133	170
INT	0.623 (3.10)[a]	0.237 (0.49)	0.493 (2.06)[a]
HERF	-0.118 (-1.54)	-0.424 (–2.80)[a]	-0.230 (-1.08)
MS	0.187 (3.19)[a]	0.288 (3.18)[a]	-0.220 (-2.11)[a]
X-INEFF	0.007 (0.15)	0.004 (0.03)	-0.013 (-0.33)
S-INEFF	-0.016 (-0.93)	-0.195 (-0.93)	0.079 (0.58)
WAGE	-0.000006 (-0.02)	0.0002 (0.30)	-0.0004 (-1.03)
LTA	-0.005 (-0.96)	-0.022 (-1.98)[a]	0.02 (3.87)[a]
RISK	-0.416 (-1.96)[a]	0.382 (0.94)	-0.558 (-2.24)[a]
PCI	-0.003 (-3.09)[a]	-0.003 (-1.00)	-0.011 (-7.32)[a]
YR89	-0.011 (-0.97)	-0.041 (-2.15)	0.00007 (0.007)
YR90	-0.011 (-0.92)	-0.046 (-2.04)[a]	0.028 (2.49)[a]
YR91	-0.006 (-0.52)	-0.032 (-1.39)	0.033 (2.70)[a]
R^2	0.08	0.104	0.346
F	3.48[a]	2.39[a]	9.14[a]
Dependent Variable = Net interest margin			
N	303	133	170
INT	0.249 (10.1)[a]	0.082 (2.43)[a]	0.182 (4.28)[a]
HERF	-0.016 (1.69)	-0.011 (-1.04)	0.028 (0.73)
MS	0.018 (2.58)[a]	0.008 (1.19)	-0.037 (-2.02)[a]
X-INEFF	0.033 (5.73)[a]	0.024 (2.67)[a]	0.033 (4.48)[a]
S-INEFF	0.011 (0.80)	0.004 (0.28)	0.084 (3.48)[a]
WAGE	-0.0002 (-4.07)[a]	-0.0003 (-4.24)[a]	-0.0003 (-3.71)[a]
LTA	-0.002 (-4.03)[a]	-0.0006 (-0.80)	0.0009 (0.95)

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Table 6.5 (*Continued*)

RISK	-0.171 (-6.59)[a]	-0.036 (-1.21)	-0.141 (-3.17)[a]
PCI	-0.001 (-10.9)[a]	-0.0004 (-2.06)[a]	-0.002 (-8.55)[a]
YR89	-0.003 (-2.04)[a]	-0.003(-2.20)[a]	-0.004 (-1.95)[a]
YR90	0.005 (3.34)[a]	0.003 (1.75)[b]	0.007 (3.34)[a]
YR91	0.004 (2.70)[a]	0.003 (1.73)[b]	0.007 (3.42)[a]
R^2	0.58	0.52	0.64
F	39.1[a]	14.0[a]	27.8[a]

Notes: ALL = all banks in the sample; HC = banks located in countries with high market concentration; LC = banks located in low market concentration. INT =intercept, MS = market share, X-INEFF = X-inefficiency, S-INEFF = scale-inefficiency, WAGE = average wages and salary, LTA = natural log of total assets, RISK = total liabilities over total assets, PCI = per capita income, YR89, YR90 and YR91 = dummies for 1989, 1990 and 1991 with 1988 serving as the base year.
[a], [b] Significant at the 5% and 10% levels, respectively.
Source: Goldberg and Rai (1996, page 760)

Summary

Table 6.6 presents a summary of selected studies in the SCP literature in US and outside US.

Table 6.6
A Summary of Performance Studies in Banking

US studies

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant[a]
Schweiger & McGee (1961)	11 large cities for 1960	Automobile loan rates; instalment loan rates	No econometric tests	N	Not available
Edwards (1964)	Data from 1955 and 1957 business loan surveys, 49 SMSAs	Interest rate on business loan	0.36-0.64	CR3	Yes for 1955, no for 1957 data
Fleschig (1965)	64 banks in 19 cities, 1960 data	Interest rates on business loans	0.16-0.48	CR3	No
Comments: Influence on market concentration on interest rates charged on business loans is insignificant when regional variables are included					
Edwards (1965)	36 SMSAs, 1962 data	IT/TS IL/TL NI/TA	0.20-0.48 0.42-0.70 0.07-0.25	CR2	Yes Yes Yes
Kaufman (1966)	99 counties in Iowa, 1959 and 1960 data	IL/TL IT/TS NT/TA	0.200-0.268 0.323-0.409 0.066-0.060	CR1 N	Yes Yes Yes, with CR1 as market structure measure
Meyer (1967)	Data from 1955 and 1957 business loan survey, SMSAs in unit and limited branch banking states	Interest rates on business loans	0.69-0.73	CR3	Yes for 1955 data, no for 1957 data
Philips (1967)	Survey of bank rates on short-term business loans in 19 SMSAs	Interest rates on business loans	0.51-0.64	CR3	Yes
Taylor (1968)	1315 banks for 1962	IL/TL Portfolio selection	_	N	No
Weiss (1969)	25 SMSAs for 1968	Offering of no service charge on checking accounts	_	N CR3 H	Higher concentration related to the absence of free checking
Bell and Murphy (1969)	14 market areas in the First Federal Reserve District	Estimated service charge on demand deposits	0.22-0.29	CR3	Yes
Comments: This paper does not present a valid test of the structure-performance hypothesis. Service charge rates for each market do not reflect rates charged in the market but estimated service charges based on an equation estimated for a sample of banks and economic variables for each market area, which are inserted into the equation for estimating bank service charges.					
Aspinwall (1970)	31 SMSAs, 1965 data	Interest rate on residential mortgages	0.562 0.647	CR3 N	Yes
Brucker (1970)	175 state economic areas, 1967 data for insured banks	Elasticity of loan demand	0.57	CR3	Yes

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Table 6.6 *(continued)*

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant [a]
Emery (1971)	980 banks 1967 to 1968	Profitability as measured by deviations from the capital market line	_	N CR1	No effect apart from deposit mix
Fraser and Rose (1971)	78 Texas cities, 1966 and 1967 data	IL/TL IT/TS SC/DD NI/C	0.41-0.54 0.03-0.14 0.21-0.30 0.07-0.15	CR1	No for 1966 Yes for 1967 No No No
Vernon (1971)	85 large member banks, data for 1961-1966	NI/C	0.21	CR3	Yes

Comments: Significant coefficients on CR3 are negative, the opposite sign indicated by the structure-performance hypothesis. The article presents only t-statistics, no regression coefficients.

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant [a]
Klein and Murphy (1971)	1968 FCA data for banks in 164 SMSAs	Interest rate on time deposits. Service charge revenue divided by: 1. No of DD a/c 2. No of debits to DD a/c	0.24 0.24 0.33	CR of TD or DD at the largest, 2nd. largest & 3rd. largest banks in each SMSA	No for all concentration measures

Comments: Average of return on assets is included as an independent variable. Coefficients on concentration may be insignificant because this performance measure is included as independent variable.

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant [a]
Jacobs (1971)	National survey of interest rates on business loans of 8500 customers at 160 banks in 107 SMSAs.	Interest rates on business loans	0.18-0.25	CR3	Yes
Fraser and Rose (1972)	71 one-bank towns, 67 two-bank towns and 16 three-bank towns not in SMSAs, data for 1965 and 1966	IL/TL ITD/TD SC/DD NI/TA NI/C	0.060-0.112 0.023-0.082 0.299-0.320 0.04-0.070 0.074-0.444	N	No No No No No
Ware (1972)	Data for 1969 and 1970 for 57 counties in Ohio outside SMSAs	SC/DD NI/C IL/TL IT/TS	0.49-0.51 0.26-0.45 0.42-0.43 0.49-0.61	CR2	No No No No
Edwards & Heggested (1973)	66 of 100 largest banks, 1954 to 1966	Uncertainty avoidance (variance of profits divided by average profits)	_	CR3	Increased uncertainty avoidance with concentration
Edwards (1973)	36 large banks in 23 SMSAs, 1965 data	NI/C	0.05	CR3	No

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Table 6.6 *(continued)*

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant [a]
Fraser, Phillips & Rose (1974)	1206 Texas banks	Index of performance including many balance sheet items	_	CR1 N	No No
Yeats (1974)	Tennessee and Louisiana counties	IL/TL IT/TD NI/TA Portfolio selection	0.14-0.35	H Change in H Market share stability	Small effects of concentration but important effect for changes in concentration
Alhadeff & Alhadeff (1975)	Sample of counties 1948 to 1966	Various concentration measures	_	_	New entry significantly reduces national and local concentration
Beighley & McCall (1975)	1968 data for 184 banks in 7 SMSAs	Lerner index Elasticity of loan demand	0.42-0.43 0.25	Gini coeff. CR3 N	Lerner Index / Elasticity loan demand No / No Yes / No / No
Comments: Observations from only seven market areas					
Fraser & Alvis (1975)	74 unit banks in 74 market areas in several unit banking states	NI/TA NI/C IL/TL SC/DD IT/TS	na na na na na	Dummy variable for markets with relatively high CR1	No for all performance variables
Heggested & Mingo (1976)	332 banks in 69 SMSAs survey data for 1973	The following measures are based on a survey:		H and 1/H	
		1. Interest rate on passbook savings	0.04		No
		2. Interest rate on one-year $1000 CD	0.09		No
		3. Service charge on standardised accounts	0.11		No
		4. Charge for returned cheque	0.13		No
		5. Interest rate on new car loans	0.13		Yes
Comments: For many banks, interest rates on passbook saving accounts and $1000 CDs were at Regulation Q ceiling rates. For these dependent variables, they should have used Tobit analysis (see Hannan 1979b)					
Fraser & Rose (1976)	9 Texas counties 1973 data	IL/TL IT/TS SC/DD NI/TA	0.21-0.24 0.26-0.28 0.40-0.42 0.42	H	No No No Yes

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Table 6.6 *(continued)*

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant [a]	
Mingo (1976)	384 banks in 9 unit banking states	NI/TA	0.006	H	No	
					IL-H	SC-DD
Rose &					No	No
Fraser	704 unit banks in 90	IL/TL	0.39	N	No	Yes
(1976)	county market areas	SC/DD	0.42	CR1	No	No
	in Texas, 1970 data	IT/TS	0.35-0.37	CR2	No	No
				CR3	No	Yes
				Entropy	Yes	Yes
				H	Yes	Yes
				Hall-Tideman Index	No	No
				Relative entropy		
				Gini coef	No	No
				CR3	No	
Heggested & Rhoades (1976)	228 SMSAs for 1966 to 1972	Market share stability	_	CR3	No	
Stolz (1976)	333 banking offices in 75 rural counties for 1975	Interest rate on household & farm loans SC-DD Non-price competition variables	_	H	Concentration affects most non price variables	
Rose (1976)	90 Senational votes	United States Senators vote on the Helm's Amendments to the Financial Institutions Act of 1975	_	CR3	No	
White (1976)	40 SMSAs in statewide branching states	Service quality measured by the number of branch offices	_	H	A decrease of 0.1% in H is associated with a 14.4% rise in the number of bank branches in each SMSA	
Edwards (1977)	44 SMSAs in 1962 1964 and 1966	Labour expenses	_	Separation of monopoly & competitive markets	Yes Evidence of expense-preference behaviour and a critical level of concentration	
Heggested & Mingo (1977)	236 banks in 52 SMSAs survey data for 1973	Interest rate on new car loan Monthly service charge on demand deposits (based on a survey of banks)	0.170 0.194	H times dummy variable for areas with low H	Yes Yes	
Heggested (1977)	218 banks in 60 SMSAs, data for 1960-70	NI/TA	0.08	CR3	Yes	

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Table 6.6 *(continued)*

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant [a]
Whitehead (1977)	130 banking markets in the Sixth District, 1974 data	IL/TL IT/TS NI/C	0.39-0.45 0.37-0.45 0.39-0.43	N CR3 H	IL-TS: No IT-TS: Yes NI-C: No
Whitehead (1978)	47 banking markets in Florida, 1974 data	IL/TL IT/TS NI/C	0.160-0.262 0.095-0.129 0.025-0.066	CR3	Yes No No
Comments: Coefficients on CR3 are negative and significant with IL-TL as the dependent variable, contradicting the structure-performance hypotheses.					
Heggested & Rhoades (1978)	187 SMSAs, 1960 to 1972	Market share stability	_	CR3	Yes Higher concentration leads to a significant reduction in rivalry
Graddy & Kyle (1979)	463 banks in unit and limited branch banking states, 1974 data	SC/DD IT/TS IL/TL	0.34 0.25 0.37	H	No No No
				Performance measure	Market structure measure CR1 — N
Harvey (1979)	426 banks in 120 rural counties in 7 states, 1976 and 1977 data	IL/TL Interest payments on TD-TD NI/C	0.26-0.49 0.24-0.27 0.29-0.42	IL-TL Interest on TD-TD NI-C	CR1: No, N: Yes CR1: Yes, N: Yes CR1: Yes, N: Yes
Savage & Rhoades (1979)	6619 unit banks, 1977 data	NI/TA IL/TL SC/DD IT/TS	0.160 0.131 0.096 0.21	CR3	Yes Yes Yes
Comments: SC-DD are lower in areas with higher CR3 the opposite sign from the structure-performance hypothesis					
Rhoades (1979)	184 SMSAs, data for 1970 & 1972	NI/TA IL/TA SC/DD IT/TS	0.05-0.06 0.21-0.25 0.19-0.22 0.08-0.50	CR3	No Yes Yes No
Rhoades & Rutz (1979)	184 SMSAs, 1970 and 1972 data	IL/TL SC/DD NI/TA	0.22 0.19 0.05	CR3	Yes Yes No
Rose & Scott (1979)	600 banks, 1972 data	IL/TL IT/TS	0.087 0.034	N CR1	IL-TL Yes IT-TS No
Hannan (1979a)	367 banks in 49 local banking markets in Pennsylvania	Wage % salary expenditure Number of bank employees	0.91-0.93	Dummy variable when CR3 is greater than 63%	Yes for both performance measure
Comments: This study find evidence of expense-preference behaviour in local banking markets.					
Hannan (1979b)	About 400 banks in Pennsylvania market areas, 1970	Int. Rate paid on passbook savings account	Used Tobit maximum Likelihood	CR3 H N	Yes No Yes

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Table 6.6 *(continued)*

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant [a]
McCall & Peterson (1980)	155 banking markets in 14 unit or county wide branching states, 98 of the 155 markets are county markets, 270 banks in total for 1968	Lerner Index	All markets 0.25-0.80 SMSA markets- 0.82-0.85 County markets- 0.13-0.92	I/H Number equiva-lent	Yes in 12 equations
Comments: This study tests for a critical level of concentration. The impact of changes in concentration is greater in concentrated than in unconcentrated markets.					
Hannan & Mavinga (1980)	366 Pennsylvania banks for 1970	Bank wage and salary expenses Bank furniture & equipment expenses Bank net occupancy expenses	0.76-0.92	Binary variable, one if CR3 exceeds 63% zero other-wise	Yes in all cases
Glassman & Rhoades (1980)	Largest banks in 1406 BHCs, 1975 and 1976 data	NI/TA	0.12-0.13	CR3	Yes
Rhoades (1980)	524 commercial banks for 1976 participating in the Federal Reserve Functional Analysis Programme	Expenses/total assets for various expense items Total assets/various groups of employees (25 measures in all)	0.00-0.15 (for 25 equations)	CR3	Yes in only 5 equations
Comments: Expenses are found to be lower in high concentration markets than low concentration markets, thus rejecting expense-preference behaviour theory.					
Osborne & Wendel (1981)	154 Texas banks in 23 towns	SC/DD Service charge rates on DD based on a survey	0.30	H	No
Rhoades (1981)	3534 banks in 167 SMSAs, data for 1966, 1968, 1969, 1972, 1973, 1974, 1975	IL/TL SC/DD IT/TS NI/TA NI/C	0.14-0.32 0.08-0.23 0.12-0.24 0.05-0.18 0.10-0.29	CR3	Yes in 4 years Yes in 3 years Yes in 4 years No in all years Yes in 2 years
Comments: IT-TS is higher in areas with higher CR3 (when significant), the opposite sign from the structure-performance hypothesis.					
Rhoades & Savage (1981)	120 branch banks, 40 BHCs with no branches, and 109 BHCs with branches, 1975 data	NI/TA	0.05	CR3 of deposits in the state in which a bank is located	No

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Table 6.6 *(continued)*

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant [a]
Spellman (1981)	106 SMSAs, 1972 data	Profits of S&Ls	0.83-0.90	No. Of banks in SMSA No. Of S&Ls in SMSAs	Yes Yes
Rhoades & Rutz (1982)	6500 unit banks in between 1969 and 1978	1. NI/TA 2. Coef. Of variation of NI/TA (overall risk measure) 3. Equity/assets ratio (balance sheet risk measure) 4. Loan/asset ratio 5. Net loan losses/total loans	0.003-0.06	CR3	1. NI/TA Yes 2. Coef. Of variation NI-TA Yes 3. Equity/asset Yes 4. Loan/asset Yes 5. Net loan losses/total Loans No
Comments: This paper tests for evidence of the so-called 'quiet life hypothesis'. The results generally indicate that banks with significant market power tend to lower their level of risk.					
Rhoades (1982a)	6500 unit banks, data for 1969-78	NI/TA	0.0034	CR3	Yes
Marlow (1982)	62,409 mortgage loans in 444 SMSAs, 1975 data	Interest rate on residential mortgage loans	0.25-0.31	N CR3 CR5	Yes Yes Yes
Kwast & Rose (1982)	Sample of 80 member banks in SMSAs with total deposits over $500 million, data for 1970-77	NI/TA	0.42-0.580	H	Yes
Smirlock (1983)	2,700 unit banks in states of the Tenth Federal Reserve District, 1978 data	NI/TA NI/C	0.03-0.06	CR3	No
Comments; Coefficients on CR3 are not significant when each bank's market share is added as independent variable					
Smirlock & Marshall (1983)	38 SMSAs for 1978 and 1979, 190 banks in 1979 and 138 banks fro 1978	Number of bank employees	0.18-0.86	CR3 Market share of banks (MS)	CR3- Yes in 1 out of 24 equations MS- Yes in 1 out of 14 equations
Comments: This study finds no strong evidence of expense-preference behaviour of banks					
Hannan (1984)	412 banks operating in the state of PennysIvania in 1971	Passbook saving rate Total weekly banking hours	0.04-0.05	H	Passbook saving rate Yes Weekly banking hours No
Comments: (The equation using passbook saving rate as performance measure are estimated using Tobit Maximum log likelihoods range between 402.6 and 410.4					

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Table 6.6 *(continued)*

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant [a]
Curry & Rose (1984)	34 SMSAs in 1972 52 SMSAs in 1978	1. Portfolio composition (7 measures) 2. Bank capital (3 measures) 3. Operating efficiency (4 measures) 4. Prices of bank services (3 measures) 5. Bank profitability (3 measures)	Not reported	H	Not given

Comments: This paper tests for the relationship between bank holding company presence and banking market performance: the results suggest that outside bank holding company presence leads to increased bank lending, particularly in the real estate and consumer loan areas.

Wall 1985	Homogenous sample of independent SMSAs banks	NI/TA NI/C	_	CR3 H	No No
Smirlock (1985)	2700 unit state banks operating in the 7 state area under the jurisdiction of the Federal Reserve Bank of Kansas City	NI/Equity NI/C NI/TA	0.05-0.06	CR3 Market share of banks (MS)	CR3- Yes when MS not included as an explanatory variable CR3 - No when MS included as an independent variable (or significant and opposite) MS - Yes

Comments: This study finds support for the efficiency hypothesis in banking markets

Clark (1986a)	1857 banks located in 152 SMSAs in unit or limited branching states, 1973 to 1982	NI/Equity Standard Deviation of NI/Equity	0.02-0.05	H Market share of banks (MS)	No No
Clark (1986b)	1857 banks located in 152 SMSAs in unit or limited branching states, 1973 to 1982	NI/Equity Standard Deviation of NI/Equity	Uses two-stage least squares procedure. (F-test between 1.8 and 65.1)	H Market share of banks (MS)	H - Yes MS - No

Comments: In these two studies, Clark uses the same data to estimate the SCP relationship. Clark (1986b) is the extension of Clark (1986b) where it shown how a two-stage least squares estimation procedures generate different results from OLS. Using 2SLS Clark (1986b) finds evidence supporting the traditional SCP hypothesis on profitability and risk aversion, and rejects the efficiency hypothesis

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Table 6.6 *(continued)*

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant [a]
Evanoff & Fortier (1988)	6,300 unit banks located in the 30 states of the USA which permit either unit banking only or statewide branching for 1984	NI/TA	0.03-0.08	CR3 market share of largest (MS1) MS of 2nd largest firm (MS2) MS of 3rd largest firm (MS3)	Yes but only in two equations when MS is not included No or wrong sign when MS variable is included Yes for the MS of the largest firm when sequential MS of 3 largest firm included
Comments: This study finds support for the efficiency hypothesis					
Berger & Hannan (1989)	470 banks in 195 local banking markets observed quarterly over a two & a half year period, September 1983 to December 1985	Money-market deposit account (MMDA) rate Super-NOW rate 3,6, 12 plus 30-month CD rate	0.33-0.88	CR3 H	Yes in 8 out of 10 equations
Comments: In this study, the authors state that an alternative form of the efficient structure hypothesis that is consistent with the price concentration results is ruled out as a dominant explanation of the results					
Daskin & Wolken (1989)	441 banking markets of which 63 are SMSAs	Lerner Index	Maximum Likelihood Estimation Log Likelihood 1034 to 1049	H - loan H - deposit	Yes when H loan and H deposits below critical levels. No when above critical levels.
Comments; This paper tests for the critical level of concentration in banking markets. The estimated range of critical levels are H loan 0.36-0.38 and H deposits 0.306-0.308					
Calem & Carlino (1989)	466 commercial banks and Federal savings banks insured by the FDIC in 1985. Sample covers 145 SMSAs	Money market deposit accounts (MMDA's) rate 3 and 6 month CD rates	0.10-0.26	CR3	MMDAs Yes 6-month CD Yes 3-month CD Yes
Comments: A 10% increase in concentration creates a fall in MMDA rate by 5.0 basis point in the figure for 6-month CD rate is a fall by 3.4 basis point.					

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Table 6.6 *(continued)*

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant [a]
Hannan (1991a)	Loan survey data from the Federal Reserves Study of the Terms of Bank Lending to Business Data on 8250 loans originated by 260 banks in August 1984, November 1985 and November 1986	Commercial loan rates for: 1. Floating rate unsecured loans 2. Floating rate secured loans. 3. Fixed rates unsecured loans 4. Fixed rate secured loans greater and less than $100,000	Aug-84 0.05-0.21 Nov-85 0.07-0.38 Nov-86 0.06-0.39	H	Aug-84 Yes for 1 out of 8 equations Nov-85 Yes for 5 out of 8 equations (1 finding a negative relationship) Nov-86 Yes for 5 out of 8 equations
Comments: This study, the author notes, finds strong support for the traditional SCP paradigm					
Jackson (1992)	221 banks in 104 different local banking markets observed monthly over the Nov. 1983 to Nov. 1985. These banks are divided to low concentration group, middle and high (LC, MC &HC)	Money market deposit a/c rate Super-NOW rate 6-month CD rate	LC 0.77 MC 0.76 HC 0.77 All 0.76	CR3 MS	CR3 LC No MC No HC Yes All Yes but -ve MS LC Yes MC Yes but -ve HC No All No
Comments: This study also finds that the structure-performance relationship is nonlinear					
Berger & Hannan (1992)	470 banks in 195 local banking markets observed quarterly over a two & a half year period, September 1983 to December 1985. Markets are divided into LC, MC and HC	Money-market deposit account (MMDA) rate Super-NOW rate 3,6, 12 plus 30-month CD rate	LC 0.83 MC 0.78 HC 0.80 All 0.80	CR3	LC 3 out of 11 equations MC No HC 2 out of 11 equations All Yes for all equations
Comments: This study is an extension of Berger & Hannan (1989) and they divide the markets into low concentration (LC), middle concentration (MC) and high concentration (HC) . They find evidence of nonlinear in the price-structure relationship.					
Berger & Hannan (1993)	Data for 1985 for 216 banks in MSAs	ROA ROE MMDA rates SNOWs	0.045-0.368	H MS X-Eff S-Eff	ROA ROE MMDA SNOW No No Yes Yes No No No No Yes Yes Yes Yes No No Yes No
Berger (1995)	Data was collected from the Call Report & Summary of deposits. Data for 1980-1989 for unit banking, limited banking and Statewide branching states	ROA ROE X-Efficiency S-Efficiency	0.008-0.91	H MS X-Eff S-Eff	H No MS Yes X-Eff Yes S-Eff No
Comments: This study uses direct measure of efficiency to distinguish between SCP, RMP and X-Efficiency and Scale Efficiency Hypotheses					

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Table 6.6 *(continued)* - Studies Outside US

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant[a]
Short (1979)	Sample of 60 banks from 12 countries in Canada, Western Europe and Japan	Profit rates	0.503-0.670	H CR1 CR2 CR3	Greater concentration leads to higher profit rates
Bourke (1989)	116 large banks each year from 1972 to 1981 in 15 countries; Australia, New Zealand, California, Massachusetts, New York, Canada, Ireland, Scotland, England & Wales, France, Belgium, the Netherlands, Denmark, Norway & Spain	NPBT as a % of capital & reserves, NPAT as % of capital & reserves, NPBT as a % of capital & reserves & total borrowings, NPBT as % of total assets NPBT + staff expenses as % of total assets, NPAT + staff expenses + provision for loan losses as °o of total assets	ROA 0.28-0.53 ROC 0.003-0.1	CR3	Yes
Comments: This study provide some evidence for the Edwards-Heggested-Mingo hypothesis (Edwards & Heggested 1973; Heggested & Mingo, 1976) of risk avoidance by banks with a high degree of market power.					
Molyneux & Thornton (1992)	European banks across 18 countries	Similar to Bourke (1989)	0.001-0.276	CR10	Yes for all performance measure
This study a so find support for the expense-preference expenditure theories.					
Molyneux & Teppett (1993)	Banks in EFTA i.e., Austria, Finland, Norway, Sweden & Switzerland. Data was pooled for the period 1986-1989, 169 banks for 1986, 258 banks for 1987, 282 for 1988 & 270 banks for 1989	ROA	0.503-0.619	CR5 MS (dep) MS (ass)	CR5 Yes for all years MS (dep) Yes for 87 & 88 MS (ass) No for all years
Comments: Despite evidence of the efficiency hypothesis in two out of the eight equations, the majority of the results support the traditional SCP paradigm					
Ruthenberg (1994)	Data for 1984-1988 on 12 European countries and non-EC which includes Norway, Finland, Sweden, Israel, Australia, Canada, The US and Japan.	Lerner Index (LI) Interest Margin/TA (IM)	0.555-0.882	H of 5 largest commer-cial banks	IM EC -Yes EC & non EC Yes LI EC - Yes EC & non EC No
Comments: This study uses a transcedantal logarithmic function (translog) to estimate the SCP relationship and find evidence of a critical level of concentration. In the EC banking markets which consistently fall above the critical level of Herfindahl index are Ireland, Greece, Netherlands and Portugal.					

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Table 6.6 *(continued)*

Authors and Year	Sample	Measure of bank performance	R^2 or $\bar{R}^2$	Measure of market structure	Coefficient on the measure of market structure are significant [a]
Llyod-William, Molyneux & Thornton (1994)	Pool accounting data for Spanish banks for 1986 to 1988, 92 banks for 1988 & 56 banks for 1986 & 1987	ROA	0.27-0.58	CR3 MS (ass) MS (dep)	Pooled CR3 Yes MS (assets) No MS (deposits) No
Altunbas & Molyneux (1994a)	1187 European banks across 19 countries for 1988	ROE	0.15-0.25	H MS	Yes Yes
Comments: This study uses 3-stage least squares estimations and finds that SCP and Efficiency both hold in European banking markets whereas using Ordinary Least squares method, the study finds only the SCP paradigm holds.					
Molyneux & Forbes (1995)	Banks from 18 European countries for 1986-1989, 756 banks for 1986, 1217 for 1987, 1538 for 1988 & 1265 for 1989	ROA	0.081-0.186	CR10 MS	Pooled results CR Yes MS No 1986 CR Yes (-ve) MS No 1987 CR Yes MS No 1988 CR Yes MS No 1989 CR Yes MS No
Lucey (1995)	Irish banks 1988-1993 (60 banks) Building societies for 1987-1993 (42 banks)	ROA	Banks- 0.038-0.411 Building Soc 0.117-0.297	 H CR3 MS EFF	Banks Build. Soc No Yes No - No No Yes Yes but Negative
Comments: The relative efficiency paradigm is evidenced in the Irish banking market. For building society however the sign is negative but the author does not find adequate support of the quiet life hypothesis.					
Golberg & Rai (1996)	Large banks in 11 European countries for 1988, 1989 and 1990. 303 banks in high concentration (HC) countries and 133 banks in low concentration (LC) countries	ROA ROE Net Interest Margin (NIM) Non-interest margin = (1+ROA) / (1+NIM)	_ All 0.08 HC 0.104 LC 0.346 All 0.58 HC 0.52 LC 0.64 All 0.55 HC 0.53 LC 0.58	H MS X-INEFF S-INEFF	ROE H No MS Yes X-INEFF No S-INEFF No NIM H No MS Yes X-INEFF Yes S-INEFF Yes for banks in LC countries
Comments: This study finds support for the relative market power hypothesis using ROE as performance measure, Relative Efficiency (RE) version of the efficient structure hypothesis is only supported for banks in low concentration countries.					

Notes: [a] Regression coefficients on measures of market structure are listed as statistically significant if their t-statistics (in absolute value) are at least as large as 1.95

/ = division NI = net income, TA = initial assets, C = capital, IL = interest and fees on loans, TL = total loans, IT = interest payment on time and savings deposits, ID = interest payments on time deposits, TS = time and savings deposits, TD = time deposits, SC = revenue from service charges on demand deposits, DD = demand deposits, MMDA = money market deposit accounts, SNOWs = super negotiable orders of withdrawal, CR1 = one-firm concentration ratio, CR2 = two-firm concentration ratio, CR3 = three-firm concentration ratio, CR10 = ten- firm concentration ratio, H = Herfindahl index, N= number of loans in the market.

Source: 1. Gilbert (1984, page 619-625)

2. Molyneux *et. al.* (1996, page 305-320) and own's updates.

6.3 Limitations and Weaknesses in the Performance Studies in Banking

The majority of the studies on the relationship between market structure and performance find a positive relationship; however, some of the studies do not find such a relationship. These inconsistencies have led to claims that the literature cannot establish a satisfactory SCP relationship in the banking markets. Hannan (1991c, page 68) notes that 'without exception, these studies have not been based on an explicit model of the banking firm'. These inconsistencies have been explained in various ways, as elaborated in the following subsections.

6.3.1 Measure of Concentration

There are various measures of concentration that have been used in SCP modelling to relate the structure and performance in the banking markets. These have been discussed in detail in Chapter 4 of this thesis. However, among researchers, there is no common agreement on the best measure of concentration to be applied when assessing the impact of market structure on performance. Fraser and Rose (1971) used a one bank concentration ratio and found that the relationship between concentration and performance is not significant, whereas Heggested and Mingo (1976) used the Herfindahl Index and found a significant relationship.

6.3.2 Measure of Market Structure

Markets have been found to be crudely measured. In general, US researchers measure markets in terms of the percentage of deposits or assets held by the largest and the two or three largest banks in a standard metropolitan statistical county or SMSA. Those researchers using international databases; for example, Molyneux and Teppett (1993) and Goldberg and Rai (1996), consider each country to be a market. Short (1979) and Bourke (1989), who examine the concentration-performance relationship across different countries, again imply that each country is a separate market. However, given that banking is a multi-product industry; it is quite difficult to quantify the precise measure of market structure that reflects the degree of monopoly within the defined areas.

6.3.3 Measure of Performance

Two measures of performance have been used in the structure performance literature in banking: prices such as interest charged on deposits and loans; and profitability measures such as return on assets and return on equity. As Rhoades (1981, page 157) notes:

> Specifically, the theoretical models suggest that market structure will influence the margin between prices and costs. This margin is accounted for in a profit measure but not in the price (interest rates) measure unless costs are explicitly accounted for.

Goldberg and Rai (1996) used two other performance measures in the study of European banks: net interest margins (net interest margin/total assets) and non interest returns; *i.e.*, (1+ROA)/(1+NIM). They argue that the net interest margin is able to capture the pricing ability of banks for both services, deposit and loans. However, as Bell and Murphy (1969) point out, studies those use prices as the performance measures have two basic shortcomings; the first is that, the cost of production of the particular banking service has not been considered and the second is related to the definition of bank output. The majority of the studies have used the price of a single product which may underestimate the total impact of the monopoly power on bank performance.

6.3.4 Other Variables

A number of control variables have been used in the structure and performance studies to account for different characteristics such as risk, cost, size, and ownership characteristics. Heggested and Mingo (1976) included variables that might bias the coefficients on market concentration toward zero, since some of the influence of market structure is being captured by the independent variable; for example, both used rates of service charges as the dependent variable and included the ratio of demand deposits to total deposits as the independent variable. Type, risk and the cost of handling loans were excluded in the regressions that might explain differences in interest charged. In the previous studies, loans-to-assets ratio has been used as a proxy for portfolio risk : loans are considered risky relative to other assets. Subsequent studies have included in a capital-to-assets (or equity-to-assets) ratio as a proxy for risks levels between banks. Clark (1986b) uses loan-loss reserves to total loans as a proxy for default risk.

6.3.5 Functional Form of the SCP Model

Many of the SCP studies show that the relationship between structure and performance is linear in nature. However, if the relationship is nonlinear or dichotomous in nature, this may perhaps explain why the results of the SCP studies in banking are inconsistent. A number of studies such as those by Heggested and Mingo (1976), McCall and Peterson (1980), Jackson (1992) and Golberg and Rai (1996) have examined these issues and found that the relationship is nonlinear; thus changes in concentration would have different impacts on performance for markets with different levels of concentration. For instance, Heggested and Mingo (1976) concluded that, the less concentrated the market is initially, the greater the impact on prices (services) a given increase in concentration will have.

6.3.6 Mis-specification in the Equations

Mis-specifications in equations may lead to biassing of the coefficients to be estimated. For example, Rhoades (1981) argues that studies using price measures have not explicitly accounted for costs in the equations. Another problem related to mis-specification of the equation is the inclusion of a risk variable. Clark (1986b) points out that to test the existence of the relationship between market concentration and bank profits, risk must be adequately controlled for in the equations, otherwise,

> failure to include explicitly may have resulted in a mis specification of earlier tests of structure-performance models in banking (Clark,1986b, page 46).

In Clark's study, risk and profitability are determined simultaneously, using a 2-stage least squares model.

Another explanation of the inconsistencies in the results of the SCP studies in banking is related to the interpretation of measures of efficiency which may be incorporated in the model. For example, market share variables are included in the equation to account for efficiency in studies by Smirlock (1985), Rhoades (1985) and Evanoff and Fortier (1988), If profitability is regressed on concentration and the market share, with the result that the coefficients for market shares are positive and significant and those for concentration are insignificant, this would imply two interpretations: one justifies the acceptance of market power and the other implies that the efficiency hypothesis is supported even though an explicit measure of efficiency is omitted in the equations.

6.3.7 The Role of Regulation

Another important factor to consider is the effect of regulation, as Gilbert (1984, page 627) notes:

> There is reason to believe, however, that changes in regulations do affect the relationship. Consider the influence of entry regulation. With entry controlled by regulators, the degree to which the pricing and availability of services reflect monopolistic or competitive behaviour is determined by the local firms already in the market. With unrestricted entry into the banking markets, in contrast, pricing of banking services would be influenced by the threat of entry by firms not already in the market, irrespective of the existing structure of the market. Thus, eliminating entry regulation would tend to weaken the structure-performance relationship in banking markets.

However, Heggested (1984) argues that Gilbert may overstate its importance.

> Regulation does still permit market forces to work but may change the intensity of their effect. For example, liability rate ceilings may make collusion less difficult, as may high entry barriers. Consequently, markets with low concentration may exhibit collusive behaviour. On the other hand, competition may be enhanced by regulatory oversight (Heggested 1984, page 648).

Molyneux *et. al.* (1996, page 136) go on by stating:

> The empirical biases resulting from regulation may also be overstated because most bank SCP studies are cross -sectional and in general they control for important cross -sectional changes in regulation.

6.4 Conclusion

This chapter has discussed the most important studies of market structure and bank performance. Basically, there are two explanations of the relationship between structure and performance. The traditional Structure-Conduct-Performance hypothesis asserts that banks are able to extract monopolistic profits in a concentrated market by their ability to charge higher loan rates and offer lower deposit rates, whereas the efficient structure hypothesis proposes that efficient firms increase in size and market share because of their ability to generate more profits which usually lead to higher concentration. Studies on the relationship between structure and performance at first concentrated on the American banking system. However, recent studies on the banking structure have focussed on European banking, either in individual countries or in the European Community as a whole. As yet, little research has been undertaken at the international level and as far as we know, there has been no empirical research specifically focussing on the relationship between structure and performance in the ASEAN banking markets.

Generally, studies have found that concentration has a significant effect on performance but that the quantitative effect is rather small. However, recent studies on banking market structure that focussed on direct efficiency measures in the regression model found that the results do not support the traditional SCP hypothesis. These conflicting findings provide space for more explanations to be put forward.

Some of the methodological issues are also discussed; such as the measure of concentration, definitions of local markets, measures of performance, and the interpretation of other variables used in the model. Problems in measuring structure, performance and efficiency and in specifying models incorporating those variables are perhaps the fundamental issues that generate the conflicting findings in the banking industry in the US. Thus, it is likely to be a difficult task to apply the standard US approach to the study of bank structure and performance in banking markets such as those in the developing countries of ASEAN. Taking these matters into account, the following chapter, Chapter 7, sets out the methodology to be used in the study reported in this thesis.

CHAPTER 7

THE MODELLING FRAMEWORK

7.1 Introduction

The main aim of this chapter is to describe the modelling framework to be used in the study reported in this thesis of the relationship between structure and performance across ASEAN banking markets. The next section of this chapter describes the modelling framework used to estimate the relationship between structure and performance, using both the cost-to-income ratio and a direct measure of efficiency obtained from a stochastic cost frontier analysis to capture efficiency. Section 7.3 describes the variables used in the study and certain limitations imposed by the data. Section 7.4 provides a detailed analysis of model specification of the variables employed in the estimations for the pooled sample, for each year and for each individual country. Some methodological limitations are discussed in Section 7.5, followed by the conclusions.

7.2 The General Model

The analysis builds on the prior work of Berger (1995) who, as discussed in detail in Chapter 4, refined the Structure-Conduct-Performance (SCP) debate by categorising the theories into four instead of the usual two. The results presented later in this thesis concentrate on three of the four hypotheses within Berger's structure, omitting the Scale Efficiency hypothesis. As mentioned in Chapter 5 of this thesis, Allen and Hagin (1989) Aly *et. al.* (1990) and Berger and Humphrey (1991) have shown that scale efficiency is not to be of major importance. The first of the hypothesis is the traditional Structure-Conduct-Performance (SCP) paradigm, where higher profits are gained as a result of anti-competitive price setting by banks operating in a concentrated market. The second is the Relative Market Power (RMP) hypothesis, which asserts that only firms with large market shares and well-differentiated products are able to exercise market power in pricing these products and it is thus such firms which earn supernormal profits. The third is the Relative Efficiency (RE) version of the efficient structure hypothesis, which suggests that firms with superior management or production technology have lower costs and therefore higher profits and that these firms gain large market shares that result in high levels of concentration.

The methodological approach taken in this thesis is built on the empirical work undertaken by Lucey (1995), Berger (1995) and Golberg and Rai (1996) using a multiple regression analysis to test the effects of concentration, market share and bank efficiency on bank profitability. The present study, however, also includes a standard cost approach using the cost-to-income ratio to capture bank relative efficiency which allows a useful comparison with the X-efficiency stochastic frontier analysis. Moreover, the panel data used in this thesis covers five separate countries, and this allows for an assessment of estimates of the hypothesised relationships after taking into account country differences.

The general estimating equations are in the form:

$$P = f(M, S, D, C, X) \qquad 7.1$$

where,

P	=	generally the price of a specific product, although it may represent other dimensions of performance as well;
M	=	the degree of monopoly in the market as measured by the concentration ratio;
S	=	other market structure variables, such as proxies for barriers to entry;
D	=	a set of variables to reflect market demand conditions;
C	=	a set of variables to reflect differences in costs across firms and markets;
X	=	a set of control variables related to a specific product's characteristics;

The above parameters are estimated using a multivariate statistical approach, specifically an adaptation of multiple regression analysis.

As is evident in Chapter 6, several variations on the above model specification have been used in the study of the relationship between market structure and performance, particularly in the US. For instance, in the path breaking work that has redefined research in this area, Berger (1995) uses a model which includes direct measures of efficiency, rather than the proxies used by researchers such as Smirlock (1985), Evanoff and Fortier (1988) and Molyneux and Thornton (1992), where the market share variable is assumed to capture firm specific characteristics. In the present study, a direct efficiency measure (*i.e.*, an X-efficiency measure obtained from a stochastic frontier analysis, or the more basic cost-to-income ratio) is incorporated in the model.

7.3 Variable Selection

The choice of variables used in this study of ASEAN banks depends to some extent on data availability in BANKSCOPE, and initially some severe limitations were placed on the analysis due to the lack of information for the banking sector as a whole in the countries examined and to the absence in the case of certain banks of information concerning ownership structure. These limitations have been overcome, however, by completing the data set from other sources, specifically Central Bank publications and direct contact with the relevant authorities (see Appendix 1). Nevertheless, there are two limitations to the data used in the present study, as discussed below.

First, aggregate banking sector assets and deposits form the basis for the calculation of concentration ratios as opposed to the approach adopted in US studies where data on both loans and deposits are used. Calculating concentration ratios based on these aggregates is limiting because concentration ratios may vary across product lines. However, the reason why we have calculated the concentration ratios based on total banking sector assets and deposits is because data for different product lines were difficult to obtain.

The second limitation to our study is the fact that, for other variables in the above model specification, indicators which capture firm-specific characteristics are used rather than allowing for the different product characteristics that tends to be seen in US-based research. Again, this presents a problem because we were unable to obtain such data for

ASEAN banking.

Bearing these limitations in mind, details of the variables used in this study are discussed in greater detail below.

7.3.1 Performance Measure

We used two main performance measures in this study: after-tax returns on average assets (ROA) and after-tax returns on average equity (ROE). These accounting measures were used as opposed to market-value measures, as Sinkey (1992, page 268) notes:

> Although bank accounting values do not reflect market values fully and completely, analysis of bank financial statements is an important part of measuring bank performance.

Furthermore, many of our sample banks did not have publicly quoted equity on which we could base our estimates. Gilbert (1984) concluded that bank profit rates are a more appropriate measure of bank performance. Other researchers such as Evanoff and Fortier (1988), Molyneux and Thornton (1992), Berger (1995), Goldberg and Rai (1996), also provide support for the use of these profitability measures as opposed to other measures such as prices. As Evanoff and Fortier (1988, page 281) observe:

> Although other studies have used bank product prices as the dependent variable, banking is a multi product business, and individual prices may be misleading. Prices can be utilised only if costs are explicitly accounted for as an explanatory variable. Even then, given the regulatory constraints on the industry, the expected structure-price relationship may not be realised for a particular service because of differing pricing strategies among banks. The potential for substantial cross-subsidization between products obviously exists. Marketing strategies in certain markets may lead banks to charge low loan rates but simultaneously to pay relatively low deposit rates. Thus, the pricing strategy could obviously differ across markets.

We also used ROE as the performance measure. However, ROA is preferred to ROE because of the significant discretion that individual banks have in dividing their capital between debt and equity. Although these performance measures are regarded as superior, neither of these measures is ideal. As Heggested (1979, page 478-479) notes:

> If banks with monopoly power have higher capital-to-asset ratios, perhaps because they are more conservative or because they have made greater absolute profits over time and have retained these funds, their ratios of profits to capital may be low, even though their net return on assets is high. Alternatively, the ratio of profits-to-assets is influenced by portfolio mix, like the average loan rate. A bank may have a low profits-to-assets ratio because it has a portfolio of safe assets. If a bank is highly levered, however, its owners could still be earning a high return on equity, even though the bank's profit-to-asset ratio is low.

The results of Smirlock (1985) are somewhat similar, using any of the three profit measures; *i.e.*, return on assets, equity or capital.

7.3.2 Concentration Measure

For computation of the concentration measure, we used ten-firm concentration ratios (in terms of assets) based on total banking sector assets. Molyneux and Thornton (1992) and Molyneux and Forbes (1995) on the study of European banking, both used ten-bank concentration ratio based on assets. The theory has indicated that there seems to be a link between the level of output controlled by the few largest firms but there is no consensus as to the exact number of firms needed for this relationship to be established. For example, Berger (1995) use a three-firm concentration ratio, the Herfindahl index and a three-firm Herfindahl index and obtained similar results.

7.3.3 Market Power Variable

We initially used market share defined as bank assets divided by total banking market assets to capture firm-specific efficiency. This have been previously used, for example, by Smirlock (1985), Evanoff and Fortier (1988), Molyneux (1990), Molyneux and Thornton (1992), as a variable to test the competing traditional SCP and Efficient Structure hypotheses. However, following Berger (1995), we used market shares as proxy for market power. In this thesis, two measures of market shares have been used: individual bank market share assets divided by the total banking market assets [27] and individual bank market share deposits divided by the total banking market deposits.

There have been conflicting findings as to the interpretation of the positive dominating coefficient estimate for market shares and an insignificant coefficient for concentration in the equation. Studies such as those by Smirlock (1985), Evanoff and Fortier (1988) and by Molyneux and Thornton (1992) argue that this interpretation justifies acceptance for X-Efficiency version of the efficient structure hypothesis (ESX) in the absence of direct measures of efficiency in the equation. Others, such as those by Shepherd (1985), Rhoades (1985), Kurtz and Rhoades (1991) argues that these findings support the Relative Market Power (RMP) hypothesis which relates market shares to market power. Following Berger (1995), we used this variable to test the RMP in the ASEAN banking markets.

7.3.4 Efficiency Measure

We use two measures of bank efficiency:

[27] We have included commercial banking sector sizes and non-banking sector sizes in computation for the total banking assets for the main reason that non-banking financial intermediaries are also an important component in the financial system in the ASEAN countries as discussed in our earlier chapters, Chapter 2 and 3 of this thesis. Similarly with the total banking deposits.

(1) Standard accounting measure (cost-to-income ratio)

This ratio is defined as overheads (personnel expenses and other non-interest expenses) divided by net interest revenue plus other operating income. We would expect that this ratio is negative, implying that lower costs will lead to higher profits earned by banks. However, the implications here are two fold: firstly, this may reflects efficiency of the banks, and secondly, it may also reflect that lower costs are the result of higher market shares gained by banks through various activities such as advertising, branching and business connections rather than through efficiency.

(2) Stochastic X-efficiency measure

X-efficiency or differences in managerial ability to control costs or maximise revenues provide a measure of how effectively banks are using their inputs to produce a given level of outputs. Efficient cost frontiers can, however, vary for banks in different countries. Therefore, it is necessary to estimate a stochastic cost function. For this purpose, we estimate X-efficiency using a stochastic cost frontier model. This approach labels a bank as inefficient if its costs are higher than those predicted for an efficient bank producing the same combination of input and output and if the difference cannot be explained away by statistical noise. The standard stochastic cost frontier model can be written as:

$$lnTC = f(lnQ_i, P_i) + \epsilon_i \qquad \textbf{7.3}$$

where $lnTC$ is the total cost of production, Q_i is a measure of bank outputs, and P_i is the input price vector and ϵ_i is a two-components error term in the form:

$$\epsilon_i \quad = \quad v + u \qquad 7.4$$

where v_i are random variables which are assumed to be independent and normally distributed with zero mean and variance σ^2 and which capture the effects of the statistical noise and u are non-negative random variables which are assumed to account for technical inefficiency in cost and are assumed to be independently distributed as truncation at zero of the normal distribution.

Following the majority of cost-based studies on bank efficiency, the functional form chosen for the cost frontier is a translog function as follows:

$$\begin{aligned} lnTC \quad & \alpha_0 + \sum_{i\ 1}^{2} \alpha_i\ lnQ_i + \sum_{j-1}^{3} \beta_j\ lnP_i + \qquad 7.5 \\ & + \frac{1}{2}[\sum_{i\ 1}^{2}\sum_{j\ 1}^{3} \delta_{ij}\ lnQ_i\ lnQ_j + \sum_{i=1}^{3}\sum_{j=1}^{3} \gamma_j lnP_i lnP_j] \\ & + \sum_{i\ 1}^{2}\sum_{j=1}^{3} \rho_{ij} lnQ_j lnP_i + \varepsilon \end{aligned}$$

where,

$lnTC$ = the natural logarithm of total costs;;

lnQ_i = the natural logarithm of output;

lnP_i = the natural logarithm of input prices;

ϵ_i = v + u is as defined in equation 7.4 [28]

---

28 To impose a linear homogeneity in the equation we divided the total costs and price by the third input price.

α, β, δ, and ρ are coefficients to be estimated.

However, following a model proposed by Battese and Coeli (1995) using a stochastic cost frontier model for panel data of firms in which non-negative technical inefficiency effects are assumed to be a function of firm-specific variables and time. This model can be expressed in the following form:

$$TC_{it} \quad = \quad x_{it}\beta + (V_{it} + u_{it}) \qquad 7.6$$

for $i = 1,\ldots\ldots..N$, $t = 1,\ldots\ldots,T$,

where,

TC_{it} = the (logarithm of) the cost of the i-th firm in the t-th time period;

x_t = a kx1 vector of (transformation of the) input prices and output and other explanatory variables associated with the i-th firm at the t-th time period;

β = is an vector of unknown parameters;

V_t and u_{it} are defined as above.

The log likelihood function is therefore expressed in terms of the variance parameters, σ^2_s $\sigma^2_v + \sigma^2$ and $\gamma \equiv \sigma^2/\sigma^2_s$. The technical efficiency of cost for the i-th firm at the t-th observation is defined by the following equation:

$$TE_{it} \quad = \quad exp(-U_{it}) = exp(z_{it}\delta + W_{it}) \qquad 7.7$$

For the purpose of our efficiency measurement, we use the intermediation approach. Total costs are defined as financial and operating costs. We use two output measures: (1) total loans (Q_1); (2) other earning assets (Q_2); and three input prices (P_1, P_2 and P_3). These are: (1) the price of funds defined as the ratio of interest paid to purchased funds (customer and short term funds plus other funding), P_1; (2) the price of labour defined as the ratio of personnel expenses to total assets (P_2); and (3) the price of capital defined as the ratio of other non-interest expenses to fixed assets (P_3).

In this analysis, three exogenous variables are included. The first is the equity-to-asset ratio to control for differences in risk incurred by banks. Larger banks usually depend more on debt financing to finance their portfolios than smaller banks do. Thus failure to control for equity could yield a scale bias. As Berger and Mester (1997, page 16) note:

> The specification of capital in the cost and profit functions goes part of the way toward accounting for different risk preferences on the part of the banks. [......] But if some banks are more risk averse than others, they may hold a higher level of financial capital than maximises profits or minimises costs. If financial capital is ignored, the efficiency of these banks would be mis measured, even though they are behaving optimally given their risk preferences.

Secondly, following Berg, Forsund and Jansen (1992), we include in the translog function the ratio of loan-loss provision to total loans (llp/loans) as an indicator to control for unmeasured differences in output quality.

Finally, this analysis consider the year variable (year); the year is incorporated in the cost function to control for any possibility of a trend in the measurement of efficiency.

From the above, the full model that we are going to use in determining the X-efficiency scores is as follows:

$$
\begin{aligned}
ln(TC/P_3)_{it} \quad = \quad & \beta_0 + \beta_1 lnQ_1 + \beta_2 lnQ_2 + \beta_3 lnP_1/lnP_3 + \beta_4 lnP_2/lnP_3 \\
& + \beta_5 lnQ_1 lnQ_1 + \beta_6 lnQ_1 lnQ_2 + \beta_7 lnQ_2 lnQ_2 + \beta_8 ln(P_1/P_3)^2 \\
& + \beta_9 ln(P_1/P_3) ln(P_2/P_3) + \beta_{10} ln(P_2/P_3)^2 + \beta_{11} ln(P_1/P_3) ln\, Q_1 \\
& + \beta_{12} ln(P_1/P_3) lnQ_2 + \beta_{13} ln(P_2/P_3) lnQ_1 + \beta_{14} ln(P_2/P_3) lnQ_2 \\
& + \beta_{15}(lneq/lnta) + \beta_{16}(lneq/lnta)^2 + \beta_{17}(lnllp/lnloans) \\
& + \beta_{18}(lnllp/lnloans)^2 + \beta_{19} year + \beta_{20} year^2 + Uit + V_{it} \qquad 7.8
\end{aligned}
$$

We impose a linear homogeneity in the input prices by dividing the cost and input prices by the third input price, P_3.[29] To estimate the stochastic X-efficiency scores, we use a FRONTIER 4.1 package.

7.3.5 Other Variables

Five other variables have been selected in order to estimate the relationship between structure and performance in ASEAN banking markets. These are discussed below.

7.3.5.1 Ownership Structure

Many researchers have used public ownership as an additional variable with an expected negative coefficient to indicate that government controlled banks earn smaller profits than their private counterparts. Short (1979) and Bourke (1989) found that government ownership of banks is correlated inversely with profitability while Molyneux and Thornton (1992) find a positive relationship and Molyneux (1993) later found that the coefficient of government ownership to be insignificant. In the ASEAN banking markets, it is often debated that government controlled banks are run less efficiently than their private counterparts. Given also the importance of government controlled banks in these

[29] All the variables used to measure stochastic X-efficiency measure are expressed in real terms using country specific consumer price index (CPI) deflators relative to 1996. See Appendix 2 for individual country CPI deflators.

countries, we felt that it is important to include this variable. We expect that this coefficient would be negative, implying that government controlled banks earn smaller returns than their private counterparts.

7.3.5.2 Demand Conditions

The use of per capita income is not suggested extensively in the literature. A number of studies utilise market growth in terms of the annual growth in money supply. Bourke (1989) and Molyneux (1993), for example, use market growth to account for the demand condition while that Short (1979) uses asset growth. Golberg and Rai (1996) use PCI or per capita income to account for this demand condition and his study find a negative and significant coefficient for PCI. In this thesis, we have employed PCGNP or per capita gross national product to account for the demand condition. This ratio is defined as the gross national product divided by the population. These data were initially expressed in units of local currency, with GNP figures expressed in constant (1990) prices. Then this figure is converted into US dollars at the official exchange rates which is based on the official market rate quoted in International Financial Statistics for the country concerned. The ratio will either be positive or negative to profitability. Positive coefficients indicate that the higher the per capita GNP the higher will be the demand for financial services and therefore, the higher the returns to banks. On the other hand, according to Golberg and Rai (1996), negative coefficients indicate support for the maturity hypothesis; *i.e.*, countries with higher per capita GNP are assumed to have a banking system that operates in a mature environment which results in more competitive profit margins.

7.3.5.3 Bank Size

The size variable, the log of total assets, has been used by Evanoff and Fortier (1988), Molyneux (1993), Goldberg and Rai (1996) to account for cost differences related to bank size and for the greater ability of larger banks to diversify. Molyneux (1993) uses three variables to account for cost differences: total assets of individual banks, interest paid/total funds and staff expenses/total assets. For our purpose, total assets of individual banks are used to account for size. However, the effect of total assets is indefinite because any positive influence on profits from economies of scale may be partially offset by the greater ability of large banks to diversify their assets, resulting in lower risks and lower returns.

7.3.5.4 Risk Factors

A number of papers have included several control variables to hold constant risk factors that may affect profits. Evanoff and Fortier (1988), Molyneux and Teppet (1993) include capital-to-asset ratio and loans-to-assets ratios while Molyneux (1993) includes the variable of loan-loss-reserves to total loans in the equation. The capital to asset ratio is included to account for differing risk levels between banks. Lower ratios would indicate a relatively risky position in which the coefficient would be expected to be negative. However, according to Molyneux and Teppett (1993), a positive relationship would indicate that better capitalised banks benefit from capital economies of scale and are, therefore able to undertake more profitable business. Loans-to-asset ratios provide a measure of risk since loans are riskier and have a greater expected return than other primary assets such as government securities. Thus, a positive relationship between this ratio and profitability is expected. It could also be that banks which actively pursue loans may be required to aggressively seek a high cost of funds and this could offset the positive impact on profitability. Our study takes into account the risks related to both asset composition (loans-to-assets ratio) and capital structure (equity-to-assets ratio).

7.4 Model Specification

Based on (7.1) above, the model to test the relationship between structure an performance can be stated in the following form:

$$\pi_{ij} = \beta_0 + \beta_1 CR_j + \beta_i x_i + \epsilon_i \qquad 7.9$$

where,

π_{ij} = a performance measure for banks i in market j;

CR_j = a market structure measure such as concentration measure in market j;

x_i = is a variety of variables such as demand, cost and balance sheet mix that are believed also be the determinants of bank performance; and

ϵ_i = the error term.

Thus, according to this model, if the coefficient of β_1 is positive and statistically significant, the SCP paradigm holds in that particular market.

Smirlock (1985) for example, tests the efficiency hypothesis in the following way:

$$\pi_{ij} = \beta_0 + \beta_1 CR_j + \beta_2 MS_{ij} + \beta_i x_i + \epsilon_i \qquad 7.10$$

where MS (market share) is a proxy for firm-level efficiency; that is, firm size. However, Berger (1995) argues that the market share variable is a crude measure for efficiency and some authors such as Smirlock (1985) and Evanoff and Fortier (1988) argue that efficiencies may be proxied by firm specific variables, such as market share. Some studies such as that of Rhoades (1985) and Kurtz and Rhoades (1991) suggest that the positive relationship between market share variables and performance supports the RMP hypothesis which relates market shares to market power. Thus, from Equation (7.10), the following can be estimated to take into account Berger's (1995) two versions of the efficiency hypothesis:

$$\Pi_{ij} = \beta_0 + \beta_1 CR_j + \beta_2 MS_{ij} + \beta_3 ESX_{ij} + \beta_4 ESS_{ij} + \beta_i X_i + \epsilon_i \qquad \textbf{7.11}$$

where, *ESX* and *ESS* represent estimates of X-efficiency and scale efficiency. However, for our purpose, we only include the X-efficiency measure. [30] A review article by Berger *et. al.* (1993) of research on US commercial banks, indicates that X-inefficiencies are usually account for 20% or more of costs in banking while scale and product mix inefficiencies to account for less than 5% of costs. Berger *et. al.* (1993, page 228) note:

> The one result upon which there is virtual consensus is that X-efficiency differences across banks are relatively large and dominate scale and scope economies.

The full model used to investigate the relationship between market structure and performance in ASEAN banking is as follows:

---

30 X-Efficiency and Scale-Efficiency are not mutually exclusive and they do not contradict each other. Aly *et. al.* (1990) in their studies of US banking for 1986, find that the major source of technical inefficiency is pure technical inefficiency and not scale efficiency. Similar result was also shown by Berger and Humphrey (1991).

$$ROA_{ij} = \beta_o + \beta_1 CR_j + \beta_2 MSA_{ij} + \beta_3 EFF_{ij} + \beta_4 GOVT_{ij} + \beta_5 PCGNP_j + \beta_6 ASSETS_{ij} + \beta_7 LOANAS_{ij} + \beta_8 EQAS_{ij} + \epsilon_i \quad \textbf{7.12}$$

$$ROA_{ij} = \beta_o + \beta_1 CR_j + \beta_2 MSD_{ij} + \beta_3 EFF_{ij} + \beta_4 GOVT_{ij} + \beta_5 PCGNP_j + \beta_6 ASSETS_{ij} + \beta_7 LOANAS_{ij} + \beta_8 EQAS_{ij} + \epsilon_i \quad \textbf{7.13}$$

$$ROE_{ij} = \beta_o + \beta_1 CR_j + \beta_2 MSA_{ij} + \beta_3 EFF_{ij} + \beta_4 GOVT_{ij} + \beta_5 PCGNP_j + \beta_6 ASSETS_{ij} + \beta_7 LOANAS_j + \beta_8 EQAS_{ij} + \epsilon_i \quad \textbf{7.14}$$

$$ROE_{ij} = \beta_o + \beta_1 CR_j + \beta_2 MSD_{ij} + \beta_3 EFF_{ij} + \beta_4 GOVT_{ij} + \beta_5 PCGNP_j + \beta_6 ASSETS_{ij} + \beta_7 LOANAS_{ij} + \beta_8 EQAS_{ij} + \epsilon_i \quad \textbf{7.15}$$

where,

ROA ROE_{ij}	=	Return on average assets and return on average equity of bank *i* in market *j* as the performance indicators;
CR_j	=	Ten-bank concentration ratio calculated by taking the largest ten banks divided by the total assets of the banking sector in market *j;*
MSA_{ij} & MSD_{ij}	=	Market share measures to take into account market power. We use two market share measures; (1) market share of each banks in terms of total banking assets (*MSA*) and (2) market share of each bank in terms of total deposits of the banking sector (*MSD*);
EFF	=	Efficiency measures to take into account for bank efficiency. We use cost-to-income ratios and stochastic X-efficiency of bank *i* in market *j;*
$GOVT_{ij}$	=	Dummy variable equal to one if banks are owned by government and zero otherwise;
$PCGNP_j$	=	Per capita GNP to proxy for market potential on the grounds that the higher the per capita income, the greater the likelihood of demand in that particular market;
$ASSETS_{ij}$	=	The asset size of each bank to take into account differences brought about by size such as economies of scale;
$LOANAS_{ij}$	=	Ratio of loans-to-assets;
$EQAS_{ij}$	=	Equity-to-assets ratio;
ϵ_i	=	error term

7.4.1 Estimation Procedure

To test the relationship between market structure and bank performance for ASEAN banks our study uses multiple regression analysis. Multiple regression analysis is concerned with the study of the dependence of one variable, the dependent variable, on other variables known as the explanatory variables, with a view of estimating and/or predicting the (population) mean or average value of the former in terms of the known or fixed (in repeated sampling) values of the latter (Gujarati 1995).

Thus, we have, for example,

$$Y_t = \beta_1 + \beta_2 X_{2t} + \beta_3 X_{3t} + \dots\dots\dots\dots\dots\dots \beta_k X_{kt} + u_t;\ t=1\dots\dots\dots\dots n \qquad \textbf{7.16}$$

where X_{2t}, X_{3t}, ...X_{kt} are a set of independent (explanatory) variables, each of which influences the dependent variable Y_t.β_1.....β_k is unknown (population) parameters; *i.e.* ,unknown constants; and u_t is an unknown, random error term.

The following assumptions about the components of this model have been made to ensure the desirable properties of the ordinary least squares estimators β_1.....β_k, and to ensure the validity of the standard hypothesis test procedure;

(i) $E(u_t) = 0;$

(ii) $var(u_t) = \sigma^2;$

(iii) $cov(u_t, u_{t-j}) = 0$ for $j \neq 0;$

(iv) the underlying relationship between X_t and Y_t is linear;

(v) u_t follows a normal distribution.

The above assumptions mean that the variables on the right-hand side of the equation are non-random, and that the error term must be independent of each other and the disturbance should have zero mean.

The parameters $\beta_1.....\beta_k$, referred to as the partial regression coefficient, and measures the slope of the regression line for each independent variable, controlling for the other variable. For example in a three-variable regression model, β_2 measures the change in the mean value of Y, $E(Y \backslash X_2, X_3)$ with respect to X_2 while holding X_3 constant. In other words, it gives the slope of $E(Y \backslash X_2, X_3)$ with respect to X_2, holding X_3 constant. The same interpretation applies to the other independent variable; *i.e.*, β coefficients apart from β_1 which is the constant. The error term, U_t captures the influence of all factors other than $X_{2t}.........X_{kt}$, on Y_t including random determinants of Y_t, which represents other variables not included in the model.

We use an ordinary least squares estimation, choosing the values of $\beta_1......\beta_k$ which minimise Σu_t^2, the sum of the squared values of the estimated error terms. Under Assumptions 1 to 5 above, it can be shown that $\beta_1......\beta_k$ are the best and unbiased estimators. Under Assumptions 1 to 6 above, the sample distributions of $\beta_1.....\beta_k$ are normally distributed so we can write $\beta_1 \sim N(\beta_1, var(\beta_1)) \ldots \beta_k \sim N(\beta_k, var(\beta_k))$.

We have noted above that the betas (βs) allows us to estimate each coefficient independently and that the t-test is used for testing hypotheses about individual coefficients. All these tests will require Assumptions 1 to 6 above although, in large samples, tests are approximately valid under Assumptions 1 to 5. To enable us to see how well the sample regression line fits the data or, in other words, to find out the combined effects of the independent variables, we compute a measure of goodness of fit, also known as the coefficient of determination or r-squared *(R^{2})*.

$$R^2 = \frac{\sum(\hat{Y} - \bar{Y})^2}{\sum(Y_i - Y)^2} = 1 - \frac{\sum e_i^2}{\sum(Y_i - \bar{Y})^2} = \frac{explained\ variation}{total\ variation} \qquad \textbf{7.17}$$

where:

$\sum(Y - Y)^2 =$ a measure of the total variation in Y;

$\sum(\hat{Y} - Y)^2 =$ a measure of the variation in Y_i explained by $X_{2i}.......X_{ki}$;and

$\sum e^2$ = a measure of the variation in Y_i unexplained by $X_{2i}.......X_{ki}$.

An alternative goodness of fit measure which adjusts for the values of k and η is r-bar squared or adjusted r-squared (R^{2}). This is simply the r-squared adjusted for degrees of freedom. The formula is:

$$R^2\, adjusted = 1 - \frac{RSS\,/\,(\eta - k)}{TSS\,/\,(\eta - 1)} \qquad \textbf{7.18}$$

where:

RSS = residual sum of squares

TSS = total sum of squares

η = number of observations

k = number of parameter

7.4.2 Test for Normality

We have seen earlier that the u_i follows the normal distribution with zero mean and constant variance σ^2 and with this normality assumption we find that the OLS estimators of the partial regression coefficients are best linear unbiased estimators (BLUE). If this assumption is violated then the estimation would cast doubt on the validity of the linear model. The normality test allows us to find out whether the error term follows a normal distribution. We can easily verify whether the chi-square value is highly significant, which would indicate that the null hypothesis that the residuals in the model are normally distributed cannot be accepted and would therefore have to be treated with caution.

The hypothesis of normality in the residuals is accepted if the chi-square distribution with s degrees of freedom (df) falls below 4.60517 (at the 10 percent level), 5.99147 (at the 5 percent level) and 9.21034 (at the 1 percent level). However, it should be noted that if u_i is not normally distributed, the usual test procedures are still valid asymptotically, provided the sample size is large but not in the finite or small samples. (See Gujarati,1995 page 317, for more details). Furthermore, this assumption is not essential if our objective is estimation only.

7.4.3 Test for Linear Functional Form

There are several types of specification errors in the regression analysis: omission of a relevant variable, inclusion of an unnecessary variable, adopting the wrong functional form and errors of measurement. According to Gujarati (1995), this test is crucial because choosing the wrong functional form to describe the relationship between the variables of the model calls into question the validity of any inferences drawn from the estimated regression. Ramsey (1969) has proposed a general test of specification error called RESET test (regression specification error test) which involves running an auxiliary regression of the OLS residuals against the explanatory variables and the squares of the fitted values. From an equation we have, for example:

$$Y_i = \lambda_1 + \lambda_2 X_i + u_{3i} \qquad 7.19$$

Some residuals are obtained from the above equation and plotted against Y_i, to see if there is a systematic change in the pattern of the mean. We can verify the values of the chi-squared with one degree of freedom. The critical chi-squares values are 2.70554 (at the 10 percent level), 3.84146 (at the 5 percent level) and 6.63490 (at the 1 percent level). Values below this would reject the null hypothesis of non linear functional form in the model.

7.4.4 Test for Heteroscedasticity

Under assumption (iii) above, we have assumed that the variance of each disturbance term u_i, conditional on the chosen values of the explanatory variables, is some constant number equal to σ^2 or $E(u_i^2) = \sigma^2$, $i=1,2,....,n$. The problem of heteroscedasticity is likely to be more common in cross-sectional data than in time series data. This is because in cross-sectional data, one usually deals with members of the population at a given point of time, with different sizes such as small, medium or large etc. On the other hand, in time series data, the variables tend to be of similar orders of magnitude because one generally collects the same data for the same entire period of time. To overcome this problem, we use White's (1980) general heteroscedasticity test.

The White (1980) test is based on the regression of the squared residuals on squared fitted values and this test is performed by regressing the residuals onto the predicted values from which they were obtained. Given the data, we estimate the regression equations and obtain the residuals. Then an auxiliary regression is run in which the squares of the residuals from the original regression are regressed on the original X regressors, their squared values, and the cross product(s) of the regressors. To indicate that there is no heteroscedasticity, it should be shown that sample size (n) times the R^2 obtained from the auxiliary regression asymptotically follows the chi-square distribution with degrees of freedom equal to the number of the regressors excluding the constant term; that is, $n\ .\ R^2{}_{asy}\ \chi^2_{df}$. If the chi-square value obtained does not exceed the critical value at the chosen level of significance, then the null hypothesis of heteroscedastic residual variance can be rejected. The critical chi-square values from the table are 2.70554 (at the 10 percent level), 3.84146 (at the 5 percent level) and 6.63490 (at the 1 percent level). Note that heteroscedasticity does not destroy the unbiasedness and consistency properties of the OLS estimators but these estimators are no longer BLUE, not even asymptotically (*i.e.* in the case of large sample size).[31]

In our study, the problem of heteroscedasticity could be remedied using White's (1980) heteroscedasticity adjusted standard errors. MICROFIT packages allowed us to obtain White's heteroscedasticity-corrected variances and standard errors along with the usual OLS variances and standard errors and to conduct the usual statistical inference based on these standard errors.

[31] See Gujarati (1995) page 381.

7.4.5 Test for Multicollinearity

In the above model of the multiple regression analysis, we have assumed that there is no multicollinearity among some or all the explanatory variables. Multicollinearity exists when there is a 'perfect' or a 'near' relationship between two or more explanatory variables (*X's*). Perfect multicollinearity exists when an exact linear relationship exists between some or all of the explanatory variables, $X_{1t}, X_{2t}, \ldots\ldots X_{kt}$, *i.e.*, we can find a set of constants λ_1, $\lambda_2 \ldots\ldots \lambda_k$, at least one of which is non-zero so that $\lambda_1 X_{1t} + \lambda_2 X_{2t} + \ldots\ldots\ldots\ldots \lambda_k X_{kt} = 0$ for all t. On the other hand, near multicollinearity is when an approximate relationship exists between $X_{1t}, X_{2t}, \ldots\ldots X_{kt}$; *i.e.*, we can find $\lambda_1, \lambda_2 \ldots\ldots \lambda_k$ so that $\lambda_1 X_{1t} + \lambda_2 X_{2t} + \ldots\ldots\ldots\ldots \lambda_k X_{kt} \approx 0$ for all *t*. The consequences of this problem are that if two explanatory variables are closely related, the regression model has difficulty in separating out their individual effects on y_t. In other words, if perfect multicollinearity is present, the regression coefficients of the *X* variables are indeterminate and their standard errors are infinite whereas, if near multicollinearity is present, the regression coefficient, although indeterminate, possesses large standard errors (in relation to the coefficients themselves), which means the coefficients cannot be estimated with great precision.

However, near multicollinearity does not invalidate any of the six assumptions required for efficient estimation and valid statistical inference; *i.e.*, the OLS estimators are still BLUE (under Assumptions 1 to 5) and are still globally efficient (under Assumptions 1 to 6) in large samples (Gujarati, 1995).

There are various ways of detecting multicollinearity in the regression analysis. For this thesis, we use a variance-inflating factor (*VIF*), which is defined as:

$$VIF = \frac{1}{1 - R_j^2} \qquad 7.20$$

This shows how the variance of an estimator is inflated by the presence of multicollinearity. To calculate the *VIF*, we regress each X_i on the remaining X variables and compute the corresponding R_j^2, each one of these regressions is called an auxiliary regression, auxiliary to the main regression of Y on the X's. The larger the value of *VIF*, the more collinear is the variable X_j. Accordingly, if the *VIF* of the variable exceeds 10; that is, if R_j^2 exceeds 0.90, that variable is said to be collinear (Marquardt 1980).

For our ASEAN banks, we test the joint effects of concentration, market share and bank efficiency using the following procedures: Pooled time-series estimates, yearly estimations and for each individual country. An estimation is made for each country using pooled time-series cross sectional data. We cannot estimate for each individual year because we have only one concentration ratio and per capita income for each year for each country and, therefore, pooling the sample over the five-year period provide variance in the concentration measure as well as the per capita income.

7.5 Limitations of the Methodology

There are various limitations to the above methodology for the measurement of efficiency across ASEAN countries. We have discussed in depth the limitations of the SCP modelling in the banking literature review of the previous chapter (Section 6.3). Therefore, here we will only address this question in regard to the methodology employed in analysing the structure performance relationship for our sample of ASEAN banks. In defining the market size, the majority of US studies specify market areas into SMSAs (Standard Metropolitan Statistical Areas) for urban banks and counties for other banks. For our ASEAN countries, regional data based on different bank products are not available at all. Even across European banking markets, these data are very difficult (if not impossible in some cases) to obtain. [32] Accordingly, the geographic areas in which customers obtain bank services are different for various banking services. For our purpose, we use each country as a local banking markets and calculate either total banking sector assets or deposits based on this assumption. We then calculate the concentration ratio and market share for our sample banks according to this definition. However, the selection of the number of firms is highly arbitrary and subject to various criticisms.[33] Nothing in theory suggests one 'preferred' market structure measure. For our ASEAN banks, there are at least ten 'large' banks meeting the criteria for inclusion in the Bankers Magazine annual survey.

Secondly, with regard to measures of bank efficiency, we adopt two measures:(1) the cost-to-income ratio and (2) a stochastic X-efficiency measure incorporate these measures along with other variables in the model. We realise that using this financial ratio could be quite misleading because it does not control for product mix or for input prices and X-efficiency gains and also scale and scope efficiency gains cannot be distinguished. Using cost-to-income ratio does, however, incorporate efficiency because in order for banks to be efficient, they have to reduce costs, at least for one reason. Our expectation is that the lower the costs (greater efficiency), the higher the profits will be and *vice versa*.

To estimate the X-efficiency measure using a stochastic frontier approach, we have to use

32 See, for example, Molyneux *et. al.* (1996).

33 For more details see for example, Rose and Fraser (1976).

input and output prices. The choice of input and output have also been subjected to various problems as discussed in Chapter 5 of this thesis. In addition, we encountered with data availability problems, for example we have to omit Singapore from the analysis due to data shortages. In choosing the input and output measures, we had to depend on the availability of the variables under consideration for our ASEAN banks. There is long-standing debate on the issue of exactly what is it that banks produce. At present there is no consensus on the explicit definition and measurement of inputs and outputs in the banking industry. More precisely, researchers have always found difficulties in the definition and measurement of the concept of bank output (Molyneux *et. al.*,1996). The most debatable issues are in regard to the role of deposits; on the one hand, deposits are regarded as an input to the production process (intermediation and assets approach); on the other hand, they are considered as an output (production approach), involving the creation of added value, for which customers bear the opportunity cost (value-added approach, user-cost approach).

A major econometric difficulty lies in specifying the linear functional form of the equation. We mentioned earlier that our model assumes that the equation is of linear functional form where a change in market structure will have the same impact on performance. A number of authors have supported the notion that, at least for some bank products, the relationship between concentration and price is non-linear (Heggested and Mingo, 1976, 1977 and McCall and Peterson, 1980). The assumption of linear functional form may therefore lead to mis-specification and result in biassed estimates.

A related limitation concerns the country specific variables that we use in our model; *i.e.*, PCGNP and the dummy variable GOVT may not take into account all the country specific characteristics in the model, and this will also lead to mis-specification as a result of omitted variables. In other words, other unidentified country specific characteristics may also contribute to the performance concentration relationship.

7.6 Conclusion

This chapter has discussed the modelling framework that will be used in Chapters 9 of this thesis. The main methodological approach undertaken is based most important on the empirical work of Berger (1995). However, this study focusses only on the three hypotheses instead of the four: the Structure-Conduct-Performance hypothesis, the Relative Market Power and the Relative Efficiency hypotheses. This chapter also discussed the variables that are chosen and the model specification to test the relationship between structure and bank performance in ASEAN banking markets. The tests are carried out for the pooled sample, for each year and for each individual country. The specific limitations of the methodology used in the analysis are also discussed.

CHAPTER 8

DATA AND DEFINITION OF VARIABLES

8.1 Introduction

The main aim of this chapter is to present and describe the variables used in the present study of the structure, performance and efficiency of ASEAN banking markets. The period covered by the analysis is 1991 to 1995. Section 8.2 describes the various sources of banking data obtained for the ASEAN countries involved, and Section 8.3 investigates the sample in terms of both the number of banks in the sector and the proportion of banking sector assets. The next section focuses on the precise definition of each of the variables used in estimating the SCP, RMP and RE hypotheses outlined in Chapter 4 of this thesis, including: (1) performance measures; (2) concentration ratio; (3) indicators of market power; (4) efficiency proxies; and (5) other variables relating to the structure of ownership, bank size, demand conditions and risk factors related to both assets composition and capital structure. Section 8.5 concludes the chapter.

8.2 Sources of Data on ASEAN Banking Markets

One of the main problems faced in this study relates to the difficulty of gathering comparable data. While balance sheet and income statement data were obtainable from BANKSCOPE, information on shareholdings was requested directly from each bank and aggregate data relating to the banking sector in each country was supplied by the relevant authority in each country. Appendix 1 lists relevant authorities from which we obtained data. The economic indicators used in the analysis were obtained from International Financial Statistics.

The main source, BANKSCOPE, is compiled by the European bank rating agency, IBCA. These databases are supplied on a compact-discs (CD-ROM) that can be read on any standard personal computer. The data is compiled mostly from annual reports and is then presented in a detailed spreadsheet, a 'world standard' format, a condensed format and as a bank profile, depending on the requirements of the user. Details of these formats can be found in the manuals provided by Bureau van Dijk and Sleigh Corporation. For the purposes of this research, accounting data on the banks in the five ASEAN markets under study were obtained from the full spreadsheet and the global format for cross country comparisons. This information is supplied in Excel spreadsheets which can be easily transferred into other statistical packages for further analysis without reformatting.

The information concerning individual banks obtained from BANKSCOPE was validated by checking to accounts published by each of the sampled banks which replied to a request for a copy of the relevant annual reports. It was possible to confirm the accuracy of the BANKSCOPE data set in these cases (40% of total sample). In addition to data reported in the original currency, BANKSCOPE also provides US dollar equivalent figures translated at the balance sheet date. For this study, the dollar amounts were used to achieve comparability across countries for the individual banks involved, and aggregate data obtained from banking authorities was translated into US dollars at the rates used by BANKSCOPE.

The sample includes commercial banks, saving banks, investment/security houses, specialized government credit institutions and real estate and mortgage banks. We included the noncommercial banks as well as commercial banks because nonbank financial intermediaries form an important component of the financial system in ASEAN countries, as discussed in Chapter 3. The majority of our sample banks are domestic banks though we did not exclude foreign banks in the selection. As far as possible, we used unconsolidated accounts in order to avoid double counting.

8.3 Sample Size

Table 8.1 presents a breakdown of the sample used in this analysis, by number of banks. If we consider the sample pooled across years, it can be seen that Indonesia provides us with the largest number of observations, followed by Singapore. The Philippines provides the fewest observations. It is noticeable that in 1991 the sample sizes for Indonesia and Malaysia in particular are relatively small compared to that of 1995. In general, however, we can see that the number of sample banks is greater at the end of the study period than at the beginning.

Table 8.2 presents the sample size as a percentage of total assets in the banking sector. On the whole, we find that, for every country except Malaysia, the sample accounts for more than 60 percent of total banking sector assets. In Malaysia, the sample represented only about 45 percent in 1991, which increased to 71 percent in 1995. Pooled across the five years, the sample represents about 61 percent of the sector in Malaysia, 70 percent in Thailand, 78 percent in Singapore, 81 percent in the Philippines and 89 per cent in Indonesia. For all countries, the majority of observations relate to large domestic commercial banks.

Table 8.1

Number of sample banks, 1991-1995

Country/Year	1991	1992	1993	1994	1995	1991-1995
Singapore	34	37	42	46	44	203
Malaysia	21	30	41	55	56	203
Thailand	22	29	37	43	42	173
Philippines	17	23	29	31	30	130
Indonesia	30	66	86	91	82	355
Total	124	185	235	266	254	1064

Source: BANKSCOPE

Table 8.2

Sample size as a percentage of total banking sector assets, 1991-1995

Country/Year	1991	1992	1993	1994	1995	1991-1995
Singapore	74.1	75.5	81.6	79.0	80.8	78.2
Malaysia	45.5	52.5	68.8	69.2	71.3	61.5
Thailand	78.2	80.8	81.9	80.0	77.6	70.7
Philippines	61.8	83.6	86.9	86.9	87.4	81.3
Indonesia	80.5	88.9	91.4	92.3	91.7	89.0

Source: Author's own estimates

As discussed, the above tables describe the complete sample in each country for each year. However, when we take all the variables that are necessary to analyse the relationship between structure and performance in ASEAN banking, some of the banks have to be dropped from the analysis because the variables for estimating this relationship are unavailable. For one variable, the number of employees, it was not possible to complete a useable data set from accounts received nor the BANKSCOPE source, with a number of the written requests sent to banks on this subject resulting in non-replies. Therefore, this variable was not used in the final analysis. For the other variables, Table 8.3 provides an indication of the number of useable observations.

Table 8.3

Useable observations for the final analysis [a]

	Singapore	Malaysia	Thailand	Philippines	Indonesia
ROA	201	203	173	130	355
ROE	201	203	173	130	355
CR10	203	203	173	130	355
MSA	203	203	173	130	355
MSD	203	203	173	130	355
COSIN	61	203	173	130	355
X-EFF	3	193	173	127	344
GOVT	203	203	173	130	355
PCGNP	203	203	173	130	355
ASSET	203	203	173	130	355
LOANAS	203	203	173	130	355
EQAS	203	203	173	130	355
Total	203	203	173	130	355

Notes: [a] For the final analysis, total observations using cost-to-income ratio are 922 and using a stochastic X-efficiency, total observations are 837 (Singapore is omitted in this case because many of the missing values are related to financial expenses and personnel expenses).

8.4 Details of Variables Used in the Analysis

Definitions of the variables used in the analysis of the structure and performance of ASEAN banking markets are presented below, together with descriptive statistics for the sample.

8.4.1 Performance Measures

For our analysis we use two profitability measures to account for the performance of ASEAN banks: firstly, after-tax return on average assets (ROA) and, secondly, after-tax return on average equity (ROE). The average figure in the denominator represents the arithmetic mean of the value of assets or equity at the end of year t and year t-1. The profit figure represents earned income in the case of ROA and net income attributable to shareholders in the case of ROE. We will deal with each of these performance measures in turn.

8.4.1.1 After-tax return on average assets

After-tax return on average assets measures bank profits per dollar of assets. An after-tax return on average assets is equal to the income after taxes and deductions for extraordinary items plus the loan loss reserves, divided by average total assets.

Table 8.4 provides descriptive statistics relating to ROA for 1991 through 1995.The performance of Indonesian banks and Malaysian banks appears to have risen during the five-year period. The mean values of the ROA for Malaysian banks range from 0.89 percent in 1991 to 1.44 percent in 1995 while those for the Indonesian banks range from

Table 8.4

After-tax return on average assets (%), 1991-1995

Country	Year	Mean	Median	Standard Deviation	Dispersion	Minimum	Maximum
Singapore	1991	1.77	0.98	2.35	1.33	-0.19	11.49
	1992	1.45	0.83	1.65	1.14	0.15	7.80
	1993	2.65	1.17	6.64	2.51	-3.87	39.96
	1994	1.67	1.12	2.25	1.35	-1.48	12.04
	1995	1.27	1.19	2.29	1.80	-9.36	7.35
	Pooled	1.76	1.11	3.56	2.02	-9.36	39.96
Malaysia	1991	0.89	0.84	0.36	0.40	0.25	1.57
	1992	0.92	0.90	0.30	0.33	0.39	1.72
	1993	1.24	1.03	1.17	0.94	0.20	2.50
	1994	1.21	1.10	0.60	0.50	0.21	3.36
	1995	1.44	1.40	0.71	0.49	-0.62	3.93
	Pooled	1.18	1.09	0.75	0.64	-0.62	3.93
Thailand	1991	1.07	0.99	0.64	0.60	0.22	2.69
	1992	1.95	1.68	1.26	0.65	0.27	6.14
	1993	2.13	1.93	1.06	0.50	0.17	4.23
	1994	2.29	2.08	1.29	0.56	0.40	6.74
	1995	1.56	1.46	0.89	0.57	0.04	4.55
	Pooled	1.86	1.68	1.14	0.61	0.04	6.74
Philippines	1991	2.82	2.65	1.20	0.43	1.27	5.36
	1992	2.41	2.17	1.00	0.41	0.47	5.25
	1993	2.35	2.16	1.31	0.56	0.64	7.70
	1994	2.41	2.03	1.51	0.63	0.10	8.23
	1995	2.45	2.20	1.40	0.57	0.25	8.38
	Pooled	2.46	2.20	1.31	0.53	0.10	8.38
Indonesia	1991	0.82	0.68	0.83	1.01	-1.00	2.98
	1992	1.13	0.93	0.84	0.74	0.04	3.70
	1993	1.22	0.98	0.84	0.69	0.07	5.22
	1994	1.27	1.01	0.82	0.65	0.02	3.88
	1995	1.53	1.32	0.91	0.59	0.12	4.35
	Pooled	1.25	1.04	0.87	0.70	-1.00	5.22

Source: Author's own estimates

0.82 percent in 1991 to 1.53 percent in 1995. Banks in the Philippines performed well in 1991, at 2.82 percent; the mean ROA fell during the latter period but remained stable. In Thailand, it seems apparent that, for both 1993 and 1994, the mean return-on-average assets were comparably high: 2.13 percent and 2.29 percent, respectively. In contrast, the mean ROA for banks in Singapore was the lowest of all the countries in 1995 but in

1993 the ratio was the highest. [34]

If we consider the variability of the return on assets, we find that it is relatively high for Singapore banks, implying that the ROA is much more dispersed across banks than in other ASEAN countries. The 'dispersion' statistics (that is, standard deviation divided by the mean) confirm this observation. Figure 8.1 illustrates this situation diagrammatically. There may be different reasons for this marked difference. The first might be the different operating conditions imposed across ASEAN countries. The second is that there is more competitive environment in Singapore and the large number of foreign banks may add to the variabil ty of returns - this is not surprising, given that Singapore is an important financial centre where the number of foreign banks represents about 91 percent of the total number of banks (see Chapter 2).

8.4.1.2 After-tax return on average equity

After-tax return on average equity can be defined as net income after taxes and deductions for extraordinary items plus the loan loss reserves divided by average equity (subordinated debts plus total equity). It measures profitability from the shareholders' perspective and is a measurement of bank profits per dollar of book equity capital. The ROE across ASEAN banks is summarised in Table 8.5 below.

It seems apparent that, for Malaysian and Indonesian banks, the performance in terms of ROE rose during the period under study. In contrast, the mean ROE figure for banks in Singapore, Thailand and the Philippines declined slightly in 1995. However, it seems that

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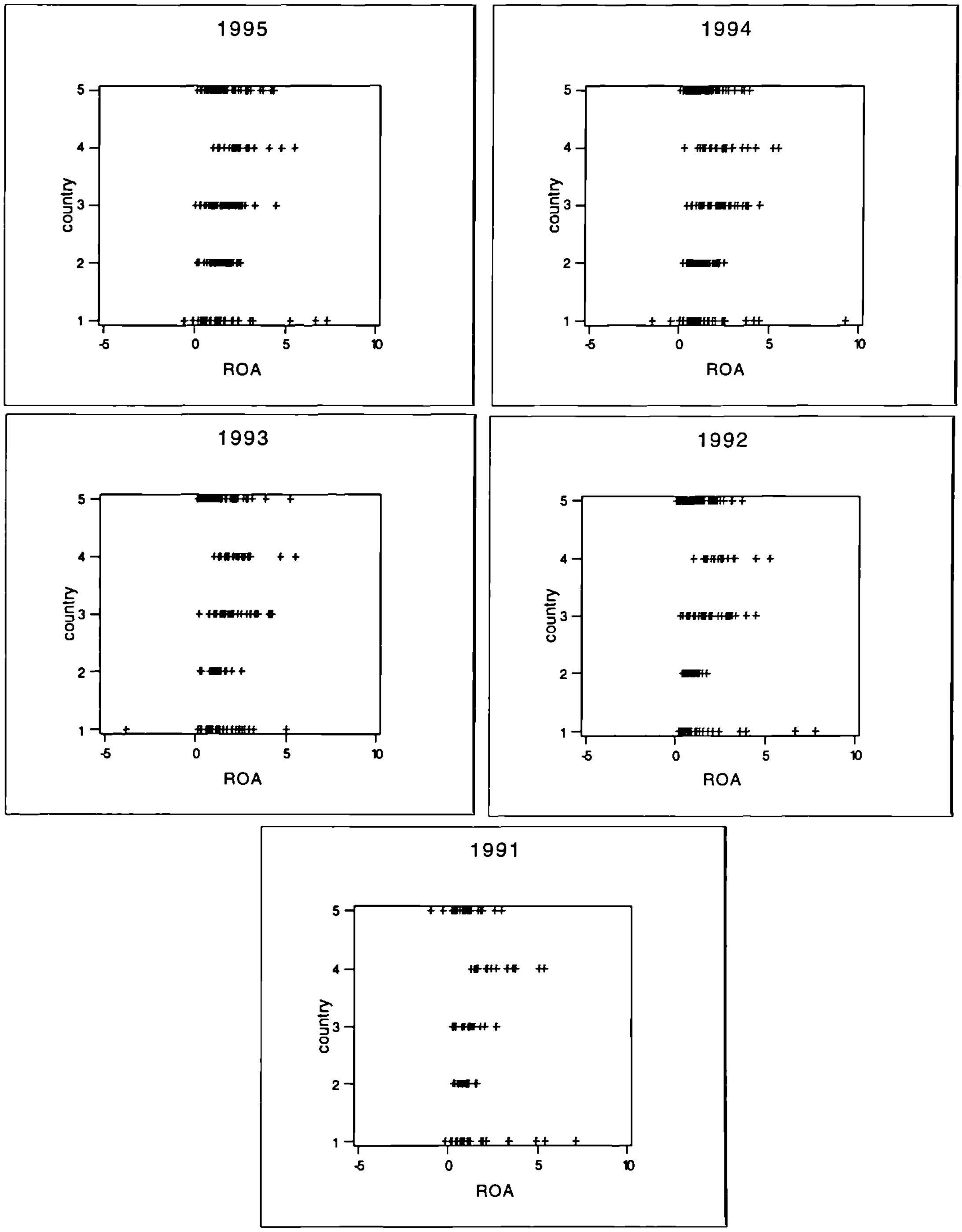
34 Banks' profits are heavily influenced by factors such as interest rates and actions taken by bank managers. Increased competition in the banking markets also contributes to the decline of bank profit margins. The strategy of expansion adds further to the profits squeeze.

Figure 8.1
After-tax return on average assets (%), 1991-1995



Notes: country 1: Singapore, 2: Malaysia, 3: Thailand, 4: Philippines and 5: Indonesia
Excluding observations less than -5 and greater than +10

Table 8.5

After-tax return on average equity (%), 1991-1995

Country	Year	Mean	Median	Standard Deviation	Dispersion	Minimum	Maximum
Singapore	1991	9.67	7.95	7.67	0.79	-1.89	41.25
	1992	9.08	8.26	6.31	0.69	0.64	31.37
	1993	20.46	10.87	54.50	2.66	-14.05	350.62
	1994	13.11	9.53	24.44	1.86	-13.13	158.30
	1995	8.45	8.88	8.60	1.02	-16.56	32.52
	Pooled	12.27	8.86	27.88	2.27	-16.56	350.62
Malaysia	1991	10.60	9.81	5.57	0.53	-2.83	21.43
	1992	12.55	12.01	5.88	0.47	4.17	35.00
	1993	14.59	14.19	6.09	0.42	3.28	35.00
	1994	15.66	15.46	7.26	0.46	2.93	32.99
	1995	17.75	18.22	6.47	0.36	1.61	33.72
	Pooled	15.03	14.71	6.78	0.45	-2.83	35.00
Thailand	1991	14.14	13.65	7.24	0.51	4.18	30.81
	1992	21.06	19.06	11.47	0.54	5.01	57.93
	1993	22.77	21.71	9.76	0.43	3.59	49.99
	1994	22.61	22.07	8.93	0.39	6.29	55.09
	1995	15.10	15.54	6.94	0.46	0.60	30.01
	Pooled	19.48	18.65	9.60	0.49	0.60	57.93
Philippines	1991	23.24	21.33	8.23	0.35	13.48	41.95
	1992	19.60	18.56	8.35	0.43	3.42	41.91
	1993	16.56	15.63	7.02	0.42	4.33	37.44
	1994	15.00	14.67	6.83	0.46	0.51	33.16
	1995	16.13	16.05	6.25	0.39	1.91	35.50
	Pooled	17.49	16.66	7.61	0.44	0.51	41.95
Indonesia	1991	9.74	10.57	7.35	0.75	-6.00	23.56
	1992	9.78	8.86	5.38	0.55	0.66	27.45
	1993	10.76	10.69	4.83	0.45	0.86	24.44
	1994	11.25	11.07	5.32	0.47	0.37	23.02
	1995	14.14	13.38	5.63	0.40	1.96	38.19
	Pooled	11.40	11.30	5.69	0.50	-6.00	38.19

Source: Author's own estimates

the mean ROE was highest in 1993 for banks in Singapore and Thailand. If we consider the dispersion statistic, we find that, overall, the dispersion statistics for ROE in Malaysia, Thailand, the Philippines and Indonesia was less marked than that of banks in Singapore.

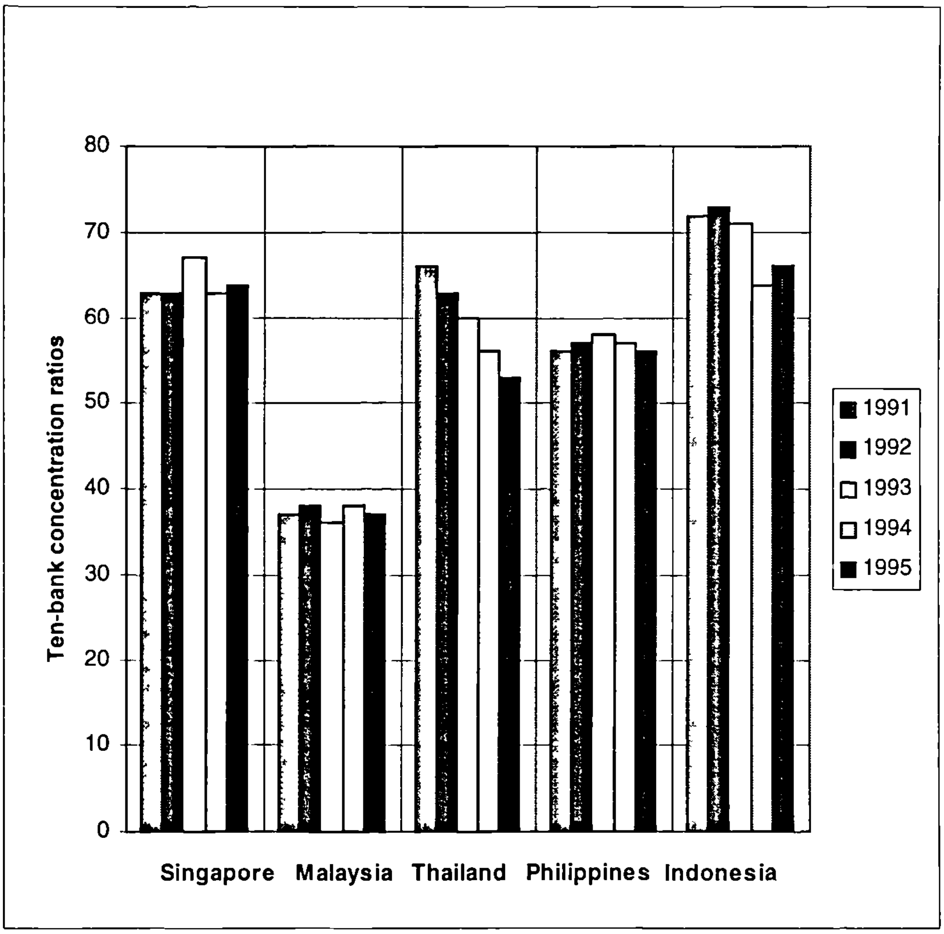
8.4.2 Concentration Measure

In Chapter 3 of this thesis, the issue of bank concentration was discussed when providing some background information on ASEAN banking markets. Table 3.12 showed the ten-bank, five-bank and three-bank concentration ratios for assets and deposits in each country. For the purpose of analysis, however, we only use a ten-bank asset concentration ratio which measures the proportion of the banking sector assets controlled by the ten largest banks. The rationale for choosing this measure is that, in the banking system of each of the ASEAN countries, there are at least ten 'large' banks meeting the criteria for inclusion in The Bankers Magazine annual survey. As mentioned earlier, to calculate this variable, data was obtained on the size of individual banking sectors from different sources which include individual country' s central bank publications and also from the relevant authorities which are listed Appendix 1. It should be noted that, in estimating market size, we have included both the commercial and noncommercial banking organizations.

Figure 8.2 illustrates the situation for ASEAN banks over the period under study. Quite surprisingly, if we consider the Singapore banking system, even though it is market oriented and highly competitive, the concentration ratio based on assets is quite high: 63 percent in 1991 and slightly larger in 1995. The largest bank which is also a private bank, the Development Bank of Singapore is the second largest in the region, after Thailand's largest bank, Bangkok Bank. Malaysian banking market has low concentration ratio. On the other hand, banking market in Thailand is high: 66 percent in 1990 and decreased to 53 percent in 1995. The Philippines is also classified as having a high concentration of banks but the concentration ratio is smaller than Indonesia which is considered as having the highest concentration of banks among the five ASEAN countries. The Indonesian banking market is still highly concentrated although there have been significant inroads into this domination of the banking system particularly in the period following the deregulation measures of 1988 [35] as a result of the rapid growth of private banking and capital market.

Figure 8.2

Ten-bank concentration ratios, 1991-1995



Source: Author's own estimates

[35] For further details of these deregulation measures, refer to Cole and Slade (1995), Appendix 3B page 155.

8.4.3 Market Power Variable

Two variables are used to account for market power: first, market share based on assets; and, second, market share based on deposits. These variables are calculated as the proportion of banking sectors assets and deposits attributable to each individual bank.

8.4.3.1 Market share - assets

For each bank we calculate the market share as a proportion of the total banking sector assets. Table 8.6 provides descriptive statistics of market power based on asset holding across ASEAN banks for 1991 through 1995. The mean values show quite a different pattern for the different countries. The average market share is higher in Thailand and the Philippines than in Malaysia, Singapore and Indonesia. The maximum value shows that, in 1995 for example, the largest bank in Singapore, the Development Bank of Singapore accounts for about 14.4 percent of the total banking sector assets compared with 13.4 percent for Thailand's largest bank, Bangkok Bank; 12.7 percent for Malaysia's largest bank, Malayan Banking Berhad; 9.7 percent for the largest Indonesian bank, Bank Negara Indonesia and about 9.6 percent for the Philippines largest bank; Metropolitan Bank and Trust Company. Although we can conclude that the largest bank in each country represents quite a large share of the total banking assets, and may therefore have considerable effect on the calculation of the mean, this does not help to explain the differences between countries in average market power. Nevertheless, the median values are much lower than the mean values. This would imply that the share of the large banks does somewhat influence the variability of market power based on asset holdings, skewing the distributions accordingly. Also, the dispersion statistic for all the ASEAN banks is generally large, ranging from 0.72 to 2.20.

Table 8.6

Market share - assets (%), 1991-1995

Country	Year	Mean	Median	Standard Deviation	Dispersion	Minimum	Maximum
Singapore	1991	2.07	0.36	4.11	1.99	0.02	16.57
	1992	1.93	0.37	3.90	2.02	0.02	16.26
	1993	1.83	0.34	3.79	2.07	0.02	15.79
	1994	1.62	0.23	3.47	2.14	0.01	14.80
	1995	1.72	0.36	3.52	2.04	0.00	14.44
	Pooled	1.82	0.32	3.71	2.04	0.00	16.57
Malaysia	1991	1.42	0.56	2.66	1.87	0.10	12.09
	1992	1.23	0.46	2.51	2.04	0.10	13.37
	1993	1.17	0.38	2.17	1.85	0.11	11.79
	1994	1.16	0.56	2.04	1.76	0.03	12.84
	1995	1.19	0.63	1.94	1.63	0.04	12.74
	Pooled	1.21	0.56	2.16	1.79	0.03	13.37
Thailand	1991	3.39	1.41	4.61	1.36	0.23	19.06
	1992	2.66	0.98	3.86	1.45	0.16	17.60
	1993	2.11	0.85	3.27	1.55	0.08	16.28
	1994	1.78	0.71	2.86	1.61	0.05	14.67
	1995	1.75	0.72	2.65	1.51	0.04	13.41
	Pooled	2.20	0.82	3.35	1.52	0.04	19.06
Philippines	1991	3.17	2.37	2.27	0.72	0.40	8.16
	1992	3.18	1.92	2.84	0.89	0.45	11.87
	1993	2.63	1.41	2.88	1.10	0.01	11.61
	1994	2.46	1.45	2.70	1.10	0.11	10.50
	1995	2.54	1.45	2.71	1.07	0.10	9.67
	Pooled	2.74	1.61	2.69	0.98	0.01	11.87
Indonesia	1991	2.68	1.01	3.88	1.45	0.00	12.66
	1992	1.35	0.26	2.91	2.16	0.04	12.09
	1993	1.12	0.24	2.46	2.20	0.05	11.48
	1994	1.01	0.25	2.09	2.07	0.04	10.61
	1995	1.12	0.29	2.16	1.93	0.04	9.70
	Pooled	1.26	0.27	2.57	2.04	0.00	12.66

Notes: Dispersion is standard deviation divided by mean
Source: Author's own estimates

8.4.3.2 Market share - deposits

One noticeable difference between market share in terms of assets and market share in terms of deposits is that the mean value of market share (deposits) across ASEAN banks is greater than the market share (assets) measure. This suggests that, on average, large banks have a greater share of deposits than assets. This would be the case because such banks rely heavily on deposits as a source of funds. Table 8.7 presents descriptive statistics relating to market power based on deposit taking. In terms of variability, we find that the situation with regard to deposit taking appears to be similar to that when market power is measured on the basis of asset holding.

Table 8.7

Market share - deposits (%), 1991-1995

Country	Year	Mean	Median	Standard Deviation	Dispersion	Minimum	Maximum
Singapore	1991	3.41	0.51	6.59	1.93	0.01	22.67
	1992	3.09	0.45	6.00	1.94	0.01	21.51
	1993	2.92	0.30	5.93	2.03	0.02	20.30
	1994	2.61	0.25	5.40	2.07	0.03	19.19
	1995	2.89	0.31	5.65	1.96	0.02	19.36
	Pooled	2.96	0.33	5.81	1.96	0.01	22.67
Malaysia	1991	3.05	1.29	5.30	1.74	0.25	23.66
	1992	2.39	1.05	4.77	2.00	0.18	25.02
	1993	2.37	0.81	4.40	1.86	0.23	23.91
	1994	2.32	1.02	4.04	1.74	0.05	25.91
	1995	2.48	1.39	4.11	1.66	0.08	26.79
	Pooled	2.46	1.07	4.35	1.77	0.05	26.79
Thailand	1991	3.82	1.75	5.18	1.36	0.00	19.90
	1992	3.04	0.92	4.58	1.51	0.00	18.58
	1993	2.50	0.80	4.17	1.67	0.00	18.38
	1994	2.21	0.52	3.87	1.75	0.00	17.50
	1995	2.22	0.51	3.71	1.67	0.00	16.76
	Pooled	2.63	0.80	4.19	1.59	0.01	19.90
Philippines	1991	3.95	2.80	3.27	0.83	0.01	12.79
	1992	3.56	2.02	3.51	0.99	0.43	14.71
	1993	2.91	1.64	3.48	1.20	0.00	14.60
	1994	2.71	1.46	3.22	1.19	0.01	12.70
	1995	2.21	1.12	2.53	1.14	0.02	9.35
	Pooled	2.95	1.66	3.20	1.08	0.43	14.71
Indonesia	1991	2.71	1.17	3.76	1.39	0.03	12.38
	1992	1.28	0.18	2.73	2.13	0.00	12.10
	1993	1.09	0.16	2.37	2.17	0.00	10.48
	1994	0.99	0.21	2.05	2.07	0.00	9.14
	1995	1.01	0.25	1.99	1.97	0.01	10.39
	Pooled	1.22	0.25	2.46	2.02	0.01	12.38

Notes: Dispersion is standard deviation divided by mean
Source: Author's own estimates

8.4.4 Efficiency Measures

The present study uses two different measures of bank efficiency: the cost-to-income ratio and a stochastic X-efficiency measure.

8.4.4.1 Cost-to-income ratio

Cost-to-income is simply costs which include personnel expenses and other expenses, divided by total revenue (net interest margin plus other operating income). To be efficient, banks are expected to operate at the lowest cost possible. Table 8.8 provides comparative cost-to-income ratio data for the sample of ASEAN banks. From 1991 to 1995, it appears that the mean cost-to-income ratio for banks in Singapore has reduced by six percentage points, from 55 percent to 49 percent. In Thailand and Indonesia the mean cost-to-income ratio has also fallen, by about seven percentage points. The mean figure for Malaysian banks has significantly reduced by 17 percentage points. On the other hand, the mean for banks in the Philippines has increased by five percent, from 58 percent in 1991 to about 63 percent in 1995. We have seen earlier that banks in the Philippines have a relatively high after-tax return on assets and they also have higher cost-to-income ratios. The increase in the cost-to-income ratio could be attributed to factors such as higher labour costs, more nonperforming loans and an increase in the number of branches that is not reflected in proportionately greater income, or might partly be attributed to the adverse effects of business cycles. However, the reason for the increase in the cost-to-income ratios in the Philippines is likely to be attributable to the expansion in the number of branches during the period, as mentioned in Chapter 2 of this thesis.

Table 8.8

Cost-to-income ratio (%), 1991-1995 [a]

Country	Year	Mean	Median	Standard Deviation	Dispersion	Minimum	Maximum
Singapore	1991	55.74	57.15	15.24	0.27	32.81	71.56
	1992	57.87	60.44	10.76	0.19	37.91	74.35
	1993	54.15	52.58	10.88	0.20	37.33	76.40
	1994	47.73	45.09	15.06	0.32	20.07	87.50
	1995	49.40	41.20	43.50	0.88	3.80	200.00
	Pooled	52.15	49.02	24.55	0.47	3.80	200.00
Malaysia	1991	59.89	56.23	14.68	0.25	40.41	97.08
	1992	53.51	52.37	13.24	0.25	29.66	78.12
	1993	46.98	49.30	12.05	0.26	20.92	68.63
	1994	42.33	42.62	12.42	0.29	20.96	81.71
	1995	42.11	44.08	12.72	0.30	14.95	70.23
	Pooled	46.68	47.76	14.02	0.30	14.95	97.08
Thailand	1991	57.10	56.24	13.42	0.24	30.38	81.67
	1992	42.43	43.43	13.66	0.32	14.84	72.97
	1993	42.55	40.80	13.54	0.32	21.07	71.75
	1994	41.51	39.85	12.78	0.31	21.13	74.38
	1995	50.26	47.36	16.10	0.32	21.96	83.77
	Pooled	45.99	45.51	14.91	0.32	14.84	83.77
Philippines	1991	58.40	58.68	9.27	0.16	39.03	75.88
	1992	60.62	60.35	10.82	0.18	35.38	83.87
	1993	66.04	64.96	12.02	0.18	44.63	92.95
	1994	65.68	66.19	12.65	0.19	37.95	92.00
	1995	62.55	62.95	11.73	0.19	39.50	92.72
	Pooled	63.19	62.64	11.74	0.19	35.38	92.95
Indonesia	1991	61.62	66.52	25.47	0.41	-38.71	98.56
	1992	60.51	59.48	25.82	0.43	22.46	186.96
	1993	59.67	62.96	19.92	0.33	23.23	93.94
	1994	58.65	58.96	17.12	0.29	24.03	105.26
	1995	54.71	55.22	17.59	0.32	16.16	94.59
	Pooled	58.69	59.36	20.52	0.35	-38.71	186.96

Notes: [a] Dispersion is standard deviation divided by mean
Source: Author's own estimates

An important question is in fact what is the minimal value of this ratio at which a bank can still be considered to be efficient? There is an emerging consensus from many countries that a cost-to-income ratio of 50-55 percent is the minimum realistic target for a full-service retail bank (See Salomon Brothers, 1993). If this is the case, then we can conclude that, in general, banks in Singapore, Thailand and Malaysia are relatively efficient whereas banks in the Philippines and Indonesia fall below the line on average. The significant difference in terms of the cost-to-income ratios of banks in ASEAN would tentatively reflect the different management approaches to cost control adopted by banks in member countries. But this does not explain the relative inefficiency in the Phillippines and Indonesia. If we consider the dispersion statistic (standard deviations divided by mean) over the years, cost-to-income is the least dispersed in the Phillippines but the most dispersed in Indonesia.

8.4.4.2 Stochastic X-efficiency measure

Using a stochastic cost frontier model, as described in Chapter 7, we now consider the variables that are used in the calculation of efficiency scores. In each case, a deflated measure is used for analysis, scaling by the Consumer Price Deflator with 1996 as the base year in each country (see Appendix 2 for CPI and CPI deflator). In fact, the estimations reported in the next chapter based on an X-efficiency measure do not include Singapore because there is an insufficient number of available observations to allow for the estimation as detailed financial data was not disclosed by banks in this country. In the final analysis, we have only three observations available for banks in Singapore. Thus, in all, we have only 837 observations that can be used to estimate stochastic X-efficiency scores for ASEAN banks, and Singapore is omitted altogether.

(A) Total costs

Total costs include operating costs such as personnel expenses and other non-interest expenses and financial costs such as interest paid. Table 8.9 presents descriptive statistics for the total costs per bank per year, deflated by the CPI.

It appears that the costs incurred by the banks in Thailand are relatively high, increasing from US$970.8 million in 1991 to about US$1.2 billion in 1995 in real terms, *i.e.*, after consumer price inflation. The costs in Thailand, Malaysia and the Philippines have also increased during the period, but have decreased in Indonesia from US515 million in 1991 to US291.6 million in 1995.

(B) Output

For our case, we use two output measures; total loans and other earning assets, each of which will be considered below.

(i) Total loans

Total loans include all types of loans (consumer and other loans). Table 8.10 reports descriptive statistics for (deflated) total loans of ASEAN banks for the period 1991-1995. Loans for 1992, 1993 and 1994 are relatively more dispersed than for the other two years. The median value is much lower than the mean value implying that banks with large loan portfolios influence the variability of loans in these markets. Overall, we find that, after deflation, total loans in1991were slightly higher than in 1995, US$2.25 billion and US$2.08 billion respectively. Considering the description of individual countries, it appears that banks in Thailand have a relatively high volume of loans compared to their counterparts; double those of banks in Malaysia. In the Philippines, it is noticeable that the amount of lending is much smaller; US677 million in 1991, although increasing to US1 billion in 1995. In Indonesia, it seems that total loans were much higher in 1991 (US2.3 billion) compared to 1995 (US1.2 billion).

Table 8.9

Total costs [a, b]

	Period	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Pooled							
Pooled	1991-1995	422.94	95.76	964.83	2.28	0.13	11788.84
Yearly							
	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Yearly	1991	507.05	180.15	806.75	1.59	5.72	4715.75
	1992	370.95	87.81	714.09	1.92	1.85	4522.25
	1993	384.56	76.02	982.89	2.55	1.46	10219.51
	1994	390.52	84.33	925.73	2.37	0.67	9085.16
	1995	493.04	118.89	1182.91	2.39	0.13	11788.83
Individual Country							
	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Malaysia	1991	243.52	80.51	702.95	2.88	5.72	3274.82
	1992	230.65	46.90	704.39	3.05	5.76	3878.12
	1993	255.10	76.02	621.59	2.43	4.08	3663.18
	1994	258.08	84.33	496.85	1.92	4.18	2723.95
	1995	276.22	118.89	489.46	1.77	7.13	2755.64
	Pooled	256.52	81.80	575.36	2.24	4.08	3878.12
Thailand	1991	970.89	449.61	1179.34	1.21	36.58	4715.74
	1992	783.54	336.99	1057.20	1.34	29.68	4522.25
	1993	978.21	218.29	1902.16	1.94	16.59	10219.51
	1994	962.76	168.89	1749.15	1.81	11.83	9085.16
	1995	1273.53	278.97	2267.33	1.78	12.51	11788.83
	Pooled	1012.50	296.43	1762.99	1.74	11.83	11788.83
Philippines	1991	219.14	136.54	216.17	0.98	23.43	756.09
	1992	286.51	141.72	439.22	1.53	28.55	2081.46
	1993	240.93	105.71	376.18	1.56	28.31	1844.22
	1994	313.04	98.25	591.62	1.88	13.14	3165.58
	1995	333.88	162.23	537.96	1.61	8.67	2736.09
	Pooled	284.74	124.21	466.71	1.63	8.67	3165.58
Indonesia	1991	515.05	370.97	583.16	1.13	8.38	2220.61
	1992	277.33	56.48	522.83	1.88	1.85	2606.89
	1993	231.06	54.73	434.20	1.87	1.46	2628.09
	1994	223.16	49.09	411.54	1.84	0.67	2482.11
	1995	291.63	64.39	512.82	1.75	0.65	2844.40
	Pooled	274.49	63.01	481.14	1.75	0.65	2844.40

Notes: [a] There is insufficient data to estimate for Singapore banks
[b] In million US dollars; values are expressed in real terms using country specific deflators relative to 1996

Table 8.10

Total loans [a,b]

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Pooled							
	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Pooled	1991-1995	1833.51	513.22	3718.87	2.03	0.01	35262.04
Yearly							
	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Yearly	1991	2259.14	817.10	3880.11	1.72	1.79	24748.96
	1992	1646.62	466.26	3539.30	2.14	14.67	27185.58
	1993	1617.17	416.58	3463.11	2.14	20.71	30256.98
	1994	1731.98	498.86	3634.88	2.09	19.00	33298.84
	1995	2088.70	704.43	4076.58	1.95	0.01	35262.04
Individual Country							
	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Malaysia	1991	1347.88	519.46	2503.11	1.85	86.96	11544.21
	1992	1319.65	495.86	2780.30	2.10	99.31	15088.32
	1993	1498.57	518.97	2763.47	1.84	106.58	15593.69
	1994	1654.08	742.08	2706.77	1.63	56.04	17198.75
	1995	1998.27	1102.34	3198.72	1.60	84.39	20851.56
	Pooled	1630.09	651.46	2832.25	1.73	56.04	20851.56
Thailand	1991	4283.31	1787.73	5856.25	1.36	301.75	24748.95
	1992	3946.48	1456.08	5896.49	1.49	212.32	27185.58
	1993	3808.49	1516.29	6028.06	1.58	147.09	30256.98
	1994	4008.22	1611.97	6525.96	1.62	116.59	33298.84
	1995	4586.08	1867.28	7075.88	1.54	113.27	35262.03
	Pooled	4130.42	1627.13	6314.46	1.52	113.27	35262.03
Philippines	1991	677.19	506.31	465.88	0.68	70.62	1780.39
	1992	730.67	485.02	666.29	0.91	117.61	2790.82
	1993	783.80	416.58	803.84	1.02	31.97	3412.83
	1994	852.62	522.48	907.45	1.06	19.00	3548.22
	1995	1150.31	727.59	1158.60	1.00	13.52	4099.95
	Pooled	860.81	506.31	873.22	1.01	13.52	4099.95
Indonesia	1991	2312.61	787.39	3391.76	1.46	1.79	11870.02
	1992	1063.51	155.80	2501.03	2.35	14.67	11348.63
	1993	984.80	182.66	2183.36	2.21	20.71	10020.73
	1994	1008.99	254.69	2023.21	2.00	24.65	9044.39
	1995	1215.55	324.71	2279.26	1.87	54.86	10028.86
	Pooled	1166.61	249.12	2357.46	2.02	1.79	11870.02

Notes: [a] There is insufficient data to estimate for Singapore banks
[b] In million US dollars; values are expressed in real terms using country specific deflators relative to 1996

(ii) Other earning assets

Other earning assets are investments in assets other than loans, fixed assets and non-earning assets. These items include, among others, bank deposits, short term investments, government securities, equity investments and other forms of investment made by the banks. Table 8.11 reports descriptive statistics of (deflated) other earning assets for our ASEAN banks from 1991 to 1995.

If we consider the statistics for each individual country in ASEAN, we find that the banks in Malaysia, Thailand and the Philippines appear to have a similar investment pattern in that, during the period under study, there was an increase in the amount of investments made by these banks. In Indonesia, the opposite is the case. Overall, we find that the number of investments made by Malaysian and Thai banks were relatively high. In 1995, the mean value for investments in Malaysia was US$897.3 million compared to the lowest mean values of US$431.2 million for Indonesian banks. The variability of investments was relatively high amongst Malaysian banks but relatively low in the Philippines.

Table 8.11

Other earning assets [a, b]

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Pooled							
	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Pooled	1991-1995	572.95	190.08	1033.58	1.80	3.05	8612.98
Yearly							
	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Yearly	1991	633.00	251.75	989.03	1.56	9.10	5977.03
	1992	490.74	173.14	876.87	1.78	6.53	5632.64
	1993	544.44	171.86	1014.35	1.86	4.48	6535.71
	1994	576.09	173.00	1134.24	1.96	3.05	8612.98
	1995	628.00	221.08	1064.80	1.69	3.39	6560.01
Individual Country							
	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Malaysia	1991	674.80	225.43	1387.76	2.05	38.95	5977.03
	1992	570.88	196.14	1215.92	2.12	39.82	5932.64
	1993	772.92	326.28	1464.31	1.89	48.79	6535.71
	1994	935.21	456.82	1715.91	1.83	7.46	8612.98
	1995	897.30	473.45	1415.69	1.57	17.25	6560.01
	Pooled	807.24	342.68	1471.34	1.82	7.46	8612.98
Thailand	1991	725.29	287.57	1033.34	1.42	34.72	3933.30
	1992	606.70	280.53	800.49	1.31	26.88	3521.89
	1993	608.79	275.63	867.36	1.42	28.94	4091.41
	1994	624.16	277.64	969.53	1.55	3.05	5339.83
	1995	726.23	314.19	998.34	1.37	8.42	5711.01
	Pooled	655.59	280.63	928.56	1.41	3.05	5711.01
Philippines	1991	552.31	407.07	425.18	0.76	75.45	1420.04
	1992	580.45	376.30	517.43	0.89	60.63	1708.58
	1993	526.04	271.54	614.25	1.16	15.64	2424.99
	1994	532.32	284.01	627.87	1.17	8.63	2330.14
	1995	578.54	282.99	685.55	1.18	18.10	2359.00
	Pooled	552.50	307.85	589.30	1.06	8.63	2424.99
Indonesia	1991	578.11	223.64	878.71	1.51	9.09	3806.46
	1992	367.87	85.98	821.11	2.23	6.53	5073.74
	1993	416.15	96.65	918.85	2.20	4.48	5347.68
	1994	370.12	95.48	869.47	2.34	3.61	5694.75
	1995	431.20	101.76	919.55	2.13	8.17	5251.01
	Pooled	411.91	98.31	882.36	2.14	3.61	5694.75

Notes: [a] There is insufficient data to estimate for Singapore banks
[b] In million US dollars; values are expressed in real terms using country specific deflators relative to 1996

(C) Input prices

To estimate the cost function, we use three deflated input prices: the price of funds, the price of labour and the price of capital. We will deal with each briefly below:

(i) The price of funds

The price of funds is defined as the interest paid divided by purchased funds (customer and short term funds plus other funding). Descriptive statistics for the ASEAN banks are reported in Table 8.12. The yearly estimates show that there is a marginal reduction in the price of funds during the period, US$0.11 million in 1991 to US$0.10 million in 1995. This variable is highly dispersed for the years from 1993 to 1995 which contributes to the overall dispersion of 3.22 for the pooled estimates.

Considering the individual country estimates, we find that banks in Thailand and Indonesia had a relatively higher price of funds compared to banks in Malaysia and the Philippines during the period. The mean value for this variable ranges from around US$0.06 million to US$0.10 million in Thailand and from US$0.08 million to US$0.16 million in Indonesia. However, we can see that during the period under study, the mean value for the price of funds declined over the years except for banks in the Philippines.

Table 8.12

The price of funds [a, b]

Pooled

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Pooled	1991-1995	0.103	0.077	0.332	3.22	0.006	6.232

Yearly

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Yearly	1991	0.110	0.105	0.040	0.40	0.040	0.222
	1992	0.101	0.085	0.042	0.42	0.032	0.218
	1993	0.111	0.074	0.449	4.01	0.023	6.232
	1994	0.088	0.066	0.293	3.32	0.011	4.368
	1995	0.109	0.079	0.419	3.82	0.006	6.048

Individual Country

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Malaysia	1991	0.060	0.055	0.013	0.23	0.040	0.101
	1992	0.070	0.069	0.014	0.20	0.038	0.107
	1993	0.065	0.065	0.012	0.18	0.039	0.096
	1994	0.045	0.047	0.016	0.36	0.011	0.091
	1995	0.046	0.045	0.008	0.17	0.017	0.060
	Pooled	0.055	0.053	0.016	0.30	0.011	0.107
Thailand	1991	0.109	0.107	0.010	0.09	0.082	0.127
	1992	0.087	0.083	0.026	0.30	0.070	0.218
	1993	0.072	0.072	0.008	0.12	0.049	0.086
	1994	0.067	0.069	0.010	0.15	0.025	0.085
	1995	0.088	0.091	0.015	0.17	0.034	0.119
	Pooled	0.082	0.079	0.020	0.24	0.025	0.218
Philippines	1991	0.091	0.093	0.018	0.20	0.058	0.120
	1992	0.078	0.078	0.017	0.21	0.045	0.105
	1993	0.282	0.054	1.166	4.12	0.038	6.232
	1994	0.202	0.060	0.773	3.82	0.035	4.368
	1995	0.269	0.067	1.111	4.11	0.006	6.048
	Pooled	0.199	0.067	0.845	4.24	0.006	6.232
Indonesia	1991	0.160	0.157	0.031	0.19	0.097	0.222
	1992	0.130	0.135	0.045	0.35	0.032	0.215
	1993	0.094	0.098	0.032	0.34	0.023	0.169
	1994	0.083	0.087	0.022	0.27	0.033	0.136
	1995	0.105	0.105	0.026	0.24	0.048	0.156
	Pooled	0.105	0.104	0.038	0.36	0.023	0.222

Notes: [a] There is insufficient data to estimate for Singapore banks
[b] In million US dollars; values are expressed in real terms using country specific deflators relative to 1996

(ii) The price of labour

In this thesis, the price of labour is calculated by dividing personnel expenses by the total assets of each individual bank. The descriptive statistics are presented in Table 8.13 below. Over the years, it can be seen that the (deflated) price of labour is quite stable for all the years and for each individual country. The dispersion statistics show a less dispersed price of labour during the period.

(iii) The price of capital

The price of capital is calculated using other non-interest expenses divided by fixed assets. The descriptive statistic are reported in Table 8.14 below. The mean values show that there appears to be an increase in the price of capital over the five-year period. However, individual country estimates show that the mean values for banks in Malaysia and the Philippines reduced slightly whereas the opposite is true for banks in Indonesia and Thailand. Looking at the dispersion statistics, we find that, overall, the price of capital is relatively more dispersed for banks in Thailand and Indonesia.

Table 8.13

The price of labour [a, b]

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Pooled							
	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Pooled	1991-1995	0.011	0.077	0.006	0.55	0.001	0.075
Yearly							
	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Yearly	1991	0.012	0.012	0.005	0.46	0.003	0.031
	1992	0.012	0.011	0.006	0.52	0.002	0.036
	1993	0.012	0.010	0.006	0.52	0.002	0.040
	1994	0.011	0.009	0.006	0.54	0.001	0.045
	1995	0.010	0.009	0.007	0.64	0.002	0.075
Individual Country							
	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Malaysia	1991	0.010	0.009	0.003	0.32	0.005	0.017
	1992	0.009	0.009	0.003	0.36	0.002	0.017
	1993	0.008	0.008	0.002	0.34	0.002	0.016
	1994	0.008	0.008	0.003	0.44	0.001	0.019
	1995	0.009	0.008	0.003	0.35	0.003	0.018
	Pooled	0.008	0.008	0.003	0.37	0.001	0.019
Thailand	1991	0.008	0.007	0.003	0.36	0.004	0.016
	1992	0.008	0.008	0.002	0.30	0.003	0.013
	1993	0.009	0.009	0.002	0.31	0.003	0.018
	1994	0.009	0.008	0.004	0.53	0.003	0.035
	1995	0.008	0.007	0.005	0.61	0.003	0.036
	Pooled	0.008	0.008	0.003	0.46	0.003	0.036
Philippines	1991	0.017	0.016	0.006	0.36	0.007	0.031
	1992	0.017	0.015	0.006	0.38	0.005	0.032
	1993	0.016	0.014	0.006	0.38	0.002	0.029
	1994	0.015	0.014	0.005	0.37	0.001	0.029
	1995	0.014	0.013	0.005	0.37	0.004	0.034
	Pooled	0.016	0.015	0.006	0.37	0.001	0.034
Indonesia	1991	0.014	0.014	0.005	0.36	0.005	0.027
	1992	0.014	0.013	0.006	0.48	0.003	0.036
	1993	0.013	0.013	0.007	0.50	0.003	0.040
	1994	0.013	0.012	0.007	0.52	0.003	0.045
	1995	0.011	0.011	0.005	0.47	0.002	0.035
	Pooled	0.013	0.012	0.006	0.49	0.002	0.045

Notes: [a] There is insufficient data to estimate for Singapore banks
[b] In million US dollars; values are expressed in real terms using country specific deflators relative to 1996

Table 8.14

The price of capital [a, b]

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Pooled							
Pooled	1991-1995	1.392	0.787	2.605	1.87	0.031	50.000
Yearly							
Yearly	1991	1.032	0.779	0.829	0.80	0.090	6.285
	1992	1.258	0.829	1.601	1.27	0.049	16.000
	1993	1.228	0.834	1.248	1.01	0.031	8.500
	1994	1.542	0.714	2.907	1.88	0.087	31.750
	1995	1.633	0.793	3.924	2.40	0.121	50.000
Individual Country							
Malaysia	1991	1.458	1.023	1.304	0.89	0.406	6.285
	1992	1.448	1.059	1.097	0.75	0.437	6.000
	1993	1.589	1.200	1.473	0.92	0.207	8.500
	1994	1.262	0.862	1.116	0.88	0.248	5.769
	1995	1.131	0.820	0.807	0.71	0.185	3.491
	Pooled	1.343	1.000	1.147	0.85	0.185	8.500
Thailand	1991	0.831	0.596	0.505	0.60	0.249	2.166
	1992	0.915	0.619	0.745	0.81	0.200	3.803
	1993	0.954	0.708	1.008	1.05	0.127	5.936
	1994	1.107	0.687	1.462	1.32	0.089	9.440
	1995	1.097	0.780	0.953	0.86	0.121	3.869
	Pooled	1.005	0.684	1.041	1.03	0.089	9.440
Philippines	1991	0.938	0.746	0.654	0.69	0.590	3.340
	1992	0.700	0.710	0.205	0.29	0.237	1.053
	1993	0.675	0.697	0.219	0.32	0.252	1.035
	1994	0.637	0.599	0.280	0.44	0.166	1.283
	1995	0.646	0.550	0.386	0.59	0.228	2.178
	Pooled	0.699	0.651	0.365	0.52	0.166	3.340
Indonesia	1991	0.926	0.790	0.556	0.60	0.090	2.800
	1992	1.519	0.820	2.199	1.44	0.049	16.000
	1993	1.365	0.865	1.357	0.99	0.031	7.000
	1994	2.183	0.806	4.208	1.92	0.087	31.750
	1995	2.450	0.822	5.995	2.44	0.131	50.000
	Pooled	1.821	0.824	3.791	2.08	0.031	50.000

Notes: [a] There is insufficient data to estimate for Singapore banks
[b] In million US dollars; values are expressed in real terms using country specific deflators relative to 1996

(D) Exogenous variables

We include three exogenous variables in the stochastic frontier analysis: the equity-to-assets ratio, the loan-loss provisions to total loans and a dummy variable (year) to capture trend.

Table 8.15 reports the descriptive statistics for the equity-to-asset ratio and Table 8.16 for the ratio of loan-loss provisions to total loans.

Stochastic X-efficiency scores

Based on the variables described above and the model explained in Chapter 7, we obtained the stochastic efficiency scores for ASEAN banks which can be seen in Table 8.17. Appendix 3 presents the maximum likelihood parameter estimates for the cost function.

Overall, we can see that the mean X-efficiency measures for the ASEAN banks are around 85°o. It appears that no strong trend is discernible between 1991 and 1995, but in Malaysia, Thailand and Indonesia, there is a fall in X-efficiency between 1994 and 1995, though marginal. In the Philippines, there is a slight increase in the mean X-efficiency of banks between 1994 and 1995.

Comparing the four ASEAN banking markets, we find that banks in Malaysia are relatively more X-efficient than banks in Thailand and Indonesia, and those in the Philippines are at the lowest efficiency level. Pooled for each country, mean X-efficiencies appear to be around 87.8% for Malaysia, 86% for Thailand, 85.3% for Indonesia and 83.7% for the Philippines banks. However, the differences in terms of X-efficiencies between banks in the ASEAN countries are not so great.

Table 8.15

Equity-to-assets ratio [a, b]

Pooled

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Pooled	1991-1995	0.108	0.091	0.070	0.65	0.013	0.965

Yearly

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Yearly	1991	0.093	0.076	0.061	0.66	0.013	0.462
	1992	0.110	0.092	0.072	0.65	0.031	0.610
	1993	0.107	0.089	0.058	0.54	0.035	0.382
	1994	0.113	0.097	0.068	0.60	0.043	0.635
	1995	0.110	0.092	0.082	0.74	0.038	0.965

Individual Country

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Malaysia	1991	0.082	0.074	0.041	0.50	0.032	0.235
	1992	0.082	0.072	0.039	0.47	0.044	0.261
	1993	0.077	0.067	0.040	0.52	0.046	0.297
	1994	0.081	0.074	0.038	0.47	0.043	0.314
	1995	0.084	0.076	0.033	0.39	0.038	0.240
	Pooled	0.081	0.074	0.037	0.46	0.032	0.314
Thailand	1991	0.074	0.071	0.025	0.34	0.044	0.167
	1992	0.096	0.074	0.046	0.48	0.050	0.278
	1993	0.091	0.085	0.028	0.31	0.044	0.165
	1994	0.102	0.086	0.040	0.39	0.049	0.210
	1995	0.104	0.094	0.036	0.34	0.060	0.184
	Pooled	0.095	0.084	0.037	0.39	0.044	0.278
Philippines	1991	0.132	0.120	0.058	0.44	0.062	0.279
	1992	0.131	0.134	0.033	0.25	0.071	0.217
	1993	0.141	0.133	0.050	0.36	0.075	0.328
	1994	0.167	0.135	0.084	0.50	0.078	0.449
	1995	0.157	0.131	0.082	0.52	0.092	0.419
	Pooled	0.148	0.133	0.067	0.45	0.062	0.449
Indonesia	1991	0.093	0.081	0.083	0.89	0.013	0.462
	1992	0.123	0.096	0.096	0.78	0.031	0.610
	1993	0.116	0.096	0.068	0.59	0.035	0.382
	1994	0.111	0.103	0.050	0.45	0.049	0.314
	1995	0.099	0.092	0.037	0.37	0.046	0.199
	Pooled	0.110	0.095	0.066	0.60	0.013	0.610

Notes: [a] There is insufficient data to estimate for Singapore banks
[b] The original values are expressed in real terms using country specific deflators relative to 1996

Table 8.16

Loan-loss provisions to total loans [a, b]

Pooled

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Pooled	1991-1995	0.006	0.004	0.011	1.85	-0.011	0.251

Yearly

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Yearly	1991	0.008	0.004	0.026	3.33	-0.011	0.251
	1992	0.007	0.006	0.008	1.07	-0.008	0.064
	1993	0.005	0.003	0.005	0.99	-0.002	0.023
	1994	0.005	0.004	0.006	1.04	-0.005	0.030
	1995	0.005	0.003	0.010	1.91	-0.011	0.127

Individual Country

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Malaysia	1991	0.002	0.003	0.005	1.92	-0.011	0.010
	1992	0.003	0.004	0.004	1.11	-0.008	0.011
	1993	0.005	0.005	0.004	0.80	-0.002	0.017
	1994	0.006	0.006	0.005	0.85	-0.002	0.019
	1995	0.004	0.003	0.004	1.11	-0.011	0.019
	Pooled	0.004	0.004	0.005	1.03	-0.011	0.019
Thailand	1991	0.003	0.003	0.002	0.60	0.001	0.008
	1992	0.007	0.004	0.011	1.59	-0.001	0.064
	1993	0.003	0.002	0.002	0.78	-0.001	0.012
	1994	0 003	0.003	0.002	0.71	-0.001	0.010
	1995	0.002	0.002	0.002	1.07	-0.004	0.012
	Pooled	0.003	0.002	0.005	1.39	-0.004	0.064
Philippines	1991	0.005	0.004	0.003	0.70	0.000	0.012
	1992	0.006	0.005	0.005	0.84	0.000	0.020
	1993	0.003	0.001	0.003	1.10	0.000	0.013
	1994	0.003	0.002	0.005	1.59	0.000	0.030
	1995	0.007	0.003	0.023	2.94	0.000	0.127
	Pooled	0.005	0.003	0.011	2.30	0.000	0.127
Indonesia	1991	0.017	0.007	0.046	2.72	0.000	0.251
	1992	0.009	0.008	0.007	0.77	0.000	0.038
	1993	0.006	0.004	0.006	0.94	-0.001	0.023
	1994	0.006	0.005	0.006	0.98	-0.005	0.028
	1995	0.006	0.005	0.005	0.94	-0.000	0.025
	Pooled	0.008	0.005	0.014	1.83	-0.005	0.251

Notes: [a] There is insufficient data to estimate for Singapore banks
[b] The original values are expressed in real terms using country specific deflators relative to 1996

Table 8.17

Stochastic X-efficiency scores [a, b]

	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Pooled							
Pooled	1991-1995	0.848	0.877	0.080	0.09	0.271	0.982
Yearly							
Yearly	1991	0.823	0.821	0.061	0.07	0.629	0.958
	1992	0.911	0.933	0.063	0.07	0.586	0.973
	1993	0.785	0.793	0.071	0.09	0.271	0.982
	1994	0.888	0.905	0.068	0.07	0.368	0.972
	1995	0.871	0.883	0.064	0.07	0.428	0.971
Individual Country							
Malaysia	1991	0.874	0.881	0.041	0.04	0.768	0.920
	1992	0.937	0.947	0.036	0.03	0.818	0.973
	1993	0.797	0.804	0.059	0.07	0.657	0.897
	1994	0.895	0.905	0.044	0.04	0.774	0.968
	1995	0.888	0.909	0.053	0.05	0.742	0.950
	Pooled	0.878	0.894	0.065	0.07	0.657	0.973
Thailand	1991	0.807	0.814	0.036	0.04	0.727	0.869
	1992	0.919	0.936	0.058	0.06	0.653	0.971
	1993	0.788	0.792	0.033	0.04	0.731	0.858
	1994	0.901	0.911	0.034	0.03	0.797	0.972
	1995	0.866	0.870	0.035	0.04	0.802	0.971
	Pooled	0.860	0.867	0.063	0.07	0.653	0.972
Philippines	1991	0.834	0.848	0.073	0.08	0.629	0.919
	1992	0.914	0.930	0.054	0.06	0.767	0.968
	1993	0.742	0.753	0.129	0.17	0.271	0.982
	1994	0.841	0.871	0.106	0.12	0.368	0.939
	1995	0.870	0.892	0.084	0.09	0.512	0.954
	Pooled	0.837	0.873	0.110	0.13	0.270	0.982
Indonesia	1991	0.791	0.787	0.057	0.07	0.674	0.958
	1992	0.894	0.918	0.073	0.08	0.586	0.965
	1993	0.792	0.797	0.057	0.07	0.597	0.907
	1994	0.892	0.909	0.068	0.07	0.433	0.966
	1995	0.863	0.878	0.072	0.08	0.428	0.954
	Pooled	0.853	0.875	0.080	0.09	0.428	0.966

Notes: [a] All estimations are based on the stochastic cost frontier analysis using unbalanced panel data.
[b] There are insufficient data to estimate for Singapore banks
Source: Author's own estimates

8.4.5 Other Variables

As noted earlier, five other variables have been selected in order to estimate the relationship between structure and performance in ASEAN banking markets. They are: ownership structures, demand conditions, bank size, and two risk factors: the loans-to-assets ratio and the equity-to-assets ratio.

8.4.5.1 Ownership Structure

A number of banks in Malaysia, the Philippines, and Indonesia are owned by the government but, in Singapore and Thailand, the banking markets are predominantly private sector. Everywhere, government ownership has declined following financial deregulation, even though savings institutions such as the Post Savings Bank in Singapore and Bank Simpanan Nasional in Malaysia are owned by the government , as are many of the specialised banks in Thailand, Indonesia and the Philippines . In this study we include a binary variable to account for the types of ownership. We have divided the banks into two types based on shareholdings exceeding 50%: government and privately-owned banks. In addition to partial information in BANKSCOPE concerning shareholdings, information was obtained from individual banks on this point. In some cases, however, proportionate shareholdings by the state and private interests could not be determined. Therefore, ownership structure is measured by a binary variable only: one for government majority ownership and zero otherwise. Table 8.18 provides a breakdown of the number of banks controlled by either the government or private interests.

It can be seen that private banks are increasingly important in all the five ASEAN countries. In Singapore, the only government-owned bank is POSbank, a savings institution. In Malaysia, Thailand, and the Philippines, by size, private banks are much larger in terms of their share in the banking sector. In Indonesia, even though the seven state banks are large, their domination has reduced following various financial reforms in the country beginning 1988. Savings institutions, development finance institutions and specialised banks in these four ASEAN countries are owned by the government and their shares in the banking sectors are relatively small.

Table 8.18

Ownership structure of ASEAN Banks,1991-1995

	1991	1992	1993	1994	1995	Totals
Government-owned Banks						
Singapore	1	1	1	1	1	5
Malaysia	7	8	14	16	14	59
Thailand	0	1	2	3	3	9
Philippines	2	3	3	3	3	14
Indonesia	7	9	12	10	10	51
Private Banks						
Singapore	33	36	41	45	43	198
Malaysia	14	22	27	39	42	144
Thailand	22	28	35	40	39	164
Philippines	15	20	26	28	27	116
Indonesia	23	57	74	78	72	304

Source: Author's own estimates

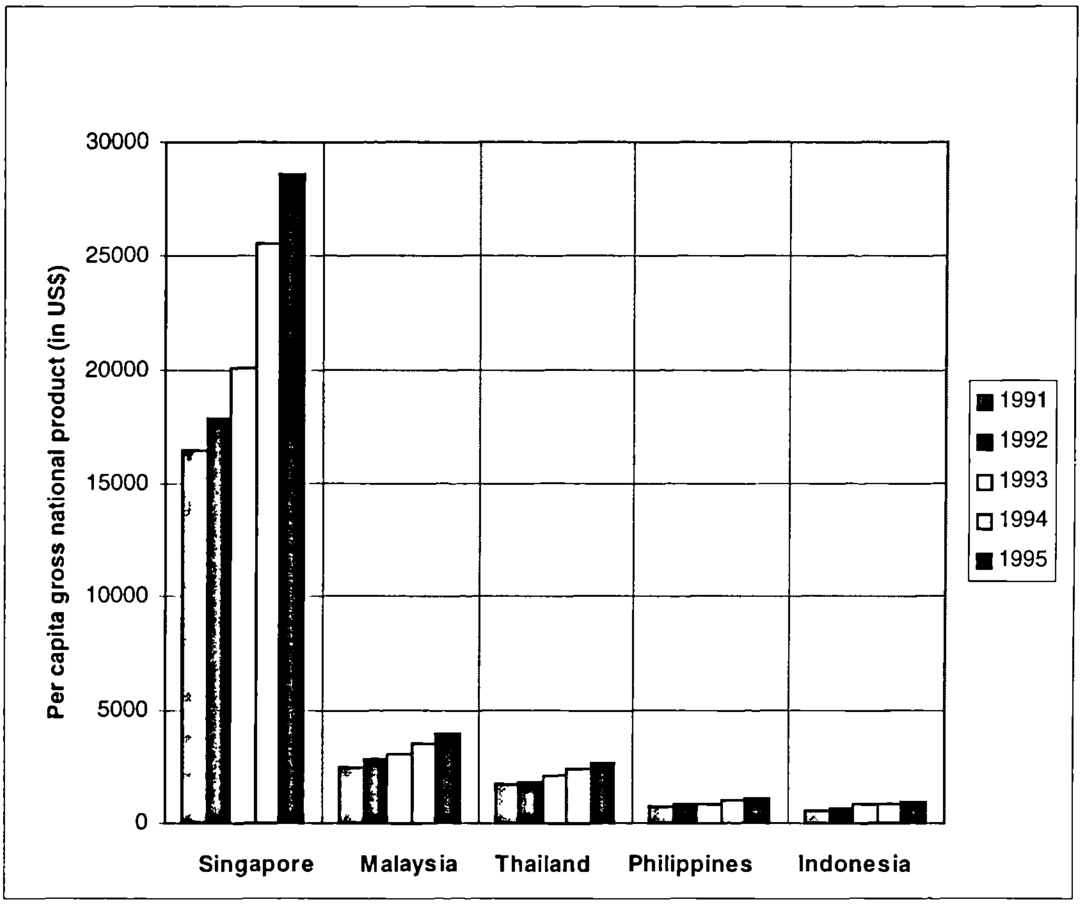
8.4.5.2 Demand Conditions

The per capita income of a country affects various factors related to the supply and demand for loans and deposits. It is hypothesized that increased per capita income in a country results in an increased demand for financial services and, therefore, more profits to the banking sector. However, this coefficient can also be negative because countries with a higher per capita GNP can be assumed to have a banking system that operates in a mature environment resulting in more competitive interest rates and greater pressure on profit margins. In this study, we use per capita gross national product (GNP) to account for this factor. This measure is estimated by dividing the gross national product by the total population. The data were initially expressed in units of local currency, with GNP figures expressed in constant (1990) prices. Then these figures were converted into US dollars at official exchange rates based on the rate quoted in International Financial Statistics (IFS) for the country and period concerned. The population was taken as mid year estimates prepared by the IFS.

Figure 8.5 illustrates the per capita GNP for ASEAN countries during the period under study. Indeed, we can see that, in Singapore, per capita GNP is substantially higher than in the other ASEAN countries, reflecting Singapore's importance as a financial sector in the region. We have seen earlier that Singapore is the smallest country, having the smallest population of the ASEAN countries, and it has the highest per capita GNP of them all. It is also clear that per capita GNP tends to increase over the years, which is not surprising given the fact that financial deepening increases over the years.

Figure 8.3

Per capita GNP (in US$), 1991-1995



8.4.5.3 Bank Size

The bank size variable, individual banks' assets, is related to the greater ability of larger banks to diversify. Table 8.19 provides descriptive statistics of the size data for all sampled banks in the ASEAN countries. Considering the figure for 1995, it can be seen that the largest bank in the region is Bangkok Bank of Thailand, which has assets of US$40 billion. The largest banks in Singapore and Malaysia are of similar size although the size of the largest bank in the Philippines is significantly smaller, half the size of the largest bank in Indonesia which is Bank Negara Indonesia. It can be seen that there is marked variability in terms of the assets size, with dispersion statistics ranging from 0.89 to 2.08. The median value is also substantially lower than the mean values which implies that the presence of large banks in a country's banking system influences the variability of assets and skews the means size distribution. This is not surprising, given similar features of size distribution across banks in other parts of the world.

Table 8.19

Assets size of ASEAN Banks (in million US$), 1991-1995

Country	Year	Mean	Median	Std. Dev.	Dispersion	Minimum	Maximum
Singapore	1991	2614	456	5192	1.99	24	20881
	1992	2763	528	5570	2.02	27	23207
	1993	3014	571	6212	2.06	37	25875
	1994	3390	478	7269	2.14	13	30936
	1995	4157	866	8493	2.04	4	34778
	Pooled	3234	528	6723	2.08	4	34778
Malaysia	1991	1705	677	3192	1.87	121	14540
	1992	1759	658	3601	2.05	145	19132
	1993	2069	676	3844	1.86	203	20840
	1994	2447	1170	4275	1.75	63	26878
	1995	3026	1588	4939	1.63	111	32315
	Pooled	2352	880	4191	1.78	63	32315
Thailand	1991	4169	1733	5664	1.36	281	23429
	1992	3928	1445	5701	1.45	241	25950
	1993	3960	1591	6124	1.55	153	30473
	1994	4323	1734	6945	1.61	112	35608
	1995	5366	2209	8091	1.51	123	40903
	Pooled	4413	1734	6690	1.52	112	40903
Philippines	1991	919	688	656	0.71	116	2364
	1992	1152	694	1026	0.89	161	4296
	1993	1075	579	1179	1.10	5	4757
	1994	1421	833	1557	1.10	62	6049
	1995	1765	1010	1876	1.06	68	6695
	Pooled	1310	735	1406	1.07	5	6695
Indonesia	1991	2323	870	3360	1.45	37	10956
	1992	1314	250	2844	2.16	41	11788
	1993	1280	275	2810	2.20	51	13106
	1994	1337	323	2750	2.06	54	13978
	1995	1608	407	3100	1.93	64	13930
	Pooled	1465	332	2917	1.99	37	13978

Notes: Dispersion is standard deviations divided by means
Source: Author's own estimates

8.4.5.4 Loans-to-assets ratio

Since the performance measure, ROA, is not risk-adjusted, we employ loans-to-assets to account for firm-specific risk. The median values, as illustrated in Table 8.20, generally range from 51 to 63 percent in the Philippines, 52 percent to 63 percent in Singapore, 63 to 70 percent in Malaysia and 65 to 75 percent in Indonesia, while in Thailand the median values remain somewhat stable over the period under study, at around 83 percent. In Thailand, this suggests that a smaller proportion of assets could be tied up in other earning assets such as investments. Banks in Singapore and the Philippines appear to hold quite a large proportion of other investment assets on their balance sheets, and this is reflected by the lower loans-to-assets ratios for banks in these countries. Also, the lower ratios for the Singapore banks perhaps reflect the particular nature of the investment in offshore business in this financial centre.

Between 1991 and 1995, these ratios appear to have increased slightly in Singapore, the Philippines and Indonesia whereas in Malaysia, the mean value declined slightly. For the pooled sample, we can see that, on average, Thai banks have the highest ratio and banks in the Philippines have the least. We also find that loans-to-assets ratios are less dispersed in Thailand than elsewhere, but also less dispersed in Indonesia, the Philippines and Malaysia compared to Singapore.

Table 8.20

Loans-to-assets ratio (%), 1991-1995

Country	Year	Mean	Median	Standard Deviation	Dispersion	Minimum	Maximum
Singapore	1991	50.92	52.47	27.39	0.54	3.03	100.21
	1992	55.69	54.97	28.29	0.51	1.49	100.64
	1993	57.32	62.56	27.01	0.47	0.01	101.36
	1994	60.30	59.22	25.75	0.43	0.01	99.00
	1995	61.38	63.42	26.93	0.44	0.08	99.72
	Pooled	57.51	58.97	26.99	0.47	0.01	101.36
Malaysia	1991	70.97	68.30	12.71	0.18	49.30	108.20
	1992	71.10	70.50	13.16	0.19	37.80	107.70
	1993	66.84	67.90	15.87	0.24	29.70	101.50
	1994	63.55	63.50	16.38	0.26	20.10	99.20
	1995	65.31	68.25	15.36	0.24	20.90	94.20
	Pooled	66.58	68.20	15.32	0.23	20.10	108.2
Thailand	1991	83.58	83.29	3.23	0.04	76.96	89.74
	1992	81.14	83.73	7.43	0.09	55.96	88.70
	1993	80.53	82.40	6.06	0.08	63.41	87.23
	1994	82.34	83.65	5.41	0.07	68.29	94.63
	1995	81.27	82.78	5.98	0.07	63.82	94.64
	Pooled	81.65	83.06	5.88	0.07	55.96	94.60
Philippines	1991	52.37	51.53	5.99	0.11	42.91	62.90
	1992	50.32	48.79	8.42	0.17	33.12	62.77
	1993	56.30	56.13	10.76	0.19	36.98	89.13
	1994	57.43	57.44	14.29	0.25	26.17	111.52
	1995	60.29	63.28	13.97	0.23	20.54	88.66
	Pooled	55.92	55.82	12.06	0.22	20.54	111.52
Indonesia	1991	69.84	75.00	17.33	0.25	0.46	87.15
	1992	62.98	65.06	14.09	0.22	26.79	86.88
	1993	65.62	66.70	13.61	0.21	21.35	111.87
	1994	69.83	72.35	14.29	0.20	23.78	102.91
	1995	71.64	74.00	11.51	0.16	36.89	99.63
	Pooled	67.86	70.26	14.03	0.21	0.46	111.87

Notes: Dispersion is standard deviation divided by means
Source: Author's own estimates

8.4.5.5 Equity-to-assets ratio

The second variable that we use to capture firm-specific risk is the equity-to-assets ratio. Table 8.21 presents descriptive statistics for the equity-to-assets ratio for the sample of ASEAN banks. It can be seen that the median value for the banks in the Philippines ranges from 12 to 13 percent, higher than the values for the other ASEAN banks. Although the median value for banks in Singapore is also relatively high (10 to 11 percent), banks in Indonesia have a lower proportion of equity and banks in Thailand and Malaysia appear to have even lower ratios. Overall the average equity-to-asset ratio in all ASEAN countries, except Singapore, increased between 1991 and 1995. As shown in Table 8.21, the equity-to-assets ratio is much more dispersed in Singapore than in the other ASEAN markets under study.

Table 8.21

Equity-to-assets ratio (%), 1991-1995

Country	Year	Mean	Median	Standard Deviation	Dispersion	Minimum	Maximum
Singapore	1991	21.19	11.07	25.57	1.21	3.54	94.68
	1992	20.31	11.88	23.71	1.17	4.85	97.96
	1993	19.03	10.80	22.55	1.18	3.79	98.78
	1994	18.54	11.56	19.71	1.06	0.67	77.07
	1995	13.39	11.11	9.12	0.68	0.62	49.13
	Pooled	18.29	11.23	20.54	1.12	0.62	98.78
Malaysia	1991	8.20	7.40	4.14	0.50	3.29	23.50
	1992	8.23	7.27	3.91	0.48	4.41	26.15
	1993	7.68	6.75	3.97	0.52	4.69	29.80
	1994	9.01	7.47	6.67	0.74	4.33	48.96
	1995	9.25	7.79	5.39	0.58	3.85	38.98
	Pooled	8.61	7.46	5.21	0.61	3.29	48.96
Thailand	1991	7.47	7.18	2.58	0.35	4.42	16.79
	1992	9.63	7.45	4.67	0.48	5.05	27.83
	1993	9.15	8.59	2.86	0.31	4.41	16.50
	1994	10.23	8.62	4.05	0.40	4.94	21.10
	1995	10.43	9.40	3.64	0.35	6.05	18.47
	Pooled	9.59	8.47	3.76	0.39	4.41	27.83
Philippines	1991	13.20	12.06	5.84	0.44	6.25	27.91
	1992	13.14	13.46	3.24	0.25	7.15	21.75
	1993	15.38	13.42	8.33	0.54	7.56	50.00
	1994	16.70	13.58	8.48	0.51	7.89	44.95
	1995	15.49	13.02	8.19	0.53	9.22	41.89
	Pooled	15.04	13.33	7.39	0.49	6.25	50.00
Indonesia	1991	9.62	8.48	8.17	0.85	1.32	46.28
	1992	12.29	9.91	9.47	0.77	3.20	61.03
	1993	12.11	9.86	7.21	0.60	3.60	38.25
	1994	11.44	10.47	5.38	0.47	4.92	31.39
	1995	10.51	9.68	4.86	0.46	4.68	29.57
	Pooled	11.24	9.74	6.75	0.60	1.32	61.03

Notes: Dispersion is standard deviation divided by means
Source: Author's own estimates

8.5 Conclusion

This chapter has considered the variables to be used to investigate the relationship between market structure and bank performance in ASEAN countries. Of these, Singapore is placed category with considerably higher per capita GNP, reflecting its importance as a financial centre. At the other extreme, both Indonesia and the Philippines have low per capita GNP, whilst Thailand and Malaysia may be considered as middle income.

For all ASEAN countries except Malaysia, the sample of banks accounts for more than 70 percent of the total banking sector. In Malaysia, the sample only accounts for 62 percent of the total banking sector assets. Of the five ASEAN banks, concentration is higher in Indonesia and smaller in Malaysia. In terms of the market share, the assets of the largest bank in 1995 exceed 14 percent in Singapore, 13 percent in Thailand, and 12 percent in Malaysia, the Philippines and Indonesia. In terms of their size, the banks in Thailand and Singapore are larger on average than banks in the Philippines and Indonesia. In our sample, we find that just over half of the ASEAN banks involved in the study are owned by private interests.

With regard to profitability, banks in the Philippines and Thailand have exhibited the highest average annual returns on assets during the period, and this is also reflected in returns on equity. Banks in Singapore, on the other hand, recorded the lowest average returns, but with a far greater dispersion within the country sample.

Cost-income ratios, a proxy for inefficiencies, are less than 50 percent for Singapore, Malaysia and Thailand, whereas banks in the Philippines and Indonesia seem to be less efficient on average, the ratio exceeding the 50 percent benchmark in 1995. Using a stochastic cost frontier to estimate X-efficiency for ASEAN banks, we also find that banks in Malaysia and Thailand are marginally more efficient than banks in the Philippines and Indonesia. Mean X-efficiencies appear to be around 87.8% for Malaysia and 86% for Thailand. However, the differences in terms of X-efficiencies between banks in the

ASEAN countries are not great.

Finally, with regard to our proxy for bank-specific risk, the loans-to-assets and equity-to-assets ratios provide some insight. The ratio of loans to assets ranges between 50 percent and 80 percent across ASEAN countries and there appears to have been an increase in this ratio between 1991 and 1995. The statistics indicate that banks in Thailand hold a substantially higher proportion of their assets in loans whereas banks in Malaysia hold about 70 percent, and those in the Philippines and Indonesia about 60 percent of their assets in loans. Banks in Singapore appear to hold quite a large proportion of other investment assets on their balance sheets as reflected by the lower loans-to-assets ratio. The result also reveals that the average equity-to-assets ratios appear to be quite high across ASEAN banks. The highest mean ratio is for banks operating in Singapore which ranges between 21 percent in 1991 and 13 percent in 1995. For all countries except Singapore, the average equity-to-assets ratio increased between 1991 and 1995.

Overall, we can conclude from this exploratory analysis that the variables described above reflect the heterogeneous nature of ASEAN banking markets. Chapter 9 will utilise these data to investigate the structure and efficiency across these markets.

CHAPTER 9

RESULTS AND INTERPRETATION

9.1 Introduction

This chapter focuses on the empirical evidence concerning the effects of concentration, market share and efficiency on bank performance in the ASEAN banking markets. Tests will be carried out using the methodology and the variables outlined in Chapters Seven and Eight of this thesis. The present chapter is divided into two main parts based on the two different proxies for bank efficiency that have been adopted: (i) the cost-to-income ratio, where data is available for all five ASEAN countries, and (ii) a stochastic X-efficiency measure, where Singapore is omitted due to data shortages. The tests are performed by regressing profits against measures of concentration, market share, the efficiency indicator and other variables. Pooled-time series estimates are discussed first, followed by the estimates for each of the five years from 1991 to 1995, and then for each of the

ASEAN countries involved.

9.2 Model Specification

It will be recalled from Chapter 4 that a general relationship between market structure and bank performance is captured by the traditional Structure-Conduct-Performance (SCP) hypothesis, while an effect on individual bank performance that is attributable to the bank's market share is assumed under the Relative Market Power (RMP) hypothesis. The influence of managerial policy on bank performance is predicted by the Relative Efficiency (RE) hypothesis. Here, we test for these separate effects jointly by regressing a measure of profit (R) - either return on assets (ROA) or return on equity (ROE) - against (i) a measure of concentration (CR), (ii) a measure of market share (MS) based on either assets or deposits (MSA or MSD) and (iii) a measure of efficiency (EFF) based on either the cost-to- income ratio (COSIN) or a stochastic X-efficiency (X-EFF) estimate. Other variables taken into consideration concern ownership structure, demand conditions, bank size and risk related both to asset composition and to capital structure. The specifications of the following equation generalise the prediction:

$$R_{ij} = \beta_0 + \beta_1 CR_j + \beta_2 MS_{ij} + \beta_3 EFF_{ij} + \beta_4 GOVT_{ij} + \beta_5 PCGNP_j + \beta_6 ASSETS_{ij} + \beta_7 LOANAS_{ij} + \beta_8 EQAS_{ij} + \epsilon_i$$

where,

R_{ij} = either the return on average assets (ROA_{ij}) or the return on average equity (ROE_{ij}) of bank i in market j, which serve as performance indicators

CR_j = a concentration ratio, in this case the ten-bank concentration ratio CR10j, calculated by taking the largest ten banks divided by the

		total assets of the banking sector in market j
MS_{ij}	=	market share measures which take into account market power. We utilise two market share measures: (1) the market share of each bank in terms of its share of total banking assets (MSA_{ij}) and (2) the market share of each bank in terms of deposits (MSD_{ij})
EFF_{ij}	=	the two efficiency measures : (1) the cost-to-income ratio (COSIN) of bank i in market j and (2) an X-efficiency (X-EFF) measure derived from a stochastic cost frontier analysis
$GOVT_{ij}$	=	dummy variable equal to one if banks are controlled by government and zero otherwise
$PCGNP_j$	=	per capita income in market j to proxy for market potential on the grounds that the higher the per capita income, the greater the likelihood of demand for financial services in that particular market
$ASSET_{ij}$	=	the size of bank i in market j, based on its total assets
$LOANAS_j$	=	the loans-to-assets ratio of bank i in market j, as a measure of risk associated with the composition of assets based on the proportion in the form of loans
$EQAS_j$	=	the equity-to-assets ratio of bank i in market j, as a measure of capital risk based on the proportion in the form of equity
ϵ	=	error term

9.3 Cost-to-income ratio as an Indicator of Efficiency

9.3.1 Pooled-Time Series Estimates

We pooled our sample data for all the ASEAN countries (Singapore, Malaysia, Thailand, the Philippines and Indonesia) from 1991 to 1995 and regressed the performance measures (either ROA or ROE) on the concentration measure (CR10), the market share (either MSA or MSD), the indicator of efficiency (EFF; *i.e.*, the cost-to-income ratio) and the other variables described above. Our sample data consisted of observations for 922

ASEAN banks for the five-year period.[36] In the equation we included four dummy (binary) variables: D92, D93, D94 and D95 (*i.e.*, using 1991 as the base year) in order to test whether there are trend effects in the data; *i.e.*, whether the parameter estimates were significantly different across years.

We tested for an efficiency effect in the first instance by excluding the cost-to-income ratio in the regression analysis, to see whether there was any significant change in the estimates and the adjusted r-squared. Table 9.1 presents the results excluding the cost-to-income ratio, and Table 9.2 reports on the full model. We find that including the efficiency variable increases the adjusted r-squared from 37.5 percent to 49.5 percent for Equation (1) where performance is measured by return on assets and the market share is based on total assets. When the market share is based on total deposits; *i.e.*, Equation (2), there is a similar increase in explanatory power, with the adjusted r-squared rising from 36.7 percent to 48.4 percent. Although the explained error in the case of return on equity is lower, there is again an increase in the adjusted r-squared under both market share proxies, from 12.7 percent to 29.5 percent in the case of the asset-based market share measure used in Equation (3) and from 11.9 percent to 28.3 percent in the case of the deposit-based market share measure used in Equation (4). Clearly, including an efficiency measure (in this case the cost-to-income ratio) increases the adjusted r-squared significantly whichever proxy is adopted for performance or market share. This indicates that bank efficiency, in this case cost-to-income ratio, is an important determinant of higher returns. This finding has been confirmed in an earlier study by Lucey (1995) on Irish credit institutions using both FDH and Distribution-free efficiency measures.

It is worth considering some general observations on Table 9.2 before drawing inferences

36 Note that the slightly fewer number of observations are due to missing data.

Table 9.1
Structure and Performance in ASEAN Banking - Pooled Results (excluding the efficiency variable; *i.e.*, cost-to-income ratio)[a]

	ROA (1)	ROA (2)	ROE (3)	ROE (4)
CONSTANT	0.75715*	0.77127*	19.8947*	20.2344*
	(3.6143)	(3.4630)	(10.7072)	(10.2842)
CR10	-0.012302*	-0.010305*	-0.15191*	-0.13793*
	(-6.4527)	(-5.8254)	(-7.3385)	(-6.7549)
MSAS	0.064151*		0.46651*	
	(4.7054)		(3.0121)	
MSDEP		0.020035**		0.10188
		(1.9700)		(0.79957)
GOVT	-0.43744*	-0.38290*	-5.1348*	-4.7275*
	(-7.0306)	(-6.2779)	(-7.3662)	(-6.8913)
PCGNP	-0.00002772*	-0.00002602*	-0.0002733*	-0.0002592*
	(-7.5421)	(-7.3120)	(-5.7188)	(-5.4116)
ASSETS	-0.00001917*	0.00000156	0.00002214	0.0002059**
	(-2.3068)	(0.21051)	(0.22115)	(1.8996)
LOANAS	0.0034448	0.0023385	0.039521*	0.029702**
	(1.5874)	(1.0698)	(2.2988)	(1.7055)
EQAS	0.10455*	0.10330*	-0.032794	-0.043323
	(11.2855)	(11.2281)	(-0.73924)	(-0.97317)
D92	0.078346	0.056449	1.1230	0.92588
	(0.76219)	(0.53819)	(1.2490)	(1.0231)
D93	0.17779**	0.14392	1.9385*	1.6379**
	(1.8141)	(1.4298)	(2.2385)	(1.8769)
D94	0.17779*	0.15633	1.8054*	1.4549**
	(2.0522)	(1.5991)	(2.0984)	(1.6679)
D95	0.28132*	0.23683*	2.1957*	1.7820*
	(3.0281)	(2.4440)	(2.5076)	(1.9933)
$\overline{R}$- squared	0.375	0.367	0.127	0.119
F	51.27	49.44	13.22	12.34
Diagnostic tests				
Functional form	42.2775*	41.7419*	0.71841	0.043604
Normality	493.6090*	474.1868*	174.6133*	175.7693*
H-cedasticity	-	-	3.3245	1.6808
VIF range	1.11-5.15	1.06-5.84	1.11-5.15	1.06-5.84

Notes: [a] t-statistics for equations (1) and (2) are based on White's (1980) heteroscedasticity-adjusted standard errors. t-statistics are in parentheses.
*, ** significant at the five and ten percent levels
Number of observations = 922
Source: Author's own estimates

Table 9.2

Structure and Performance in ASEAN Banking - Pooled Results [a]

	ROA (1)	VIF	ROA (2)	VIF	ROE (3)	VIF	ROE (4)	VIF
CONSTANT	1.8894* (7.6836)		1.8002* (6.9794)		30.3796* (14.2641)		29.7595* (13.4838)	
CR10	-0.0051145* (-2.4635)	1.2	-0.0021805 (-1.1178)	1.2	-0.085354* (-4.2854)	1.2	-0.062719* (-3.2428)	1.2
MSAS	0.088829* (5.6970)	5.2			0.69503* (4.6965)	5.2		
MSDEP			0.046211* (4.1749)	5.9			0.34420* (2.8727)	5.9
COSIN	-0.020879* (-11.5181)	1.1	-0.020723* (-11.2591)	1.1	-0.19335* (-12.4173)	1.1	-0.19183* (-12.1343)	1.1
GOVT	-0.48644* (-7.7807)	1.1	-0.41523* (-6.7914)	1.0	-5.5886* (-9.1759)	1.1	-5.0268* (-8.6107)	1.0
PCGNP	-0.0000353* (-11.3124)	1.2	-0.0003366* (-11.0808)	1.2	-0.000343* (-12.1060)	1.2	-0.000329* (-12.0043)	1.2
ASSETS	-0.0000406* (-4.1407)	4.9	-0.0000257* (-2.9974)	5.7	-0.000176* (-2.1172)	4.9	-0.0000466 (-0.53643)	5.7
LOANAS	0.0010649 (0.47666)	1.1	0.0003042 (0.13474)	1.2	0.017482 (0.96860)	1.1	0.010870 (0.59363)	1.2
EQAS	0.090335* (10.6551)	1.2	0.089303* (10.5448)	1.2	-0.16443* (-4.1936)	1.2	-0.17286* (-4.3544)	1.2
D92	-0.019392 (-0.19508)	2.1	-0.032886 (-0.32422)	2.1	0.21794 (0.23186)	2.1	0.098873 (0.10346)	2.1
D93	0.10033 (1.0630)	2.4	0.077082 (0.79618)	2.4	1.2212 (1.4156)	2.4	1.0191 (1.1536)	2.4
D94	0.11374 (1.2421)	2.6	0.091710 (0.97355)	2.6	1.0560 (1.2386)	2.6	0.85669 (0.98517)	2.6
D95	0.20098* (2.2244)	2.6	0.17822** (1.90022)	2.7	1.4517** (1.7368)	2.6	1.2394 (1.4394)	2.7
$\overline{R}$-square	0.495		0.484		0.295		0.283	
F	76.46		73.06		33.23		31.38	
Diagnostic Test Statistics								
Functional Form	18.7963*		21.5708*		0.57521		0.072270	
Normality	516.4397*		511.2076*		143.3838*		145.7592*	

Notes: [a] t-statistics are based on White's (1980) heteroscedasticity adjusted standard errors.
t-statistics are in parentheses.
*, ** significant at the 5 and 10 percent level respectively
Number of observations = 922

Source: Author's own estimates

from the parameter estimates. Firstly, it can be seen that, for each of the Equations (1) to (4), the null hypothesis that the residuals in the model are normally distributed cannot be accepted. The 1% critical chi-square value for 2 degrees of freedom is 9.21034, the 5% value is 5.99147, and the 10% value is 4.60517. The diagnostic test statistics for the normality test from our results are 516.4, 511.2, 143.3 and 145.7 and these are significantly high. However, as mentioned earlier, even though there is evidence that the disturbances are not normally distributed, the usual test procedures are still valid asymptotically provided that the sample size is sufficiently large - and our sample contains 922 ASEAN banks. Secondly, the values of the Ramsey RESET tests in Equations (1) and (2) are higher than the one percent critical chi-square value for one degree of freedom of 6.6349; thus the hypothesis that the functional form is linear in the model is rejected, suggesting that a linear functional form may be inappropriate to describe this relationship. However, in Equations (3) and (4), the test statistics of 0.57521 and 0.07227 are well below the critical chi-square values at the one and five percent levels, thus accepting the linear functional form of the model. Thirdly, in all cases the assumptions of homocedasticity are rejected at the one and five percent levels in an initial pass through the data.[37] We therefore use White's (1980) heteroscedasticity-adjusted standard errors in order to calculate all t-statistics for the significance of the estimated coefficients. Finally, for all the equations, it appears that there is no strong evidence of multicollinearity in the variables as indicated by the variance inflationary factor (VIF), with all variables having values less than the Marquardt (1980) critical value of 10. [38]

We will begin by analysing the results based on ROA as the performance measure; that

37 Our first estimates of heteroscedasticity are 108.2719, 107.0461, 46.3463 and 39.3337 which are all significant at the five percent levels.

38 MSA and ASSETS variables may be correlated but this does not appear to be apparent from the VIF factor.

is, in Equations (1) and (2) from Table 9.2. If we compare the two results, the sign for the concentration ratio (CR10) is negative in both Equations (1) and (2), implying that there is an inverse relationship between market concentration and banks' after-tax ROA in the ASEAN banking markets. Our results are consistent with the findings of Berger (1995), Lucey (1995) and Golberg and Rai (1996) who also reported results that run strongly contrary to the SCP paradigm's prediction of a positive coefficient. The variables that proxy for market power; that is, MSA and MSD, are both positive and significant, suggesting that banks with large market shares are able to gain higher profits, supporting the RMP hypothesis. A large market share may be obtained in various ways, such as branching and product differentiations that attract large numbers of customers. This finding is similar to that of Smirlock (1985), Evanoff and Fortier (1988) and Berger (1995) who also report similar results. Both Smirlock (1985) and Evanoff and Fortier (1988) however, do not include efficiency variable in their tests. The cost-to-income ratio (COSIN) which proxies for bank efficiency is negative and significant at the five percent level in both the equations, providing strong evidence for the notion that efficiency is also the driver of higher after-tax ROA in these banking markets, with lower cost-to-income ratios leading to higher profits and *vice versa*. The findings of these three equations, therefore, reject the traditional Structure-Conduct-Performance paradigm and support both the Relative Market Power and Relative Efficiency hypotheses.

In both of these equations, the coefficient for the dummy variable (GOVT) is negative and significant at the five percent level which suggests that, in ASEAN banking markets, government-owned banks earn smaller profits than their private counterparts. This is contrary to the findings of Molyneux and Thornton (1992) and Molyneux and Forbes (1995) who find that state-owned banks are more profitable than their private competitors. However, this finding has been confirmed in an earlier study by Short (1979) and Bourke

(1989) and is perhaps attributable to the fact that, as noted by Fry (1988), many of the state banks in developing countries allocate credit on the basis of development-priorities lending rather than credit worthiness which may lead to substantial amounts of non-performing loans depressing their profit margins. The coefficients for per capita income (PCGNP) are both negative and significant, supporting the maturity hypothesis. According to Golberg and Rai (1996) banking systems in countries with higher per capita incomes are assumed to operate in a mature environment, resulting in more competitive profit and interest margins. Our finding is similar to their study of European banking.

The coefficient for bank size (ASSETS) variable which control for cost differences also has a negative sign and are statistically significant in both Equations (1) and (2). This suggests that size-induced differences between banks may lead to lower after-tax ROA. Increased diversification implies less risk and hence a lower required returns. The variable that proxies for firm-specific risk, the loans-to-assets ratio (LOANAS) is positive but insignificant in both the equations suggesting that asset composition in the form of loans has little impact on profitability. This is contrary to the results found in previous studies (*e.g.* Rhoades, 1985 and Evanoff and Fortier, 1988). The coefficient on capital structure (EQAS) variable is both positive and statistically significant, suggesting that the greater the equity stake in capital, the higher the ROA. The result of EQAS is similar to the results reported by Molyneux (1993), Molyneux and Teppett (1993) and Molyneux and Forbes (1995). According to Molyneux (1993), the positive impact of capital structure on profitability indicates that the cost of equity capital is relatively cheap. In contrast, Evanoff and Fortier (1988) find that this ratio is negative and significant .

The dummy year variables show that ROA has not changed significantly over the years, except for 1995 where the t-test for D95 is significant at the five percent level for both equations. This would imply that there is no evidence of a major shift in levels during the period nor of a trend in the data .[39] Finally, the explanatory power of these two equations is quite good with the adjusted r-squared at 49.5 percent and 48.4 percent respectively. This is in fact higher than that of Berger (1995) and Golberg and Rai (1996) who reported around 10 percent. Molyneux and Forbes (1995) however, reported an adjusted r-squared of around 23 percent to 46 percent.

Next, we analyse the results of Equations (3) and (4), shown in Table 9.2 which use ROE as the performance measure. Comparing the two results, we find that the coefficient for the concentration ratio (CR10) variable is negative and statistically significant, contrary to the SCP paradigm's prediction of a positive coefficient, while those of the market share (MSA and MSD) variables are positive and significant. The findings of these two equations, therefore, reject the traditional SCP paradigm and accept the RMP hypothesis that banks with large market shares are able to gain higher profits in the ASEAN banking markets. Bank efficiency (COSIN) variable is negative and statistically significant in both equations which provides strong support for the notion that efficiency also helps to explain the link between structure and performance in these markets, as predicted by the Relative Efficiency hypothesis. These results which reject the traditional SCP paradigm and support both the RMP and RE hypotheses are similar to those using ROA as the performance measure.

The coefficient for the government ownership (GOVT) variable in the two equations is negative and significant, suggesting that government-owned banks earn smaller profits

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[39] We run the F-tests for these equations and the F-tests are 2.72 for Equation (1) and 2.25 for Equation (2). The 5% critical value for and F-distribution with the relevant degrees of freedom is 2.37 so only in Equation (1) we reject the null hypothesis of no yearly effects in the data. Refer to Appendix 4.

than their private counterparts. The coefficient for per capita income (PCGNP) is both negative and significant, supporting the maturity hypothesis that banking systems that operate in a mature environment have more competitive profit margins. These two results are similar to those found earlier.

Bank size (ASSETS) variable is negative and significant in Equation (3) and negative but insignificant in Equation (4). The former suggests that increased diversification leads to lower risk and thus lower returns while the latter indicates that size-induced differences between banks have no impact on a bank's after-tax ROE. The result of the loans-to-assets ratio (LOANAS) is similar to those for Equations (1) and (2): positive but not significant, suggesting that loan composition has little impact on profitability. The coefficient for EQAS is sensitive to whether ROA or ROE is used as the performance measure. When ROE is the dependent variable, the coefficient for EQAS is negative and significantly different from zero at the five percent level. This is contrary to our earlier findings for Equations (1) and (2) of a positive coefficient. The negative and significant EQAS suggests that lower ratios indicate a relatively more risky position leading to higher returns. This is also similar to that of Molyneux (1993) who found that the strong positive relationship between equity-to-assets ratio and ROA disappeared when ROE was used as the dependent variable.

The dummy variables for the yearly estimates also confirm that there were no major shifts in levels during the period under study. The t-statistics are all insignificant except for 1995 in Equation (3).[40] Finally, our results show that the explanatory power of these two equations is much lower than that of the ROA equations: 29.5 percent in Equation (3) and

[40] The F-test for Equations (3) and (4) are 1.44 and 1.07 respectively suggesting that there are no yearly effects in the data; that is, the estimates over the years are not statistically different (see Appendix 4)

28.3 percent in Equation (4). This result is consistent with the the previous studies for example, Bourke (1989) and Molyneux (1993). However, our estimates contradict Smirlock (1985) who found similar results employing either of three profit measures, *i.e.*; return on equity, return on capital or return on assets. Goldberg and Rai (1996) find little difference between the results using ROA and ROE as the performance measure.

To conclude, it can be seen from our pooled estimates that there is strong evidence that both market share and bank efficiency can explain the performance of individual banks in the ASEAN markets between 1991 and 1995, thus confirming the predictions of the RMP hypothesis and the RE hypothesis. However, the link between market structure and performance that was assumed within the SCP paradigm, is not present amongst ASEAN banks. Thus, these results show little evidence of anti-competitive behaviour in ASEAN banking and indicate that market concentration is not the signal of collusive behaviour but rather the result of the efficient operation of large banks, particularly of private banks which obtain a large market share, leading to high concentration.

The coefficient for the government ownership (GOVT) variable exerts a negative statistically significant impact on bank performance implying that government-owned banks earn smaller profits than their private counterparts in the ASEAN banking markets. Banks operating in a competitive environment earn smaller profits as evidenced by the negative and significant coefficients for per capita income (PCGNP). The coefficient for the size variable (ASSETS) is negative and significant in three out of the four equations, suggesting that increased diversification leads to lower risks and therefore to lower returns. Asset composition in the form of loans has little impact on profitability as evidenced by the loans-to-assets ratio (LOANAS) which is positive but insignificant. We also find that the equity-to-assets ratio (EQAS) is sensitive to whether ROA or ROE is used as the performance indicator - positive and statistically significant when ROA is used and negative and significant when ROE is used.

There is also evidence that there is less explanation of ROE than of ROA in this context. Despite the fact that our estimations do not fulfill the normality requirements of residuals, by and large our results can still be taken as providing evidence that both the RMP and RE hypotheses explain profitability in the ASEAN banking markets, given the large sample size. There are no substantial yearly effects in our estimates, and the estimates over the years are not significantly different.

9.3.2 Yearly Estimates

We then investigate further, using yearly estimates for 1991 to 1995, to confirm our earlier findings that, during this period, there were no significant yearly effects in the data estimated for ASEAN banking markets. The sample size for 1991 is 101 and is 160 for 1992, 205 for 1993, 233 for 1994 and 223 for 1995. The estimates for all years using ROA as the dependent variable are shown in Tables 9.3 and 9.4 and the estimates using ROE as the performance measure are shown in Tables 9.5 and 9.6. Equations (1) and (3) in Tables 9.3 and 9.5 utilise MSA and Equations (2) and (4) in Tables 9.4 and 9.6 use MSD as a proxy for market power.

We will first focus on ROA as the performance measure, as shown in Tables 9.3 and 9.4. Before drawing inferences from the parameter estimates, we first consider some general observations from these two tables. Firstly, for both Equations (1) and (2), the diagnostic tests for normality, that the residuals in the model are normally distributed, cannot be accepted as all the chi-square values are significantly high. However, our sample size for

Table 9.3

Structure and Performance Relationship - Yearly Results (ROA as the dependent variable [a])

Dependent variable is ROA (1)

	1991	1992	1993	1994	1995
Constant	2.3946**	2.4787*	2.3428*	1.2400*	1.9565*
	(1.8401)	(3.9905)	(5.9380)	(3.9262)	(5.9063)
CR10	-0.022066*	-0.0082057*	-0.0028465	-0.0030917	0.0016900
	(-2.6083)	(-2.1150)	(-0.68516)	(-0.65938)	(0.44985)
MSAS	0.18838*	0.14939*	0.13227*	0.10506*	0.048266*
	(2.4175)	(2.5016)	(3.7357)	(3.6040)	(2.0141)
COSIN	-0.019185*	-0.022477*	-0.025309*	-0.021762*	-0.019589*
	(-2.8181)	(-5.0804)	(-7.0558)	(-6.8500)	(-7.8291)
GOVT	-0.88571*	-0.69082*	-0.59421*	-0.39870*	-0.26301*
	(-3.1925)	(-3.8716)	(-5.7600)	(-3.9450)	(-2.8353)
PCGNP	-0.0000663*	-0.0000405*	-0.00003794*	-0.00003214*	-0.00003337*
	(-3.8128)	(-4.2129)	(-4.8254)	(-6.1794)	(-7.4495)
ASSETS	-0.000141**	-0.0001174**	-0.00008018*	-0.00003337*	-0.0000113
	(-1.8879)	(-1.9909)	(-2.6803)	(-2.1507)	(-0.95317)
LOANAS	0.0059916	0.0009890	0.0019109	0.0067042*	-0.0054256
	(0.56877)	(0.14963)	(0.49560)	(2.2455)	(-1.3953)
EQAS	0.11544*	0.068117*	0.065763*	0.11207*	0.098311*
	(3.1518)	(4.4010)	(3.6650)	(12.1787)	(6.3723)
$\overline{R}$- squared	0.447	0.419	0.476	0.564	0.560
F	11.13	15.38	24.17	38.60	36.33
n	101	160	205	233	223
Diagnostic Tests Statistics					
Functional Form	0.46488	3.1579	0.63875	0.10612	2.5310
Normality	127.5835*	135.3464*	53.2973*	17.4369*	481.2431*
VIF Range	1.2-7.9	1.2-7.5	1.2-6.5	1.1-6.9	1.1-6.3

Notes: [a] t-statistics are based on White's (1980) heteroscedasticity-adjusted standard errors
t-statistics in parentheses
*, ** significant at the five and ten percent level respectively

Source: Author's own estimates

Table 9.4

Structure and Performance Relationship - Yearly Results (ROA as the dependent variable [a])

Dependent variable is ROA (2)

	1991	1992	1993	1994	1995
Constant	2.4408 (1.5733)	2.4434* (3.6456)	2.2077* (5.5468)	1.0735* (3.4024)	1.8677* (5.4138)
CR10	-0.015295** (-1.7158)	-0.0040521 (-1.0172)	0.0009167 (0.22301)	0.0004126 (0.089563)	0.0034161 (0.94194)
MSDEP	0.069408 (1.6568)	0.089008* (2.4254)	0.075246* (3.1057)	0.052016* (2.3259)	0.030865 (1.5226)
COSIN	-0.018433* (-2.3178)	-0.023128* (-5.1083)	-0.025294* (-6.8816)	-0.021327* (-6.6498)	-0.019279* (-7.6948)
GOVT	-0.65140* (-2.1521)	-0.51858* (-2.9354)	-0.50494* (-4.8167)	-0.33709* (-3.3847)	-0.23629* (-2.6079)
PCGNP	-0.0000614* (-3.6462)	-0.0000379* (-3.9484)	-0.00003437* (-4.5184)	-0.00002991* (-6.0562)	-0.00003284* (-7.3286)
ASSETS	-0.00006489 (-1.6147)	-0.0000942* (-2.0770)	-0.00005982* (-2.4083)	-0.00001581 (-1.0385)	-0.000008572 (-0.65726)
LOANAS	0.0005313 (0.044782)	-0.0008834 (-0.13244)	0.0008356 (0.21756)	0.0060315* (2.0047)	-0.0057265 (-1.4671)
EQAS	0.10706* (2.7115)	0.063536* (4.1143)	0.064357* (3.6404)	0.11200* (12.1366)	0.098644* (6.3570)
$\bar{R}$- squared	0.392	0.398	0.456	0.554	0.557
F	9.06	14.16	22.43	37.13	36.0
n	101	160	205	233	223
Diagnostic Tests Statistics					
Functional Form	0.98924	6.9882*	0.75699	0.039329	2.7705
Normality	101.5546*	126.0583*	50.0659*	18.8240*	470.6070*
VIF Range	1.2-7.8	1.1-8.0	1.1-7.6	1.1-8.0	1.1-8.9

Notes: [a] t-statistics are based on White's (1980) heteroscedasticity-adjusted standard errors.
t-statistics in parentheses
*, ** significant at the five and ten percent level respectively
Source: Author's own estimates

each year is quite large. Secondly, for Equation (2), all years except 1992 are satisfactory from the point of view of functional form, accepting a linear functional form of the model. Thirdly, for both Equations (1) and (2), the assumptions of homocedasticity in the residual variance are rejected. [41] Therefore, we report the results based on White's (1980) heteroscedasticity-adjusted standard errors in order to calculate all t-statistics for the significance of the estimated coefficients. Finally, it appears that there is no strong evidence of multicollinearity between independent variables as all the variance inflationary factors (VIF) have values of less than 10.

The overall results for 1991 through 1995 show that the estimates from year to year are quite stable, as confirmed in our earlier findings, which show no yearly effects in our results. None of the equations is there evidence that there is support for the SCP paradigm to explain the link between structure and performance as indicated by the coefficients for concentration (CR10). The coefficients are negative and significant in 1991 and 1992 for Equation (1), and in 1991 for Equation (2), contrary to the prediction of the SCP paradigm of a positive coefficient. The coefficients are negative but insignificant in 1993 and 1994 for Equation (1), and in 1992 for Equation (2). For Equation (1), CR10 is positive but insignificant in 1995 and for Equation (2) in 1993, 1994 and 1995. Thus, these results provide little support for the traditional SCP paradigm in ASEAN banking markets between 1991 and 1995. For Equation (1), the coefficients that proxy for market power, MSA, are all positive and significant, suggesting that bank performance is attributable to the bank's market share as assumed under the RMP hypothesis. However, for Equation (2), the coefficients for MSD are positive and significant only in 1992, 1993 and 1994, implying a similar prediction for RMP in these banking markets during these

41 The original estimates show that the chi-square values are significantly higher at the five and ten percent levels; *i.e.*, at 9.7214, 6.5410, 49.2669, 12.0530, and 6.6154 for Equation (1) and 12.0569, 7.1186, 46.5122, 11.2790, and 6.8053 for Equation (2).

three years. The yearly results provide strong evidence that banks with large market shares are able to gain higher profits as predicted by the RMP hypothesis. The coefficients for cost-to-income ratio (COSIN) are negative and significant at the five percent level for both the equations, in all years, as shown in Tables 9.3 and 9.4, supporting the Relative Efficiency hypothesis. Overall, the findings of these three variables are similar to our pooled data.

The coefficients for government ownership (GOVT) presented in Tables 9.3 and 9.4 are negative and significant for both Equations (1) and (2), thereby suggesting that government-owned banks earn smaller profits than their private counterparts. The per capita income (PCGNP) variable which proxies for market demand conditions are all negatively related to ROA supporting the maturity hypothesis; countries with higher per capita incomes are assumed to have a banking system that operates in a mature environment resulting in more competitive profit margins. These two findings also confirm our earlier results with pooled data.

In Equation (1), the coefficients for ASSETS are negative and significant in all years except 1995, suggesting that during 1991 to 1994, increased diversification has led to lower risks and therefore lower returns and in 1995, ASSETS show no significant effect on ROA. For Equation (2), shown in Table 9.4, these coefficients are negative but only significant in 1992 and 1993 whereas negative yet insignificant in 1991, 1994 and 1995. LOANAS shows a positive and significant relationship in 1994 for both Equations (1) and (2). However, there is an inverse relationship between the loans-to-assets ratio and banks' ROA in 1995 for Equations (1) and in 1992 and 1995 for Equation (2), suggesting that banks with high loans-to-assets ratios possibly also had high funding costs which reduced the impact on profitability. The equity-to-assets ratio (EQAS) shows a positive, statistically significant relationship with ROA in all years for both Equations (1) and (2), suggesting that the greater the equity stake in capital, the higher the ROA. Finally, the explanatory power for these two equations is reasonably good, with the adjusted r-squared ranging between 41.9 percent and 56.4 percent in Equation (1) and 39.2 percent and 55.7 percent in Equation (2).

We next, consider the results using ROE as the performance measure which are presented in Tables 9.5 and 9.6 below. The general observation regarding these two tables are discussed before any inferences on the parameter estimates are drawn. Firstly, the diagnostic test for normality is rejected in all the years except 1994 for Equation (3). Secondly, the values of the Ramsey RESET tests are not within the acceptance region in 1991-1993 for Equation (3), and in 1992 and 1993 for Equation (4), thus rejecting a linear functional form in the model. Thirdly, the assumption of homocedasticity in the residual variance in all years is rejected except in 1991 and 1995 for Equation (3) and in 1995 for Equation (4). Therefore we present the results for Equation (3) in 1992, 1993 and 1994 and for Equation (4) in 1991-1994 based on White's (1980) heteroscedasticity-adjusted standard errors. Finally, in none of the years does multicollinearity appear to be evident, as all the VIF are well below the critical value of 10.

Considering the results shown in Table 9.5, we find that there is an inverse relationship between concentration and ROE for 1991, 1992, 1993 and 1995 contrary to the prediction of the SCP paradigm. However, in 1994, it appears that there is support for the SCP paradigm as shown by the positive and significant coefficient for CR10. Table 9.6 shows that these coefficients are negative but insignificant in all years. These results suggest that there is little evidence that the traditional SCP paradigm holds. The coefficients for market power variables, MSA, are positive and significant in all years except 1995 in Table

Table 9.5

Structure and Performance Relationship - Yearly Results (ROE as the dependent variable [a])

Dependent variable is ROE (3)

	1991	1992	1993	1994	1995
Constant	25.1072* (3.9114)	33.3201* (6.0018)	31.0135* (10.4623)	26.5801* (7.5352)	34.9175* (12.3437)
CR10	-0.12477* (-2.1106)	-0.10846* (-2.4957)	-0.078241* (-2.1968)	-0.10233* (1.9998)	-0.050058 (-1.4410)
MSAS	2.0662* (4.4177)	1.1632* (2.0299)	1.0973* (3.5624)	0.88436* (3.1792)	0.26986 (0.91151)
COSIN	-0.20549* (-4.1335)	-0..20364* (-4.8113)	-0.21052* (-7.3728)	-0.18908* (-6.7027)	-0.18340* (-7.7959)
GOVT	-8.1969* (-3.8006)	-8.6650* (-5.2054)	-6.6129* (-6.0601)	-4.7684* (-4.2087)	-3.5381* (-3.2267)
PCGNP	-0.0006059* (-3.6271)	-0.0004126* (-5.1539)	-0.0004027* (-6.3911)	-0.0003226* (-5.8366)	-0.0002849* (-4.5631)
ASSETS	-0.0014158* (-3.3646)	-0.0008145 (-1.4429)	-0.0004891* (-2.0217)	-0.0001305 (-0.98517)	0.00006803 (0.47355)
LOANAS	0.10700** (1.7390)	0.032253 (0.55110)	0.049074 (1.5684)	0.070759* (2.3591)	-0.057258* (-2.0144)
EQAS	0.11295 (0.68728)	-0.23053* (-2.1603)	-0.22982* (-3.2890)	-0.047224 (-0.58612)	-0.24384* (-3.2740)
$\bar{R}$- squared	0.274	0.277	0.368	0.289	0.302
F	5.74	8.62	15.89	12.81	13.04
n	101	160	205	233	223
Diagnostic Tests Statistics					
Functional Form	7.5409*	9.6458*	6.1354*	0.0080777	0.41132
Normality	11.7765*	51.6402*	21.0619*	1.6934	93.2244*
Heteroscedas-ticity	1.5973	-	-	-	0.0040005
VIF Range	1.2-7.9	1.2-7.5	1.2-6.5	1.2-6.9	1.1-6.3

Notes: [a] t-statistics for 1992, 1993 and 1994 are based on White's (1980) heteroscedasticity-adjusted standard errors.
t-statistics in parentheses
*, ** significant at the five and ten percent level respectively
Source: Author's own estimates

Table 9.6

Structure and Performance Relationship - Yearly Results (ROE as the dependent variable[a])

Dependent variable is ROE (4)

	1991	1992	1993	1994	1995
Constant	24.0439* (2.0427)	32.6139* (5.4979)	30.1245* (10.1513)	25.3667* (7.1660)	34.3998* (11.9298)
CR10	-0.043758 (-0.62414)	-0.073582 (-1.6416)	-0.049034 (-1.3868)	-0.074692 (-1.4770)	-0.040289 (-1.1881)
MSDEP	0.95283* (2.1223)	0.77763** (1.9205)	0.53553* (2.2870)	0.34793 (1.3757)	0.18247 (0.67574)
COSIN	-0.20158* (-2.7776)	-0.21009* (-4.8466)	-0.20857* (-7.1085)	-0.18365* (-6.4072)	-0.18180* (-7.7672)
GOVT	-5.5654* (-2.0486)	-7.3693* (-4.9960)	-5.8381* (-5.4561)	-4.2366* (-3.7870)	-3.3912* (-3.1430)
PCGNP	-0.0005603* (-4.2419)	-0.0003988* (-4.7718)	-0.0003670* (-5.9130)	-0.0003006* (-5.7383)	-0.0002823* (-4.5194)
ASSETS	-0.000789 (-1.4747)	-0.0007091 (-1.4373)	-0.0002442 (-1.1730)	0.00007957 (0.43553)	0.00007747 (0.45074)
LOANAS	0.063668 (0.62805)	0.022435 (0.38100)	0.036924 (1.1890)	0.062718* (2.0760)	-0.058664* (-2.0546)
EQAS	0.036692 (0.14211)	-0.26359* (-2.4691)	-0.24071* (-3.3836)	-0.047895 (-0.59461)	-0.24182* (-3.2391)
$\bar{R}$- squared	0.178	0.244	0.342	0.275	0.301
F	3.71	8.15	14.31	12.01	12.97
n	101	160	205	233	223
Diagnostic Tests Statistics					
Functional Form	1.2910	4.6477**	5.4715*	0.47958	0.68018
Normality	8.4212*	46.1635*	21.3146*	2.7093	90.7272*
Heteroscedasticity	-	-	-	-	0.0082462
VIF Range	1.2-7.8	1.1-8.0	1.1-7.6	1.1-8.0	1.1-8.9

Notes: [a] t-statistics for 1991,1992, 1993 and 1994 are based on White's (1980) heteroscedasticity-adjusted standard errors.
t-statistics in parentheses
*, ** significant at the five and ten percent level respectively
Source: Author's own estimates

9.5, providing strong evidence that RMP also helps to explain the profit-structure relationship in ASEAN banking markets. However, for Equation (4), MSD is positive and significant only in 1991, 1992 and 1993 while it is positive but statistically insignificant for the other two years, 1994 and 1995. The cost-to-income ratio which is a proxy for bank efficiency, is consistently negative and significant in all years both for Equations (3) and (4) confirming the results using pooled estimates. These findings show that the parameter estimates concerning concentration, market share and bank efficiency are not significantly different between 1991 and 1995.

We find that the relationship between ROE and both government ownership (GOVT) and the variable that proxies for market demand conditions (PCGNP) are the same in all years for both equations, negative and significant. This suggests that during these years, government-controlled banks earned smaller profits than their private counterparts and the negative and significant PCGNP supports the maturity hypothesis that the banking systems of countries with a higher per capita income operate in a mature environment resulting in more competitive profit margins.

The coefficients for the size variable (ASSETS) are rather mixed - negative and significant in 1991 and 1993, negative but not significant in 1992 and 1994 but positive and not significant in 1995 for Equation (3). For Equation (4) in Table 9.6, we find that ASSETS is negative but insignificant in 1991, 1992 and 1993 and positive but not significant in 1994 and 1995. The loans-to-assets ratio (LOANAS) shows similar results. For Equation (3), for example, the coefficients are positive and significant in 1991 and 1994, positive but insignificant in 1992 and 1993 and negative and significant in 1995. For Equation (4) in 1994, the coefficients for LOANAS are positive and significant, positive and insignificant for 1991, 1992 and 1993 whereas negative and significant in 1995.

Therefore, it is rather difficult to draw conclusions regarding these two variables. However, the strong positive relationship between the equity-to-assets ratio disappears when ROE is the dependent variable, consistent with our pooled data. The coefficients for EQAS are negative and significant in 1992, 1993 and 1995 for both Equations (3) and (4) and positive but insignificant in 1991 and negative but not significant in 1994 for both equations. The positive and significant EQAS suggests that the greater the equity stake in capital, the higher the ROE whereas the negative and significant coefficient for EQAS would imply that lower capital ratios indicate a relatively more risky position leading to higher returns.

Finally, the explanatory power of Equations (3) and (4) is lower than in the ROA equations with adjusted r-squared ranging from 27.4 percent to 36.8 percent for Equation (3) and from 17.8 percent to 34.2 percent for Equation (4). This is consistent with our results when we pooled the data for all the years concerned.

To summarise, overall, the yearly estimates show that there are no strong yearly shifts during the period under study. There is strong evidence that both market share and efficiency can explain the structure performance relationship in ASEAN banking markets and this supports the predictions of the RMP and RE hypotheses. However, there is no support for the traditional SCP paradigm to explain the link between market structure and performance in these banking markets between 1991 and 1995.

The coefficients for government ownership (GOVT), per capita income (PCGNP) are always negative and significant confirming the pooled estimates. In the majority of cases, size-induced differences between banks may lead to lower returns, as indicated by the negative and significant coefficients for bank size, ASSETS. The variable that proxies for asset composition in the form of loans (LOANAS) has little impact on profitability whereas the equity-to-asset ratio (EQAS) appears to be sensitive whichever performance is used as the dependent variable. It is positive and significant when ROA is the dependent variable and changes sign to negative and significant when ROE is used as the performance measure.

The explanatory power of ROA as the performance measure is greater than that of ROE, suggesting that there is less explanation of ROE than ROA in this context. This has also been shown in our pooled results, confirming earlier studies by Bourke (1989) and Molyneux (1993) although these two authors do not incorporate a direct efficiency measure in their regression models.

9.3.3 Individual Country Estimates

We further examine the link between concentration, market share and efficiency for each individual country in ASEAN. Data for individual countries are pooled for the five-year period. Estimations cannot be made for each individual year because we have only one concentration measure (*i.e.*, CR10) for each year and likewise for the country specific variable, the per capita income (PCGNP). Pooling the sample enables us to vary the concentration measure and the per capita income. In the case of the Singapore banks, we run the regression without the dummy variable for government ownership (GOVT), since all the sample banks for Singapore are privately-owned. Thus, we have 61 sample banks for Singapore, 203 for Malaysia, 173 for Thailand, 130 for the Philippines and 355 for Indonesia.

Tables 9.7 and 9.8 illustrate the results using ROA as the performance indicator whichever proxy (MSA or MSD) is adopted for market power while Tables 9.9 and 9.10 present the results using ROE as the dependent variable. We must first consider some general observations before drawing any statistical inferences from the parameter estimates. Firstly, in Tables 9.7 and 9.8, the normality of residuals cannot be accepted for any of the country estimates except for Singapore. A similar situation can be seen in Tables 9.9 and 9.10. Secondly, the values of the Ramsey RESET tests fall within the acceptance region for Singapore and Indonesia in Table 9.7 and Table 9.8. In Tables 9.9 and 9.10, these values also fall within the acceptance region for Singapore, Indonesia and Malaysia which indicates that a linear functional form is appropriate to describe this relationship in the countries mentioned. Thirdly, the assumption of homocedasticity is rejected in all cases except for Singapore in Table 9.7 and Table 9.8. In Tables 9.9 and 9.10, this assumption is also rejected for all countries except Malaysia, Thailand and Indonesia. Therefore, the results shown in Tables 9.7 and 9.8 for Malaysia, Thailand, the Philippines and Indonesia are based on White's (1980) heteroscedasticity-adjusted standard errors in order to calculate all t-statistics for the significance of the estimated coefficients. Similarly, the results for Singapore and the Philippines in Tables 9.9 and 9.10 are based on adjusted standard errors. Finally, multicollinearity seems evident in all cases except that of the Philippines, shown in Table 9.10, as the VIF are greater than the Marquardt (1980) critical value of 10.

We will begin analysing the results based on ROA as the performance indicator. It can be seen from Tables 9.7 and 9.8 that the link between market structure and performance that was assumed within the SCP paradigm is not present in each of the ASEAN banking markets. The coefficients of CR10 are positive but insignificant for Singapore, negative but insignificant for Malaysia, negative and significant for Thailand, negative and insignificant for the Philippines and positive but insignificant for Indonesia. Similarly, there

Table 9.7

Structure and Performance Relationship - Individual Country Results (ROA as the dependent variable[a])

	Singapore	Malaysia	Thailand	Philippines	Indonesia
Constant	-0.68268 (-0.40364)	2.3721** (1.6628)	22.1403* (3.3536)	9.3649* (2.0271)	-1.4805 (-0.91492)
CR10	0.012995 (0.50408)	-0.052386 (-1.3401)	-0.21401* (-2.8485)	-0.052974 (-0.67174)	0.016558 (1.0382)
MSAS	0.0186880 (0.82257)	-0.033835 (-1.2445)	-0.086219* (-2.6784)	0.028102 (0.51236)	0.049708 (1.0928)
COSIN	-0.015573* (-4.4992)	-0.010754* (-4.7266)	-0.043309* (-10.6519)	-0.058663* (-9.1815)	-0.014845* (-6.5575)
GOVT	-	-0.11889** (-1.6857)	-0.59025* (-2.3124)	-0.23083 (-1.2733)	-0.46377* (-4.3552)
PCGNP	0.00000207 (0.16707)	0.0002163* (3.0571)	-0.0028703* (-2.8384)	-0.0002167 (-0.29571)	0.0016878* (3.0548)
ASSETS	-0.0000019 (-0.11220)	0.00001989 (1.3516)	0.00001251 (0.99322)	-0.0001039 (-0.96931)	-0.00002170 (-0.58058)
LOANAS	0.013053* (2.5885)	0.0001321 (0.066646)	0.0012622 (0.098659)	-0.011371 (-1.5632)	0.0043107 (1.3561)
EQAS	0.075778* (6.6032)	0.068154* (4.0918)	0.068462* (2.7756)	0.044791* (2.7472)	0.077045* (8.9399)
$\bar{R}$-squared	0.641	0.306	0.661	0.656	0.590
F	16.3	12.16	42.93	31.76	62.2
n	61	203	173	130	355
Diagnostic Test Statistics					
Functional Form	2.4873	5.2025*	6.6287*	5.1022*	0.30200
Normality	0.74827	7.8319*	142.4023*	8.9904*	306.5601*
Heteroscedasticity	2.9119	-	-	-	-
VIF Range	1.0-19.0	1.0-17.6	1.0-69.4	1.1-13.1	1.1-33.8

Notes: [a] t-statistics for all countries except Singapore are based on White's (1980) heteroscedasticity - adjusted standard errors.
t-statistics in parentheses
*, ** significant at the five and ten percent level respectively
Source: Author's own estimates

Table 9.8

Structure and Performance Relationship - Individual Country Results (ROA as the dependent variable [a])

	Singapore	Malaysia	Thailand	Philippines	Indonesia
Constant	-0.93531 (-0.55597)	2.3904** (1.6772)	22.4922* (3.3991)	9.9705* (2.1796)	-1.4490 (-0.90908)
CR10	0.015034 (0.59024)	-0.053534 (-1.3754)	-0.21838* (-2.9035)	-0.057053 (-0.72846)	0.016672 (1.0457)
MSDEP	0.022754 (1.4424)	-0.012934 (-0.73969)	-0.084740* (-2.6999)	-0.022944 (-0.83720)	0.028468 (0.95743)
COSIN	-0.015374* (-4.5031)	-0.010617* (-4.7314)	-0.042817* (-10.4946)	-0.058452* (-9.2808)	-0.015077* (-6.7892)
GOVT	-	-0.12046** (-1.7140)	-0.63544* (-2.5591)	-0.23545 (-1.2431)	-0.43459* (-4.0356)
PCGNP	0.00000687 (0.55428)	0.0002221* (3.2195)	-0.0029417* (-2.9024)	-0.0005540 (-0.82865)	0.0016518* (3.1494)
ASSETS	-0.0000091 (-0.60423)	0.00001595 (0.84404)	0.00002506 (1.4414)	-0.000006010 (-0.076458)	-0.000003644 (-0.12862)
LOANAS	0.012576* (2.5467)	0.00008559 (0.043293)	0.0013854 (0.10835)	-0.012185** (-1.6531)	0.0043518 (1.3461)
EQAS	0.078230* (6.7933)	0.068439* (4.1203)	0.068486* (2.7619)	0.043801* (2.6860)	0.076865* (9.0726)
$\bar{R}$-squared	0.650	0.306	0.662	0.656	0.580
F	19.96	12.13	43.14	31.83	62.24
n	61	203	173	130	355
Diagnostic Test Statistics					
Functional Form	2.2025	5.1311*	6.7941*	5.7045*	0.37403
Normality	0.95854	7.9907*	158.1170*	8.3536*	317.4097*
Heteroscedasticity	2.2553	-	-	-	-
VIF Range	1.0-15.0	1.0-17.0	1.0-69.1	1.1-6.3	1.1-12.8

Notes: [a] t-statistics for all countries except Singapore are based on White's (1980) heteroscedasticity-adjusted standard errors.
t-statistics in parentheses
*, ** significant at the five and ten percent levels respectively

Source: Author's own estimates

is also no strong evidence that RMP helps to explain profitability in all the ASEAN markets. The coefficients based on MSA are positive but not statistically significant in Singapore, the Philippines and Indonesia and when MSD is used, they are positive but insignificant in Singapore and Indonesia. However, the coefficients for both MSA and MSD are negative and significant for Thailand, and negative but not significant for Malaysia, suggesting an inverse relationship between market share and after-tax ROA. These unsatisfactory findings may be explained by the fact that when estimations are made for each individual country, multicollinearity in the variables seems evident or else the model applied for each of the country concerned may not be appropriate. However, the cost-to-income ratio which is a proxy for bank efficiency is negative and significant in all the ASEAN banking markets suggesting that efficiency explains the link between market structure and performance in the individual market during the period under study, as predicted by the Relative Efficiency hypothesis. The findings on the above three variables, concentration, market share and bank efficiency, therefore, reject the Structure-Conduct-Performance paradigm and the Relative Market Power hypothesis and support the Relative Efficiency hypothesis for all the five ASEAN banking markets.

The dummy variables for GOVT, as shown in Tables 9.7 and 9.8, are negative and significant for Malaysia, Thailand and Indonesia, suggesting that in these countries, government-owned banks earn smaller profits than their private counterparts. These coefficients are negative but not significant for the Philippines. The per capita income, PCGNP is positive and significant for Malaysia and Indonesia using either MSA or MSD as proxies of market power which suggests that the greater the demand for financial services in these countries, the greater the ROA. In Thailand, the coefficients are negative and significant, indicating support for the maturity hypothesis. According to Tables 9.7 and 9.8, in Singapore, the PCGNP is positive but insignificant and in the Philippines, the coefficient for PCGNP is negative but insignificant.

From Tables 9.7 and 9.8, we can see that size-induced differences between banks in the ASEAN countries have no significant impact on the ROA as shown by the variable ASSETS. The coefficients for ASSETS are negative but insignificant for Singapore, the Philippines and Indonesia and positive but not significant for Malaysia and Thailand. The loans-to-assets ratio are positive and significant for Singapore suggesting that the greater the proportions of loans banks have in their balance sheets, the higher the ROA. In the Philippines, it appears that there is an inverse relationship between LOANAS and ROA, indicating that loan books incur greater funding costs which depress banks' profitability in this country. For the other ASEAN countries, it appears that loan composition has no significant impact on profitability. The equity-to-assets ratio are positive and significant for all ASEAN countries, as shown in Tables 9.7 and 9.8, implying that the greater the equity stake held by banks in these countries the higher the ROA. Finally, the tables show that the adjusted r-squared is reasonably high in most countries; 66 percent in Thailand and the Philippines, 64 and 65 percent in Singapore, 58 and 59 percent in Indonesia, but quite low in Malaysia at 31 percent.

Next, we analyse the results based on ROE as the performance indicator which are presented below in Tables 9.9 and 9.10. Similar results are found for CR10: positive but insignificant for Singapore and Indonesia, negative but insignificant for Malaysia and the Philippines and negative and significant for Thailand in both Tables 9.9 and 9.10. This indicates that the traditional SCP paradigm is not supported in any of these countries during the period under consideration. In the Philippines, market share (MSA and MSD) is positive and significantly related to ROE and in Singapore market share (MSD) is also positive and significant at the ten percent level, supporting the RMP hypothesis that banks

Table 9.9

Structure and Performance Relationship - Pooled Individual Country Results (ROE as the dependent variable [a])

	Singapore	Malaysia	Thailand	Philippines	Indonesia
Constant	5.8481 (0.42790)	28.3476 (1.3839)	233.8237* (3.3335)	82.9658* (2.3339)	-5.0216 (-0.37536)
CR10	0.076839 (0.40296)	-0.29015 (-0.52791)	-2.1777* (-2.6923)	-0.51089 (-0.85545)	0.17002 (1.1786)
MSA	0.15888 (0.94070)	-0.88613 (-1.1197)	-0.74763 (-1.5793)	1.4831* (3.3441)	0.58394 (0.96638)
COSIN	-0.13213* (-3.6191)	-0.11595* (-3.5590)	-0.45985* (-12.4361)	-0.42239* (-8.6895)	-0.11549* (-7.4065)
GOVT	-	-2.0854* (-2.0144)	-6.4892* (-3.2412)	-9.1430* (-8.0529)	-4.1178* (-4.2414)
PCGNP	0.00002378 (0.23914)	0.0030188* (2.8325)	-0.029377* (-2.7775)	-0.0052224 (-1.0203)	0.014492* (3.1637)
ASSETS	-0.000008319 (-0.065357)	0.0005590 (1.3549)	0.0001950 (1.0388)	-0.0016288** (-1.7366)	-0.0000985 (-0.18846)
LOANAS	0.12364* (2.8200)	-0.0071013 (-0.25956)	0.083758 (1.0020)	-0.012699 (-0.27924)	0.025959 (1.2373)
EQAS	-0.21757* (-2.1146)	-0.79438* (-4.0182)	-0.66954* (-4.3165)	-0.34368* (-4.6456)	-0.16598* (-3.2046)
$\bar{R}$- squared	0.485	0.255	0.579	0.644	0.219
F	9.08	9.66	30.63	30.19	13.40
n	61	203	173	130	355
Diagnostic Test Statistics					
Functional Form	1.1938	1.331	16.3102*	6.4546	0.41126
Normality	1.1836	28.1143*	6.3113	47.7916*	114.8848*
Heteroscedasticity	-	2.0823	2.3673	-	0.12060
VIF Range	1.0-19.0	1.0-17.6	1.0-69.4	1.1-13.1	1.1-33.8

Notes: [a] t-statistics for Singapore and the Philippines are based on White's (1980) heteroscedasticity-adjusted standard errors.
t-statistics in parentheses
*, ** significant at the five and ten percent level respectively
Source: Author's own estimates

Table 9.10

Structure and Performance Relationship - Pooled Individual Country Results (ROE as the dependent variable [a])

	Singapore	Malaysia	Thailand	Philippines	Indonesia
Constant	3.6841 (0.27107)	29.8552 (1.4623)	236.8411* (3.3855)	88.6981* (2.4951)	-4.3909 (-0.32895)
CR10	0.094235 (0.50309)	-0.30807 (-0.56425)	-2.2144* (-2.7479)	-0.55251 (-0.91692)	0.16971 (1.1750)
MSD	0.19432** (1.7964)	-0.67504** (-1.7519)	-0.74950** (-1.7627)	0.65764* (2.6175)	0.26891 (0.73772)
COSIN	-0.13042* (-3.5560)	-0.11229* (-3.4787)	-0.45543* (-12.2721)	-0.43170* (-8.8411)	-0.11815* (-7.6648)
GOVT	-	-2.1282* (-2.0665)	-6.8881* (-3.4296)	-7.8463* (-6.2599)	-3.8251* (-3.7995)
PCGNP	0.0000647 (0.66333)	0.0027639* (2.6435)	-0.0300007* (-2.8410)	-0.0079098** (-1.6472)	0.013864* (3.1007)
ASSETS	-0.00007025 (-0.69585)	0.0007957* (1.9689)	0.0003115 (1.3380)	-0.0003649 (-0.50332)	0.0001682 (0.51264)
LOANAS	0.11958* (2.7639)	-0.0098464 (-0.36084)	0.084736 (1.0160)	-0.012041 (-0.26018)	0.026849 (1.2818)
EQAS	-0.19658** (-1.9056)	-0.78579* (-3.9947)	-0.66984* (-4.3304)	-0.34498* (-4.7394)	-0.16896* (-3.2741)
$\overline{R}$- squared	0.499	0.262	0.581	0.637	0.218
F	9.56	9.98	30.82	29.29	13.34
n	61	203	173	130	355
Diagnostic Test Statistics					
Functional Form	0.74981	1.3193	15.7186*	7.0404*	0.74314
Normality	1.7446	27.6223*	7.3161*	40.7446*	120.5649*
Heteroscedasticity	-	2.0967	2.1782	-	0.13843
VIF Range	1.0-15.0	1.0-17.0	1.0-69.6	1.1-6.3	1.1-12.8

Notes: [a] t-statistics for Singapore and the Philippines are based on White's (1980) heteroscedasticity-adjusted standard errors.
t-statistics in parentheses
*, ** significant at the five and ten percent levels respectively

Source: Author's own estimates

with large market shares are able to gain higher profits. Quite surprisingly, for Malaysia and Thailand, there is an inverse relationship between market share (MSA and MSD) and ROE whereas in Indonesia, this coefficient is positive, although the t-value indicates it is insignificant in both Tables 9.9 and 9.10. The variable that proxies for bank efficiency (cost-to-income ratio) are always negative and significant for Singapore, Malaysia Thailand, the Philippines and Indonesia suggesting that efficiency is the primary driver of higher profits in these countries as predicted by the Relative Efficiency hypothesis. These result indicate that no support is found for the traditional SCP paradigm, RMP hypothesis is only evident in the Philippines whereas in all the countries concerned, there is evidence to support the notion that greater efficiency leads to higher profits as predicted by the RE hypothesis.

Similar results are found for the government ownership variable GOVT. Tables 9.9 and 9.10 show that the coefficients for the government ownership variable, GOVT are negative and significant which indicates that government-owned banks earned smaller returns in Malaysia, Thailand, the Philippines and Indonesia during the period. The coefficients for PCGNP are positive and significant in Malaysia and Indonesia but negative and significant in Thailand in both tables. For the Philippines they are negative and not significant in Table 9.9 and negative and significant in Table 9.10. The coefficients of PCGNP are however positive but not significant for Singapore banks in both tables.

As can be seen from Table 9.9, the coefficients for ASSETS are negative and significant in the Philippines (diversification effects), negative but insignificant for Singapore and Indonesia whereas positive but not significant for Malaysia and Thailand. In Table 9.10, ASSETS is positive and significantly related to ROE (scale effects) for Malaysia and positive but insignificant for Thailand and Indonesia, negative but insignificant for

Singapore and the Philippines. According to Tables 9.9 and 9.10, LOANAS is positive and significant only in Singapore indicating that the higher the proportions of loans in a Singapore bank's balance sheet, the higher the ROE. LOANAS has no significant impact on bank's ROE for the other four ASEAN countries. The coefficients for EQAS are consistently negative and statistically significant for all the ASEAN countries as shown in Tables 9.9 and 9.10, suggesting that lower capital ratios indicate a more risky position leading to higher returns. This is similar to the pooled results with EQAS which change sign from positive to negative when ROE is the performance measure. Finally, the explanatory power of ROE is much lower than ROA in all the ASEAN countries.

In conclusions, it can be seen from the individual country estimates that there is no evidence that the link between market structure and performance assumed within the SCP paradigm is present in these banking markets. There is evidence that market share explained the performance of banks in the Philippines between 1991 and 1995, thus confirming the predictions of the RMP hypothesis that large banks are able to gain higher profits. However, this theory does not explain the market behaviour of the other ASEAN banking markets. Nonetheless, the individual country results for all the ASEAN countries provide evidence that efficiency influences bank profitability, as predicted by the Relative Efficiency hypothesis. The results also find evidence of instability in the parameters estimates across individual country.

9.3.4 Conclusion on the Structure and Performance Relationship using cost-to-income ratio as an indicator of Efficiency

In the first part of this chapter, we investigated the relationship between market structure and bank performance by regressing the performance measure (either ROA or ROE) on the concentration measure (CR10), market share (either MSA or MSD) and the cost-to-income ratio (as an indicator of bank efficiency) and other variables pertaining to ownership structure, demand conditions, bank size and risk factors. The pooled estimates show strong evidence that both market share and bank efficiency explain the performance of individual banks in the ASEAN market between 1991 and 1995, confirming the predictions of the RMP hypothesis and the RE hypothesis. However, the there is no evidence that the traditional SCP paradigm can explain the link between market structure and performance in the ASEAN banking markets.

The coefficients for the government ownership variable (GOVT) are negative and significant which implies that government-owned banks earn smaller profits than their private counterparts. Banks operating in a competitive environment generally earn smaller profits as evidenced by the negative and significant coefficients for the per capita income variable (PCGNP). The coefficients for the size variable (ASSETS) are negative and significant in three out of the four equations, suggesting that increased diversification leads to lower required returns. We also find that the equity-to-assets ratio (EQAS) is sensitive to whether ROA or ROE is used as the performance indicator - positive and statistically significant when ROA is used and negative and significant when ROE is the used. Asset composition has little impact on profitability as evidenced by the loans-to-assets ratio variable (LOANAS) which is positive but insignificant.

There is also evidence that there is less explanation of ROE than ROA in this context, as confirmed in earlier studies by Bourke (1989) and Molyneux (1993) although these two authors do not incorporate a direct efficiency measure in their tests. Despite the fact that our estimations do not fulfill the normality requirements of residuals, by and large our results can still be taken as providing evidence that both the RMP and the RE hypotheses explain profitability in ASEAN banking markets, given the large sample size. It also appears that there are no substantial yearly effects in our estimates, and the estimates over the years are not significantly different.

The individual country estimates did not exhibit evidence that the link between market structure and performance that was assumed within the SCP paradigm is present in all the ASEAN markets. There is evidence that market share influences the performance of banks in the Philippines between 1991 and 1995, confirming the predictions of RMP that large banks are able to gain higher profits. Moreover, there is strong evidence that higher profits are the results of efficiency, as proxied by the cost-to-income ratio, for banks in Singapore, Malaysia, Thailand, the Philippines and Indonesia.

9.4 The Stochastic X-efficiency Measure as an Indicator of Efficiency

9.4.1 Pooled Time-Series Estimates

Using the equation specification mentioned in Section 9.2, we replicate the above estimates to test the relationship between market structure and performance in ASEAN banking by pooling the sample data for four ASEAN countries (Malaysia, Thailand, the Philippines and Indonesia) for the period 1991 to 1995. There are 837 observations in our sample and we have omitted Singapore in this case because only three observations were available for the final analysis. We also include in the equation four dummy variables, D92, D93, D94 and D95, in order to test whether there are yearly effects in the data; *i.e.*, whether the parameter estimates are significantly different across years. In order to jointly test the effects of market concentration, market share and bank efficiency, we regress performance measures (either ROA or ROE) on the concentration measure (CR10), market share (either MSA or MSD), the indicator for efficiency (EFF, *i.e.*, a stochastic X-efficiency measure) and the other variables described above.

We first test the efficiency effect by excluding the stochastic X-efficiency variable (X-EFF) in the regression analysis. Table 9.11 presents the results excluding the X-EFF variable, and Table 9.12 reports on the full model. We find that adding the efficiency variable slightly increases the adjusted r-squared from 39.0 percent to 39.3 percent in Equation (1) where return on assets is the performance measure and the market share is based on total assets. When market share is based on total deposits; *i.e.*, in Equation (2), there is also a small increase in the adjusted r-squared from 37.3 to 37.5. Where performance is measured by return on equity under both market share proxies, there is also a small increase in explanatory power, with adjusted r-squared increasing from 13.7 percent to 14.1 percent in Equation (3) and from 10.8 percent to 11.2 percent in Equation (4). For this case, including an efficiency variable (X-EFF) reveals only a small increase in the adjusted r-squared using both performance measures (ROA and ROE) and market shares proxies (MSA and MSD). Even though there is an increase in the adjusted r-squared, compared to that using the cost-to-income ratio as a proxy for bank efficiency, we find that this increase is very much smaller. This may be due to methodological differences in estimating bank efficiency: one uses a simpler approach and the other uses a more comprehensive approach.

Before drawing any statistical inferences from the parameter estimates in Table 9.12 below, some general observations must be made. Firstly, it can be seen that, in each of the Equations (1) to (4), the null hypothesis that the residuals in the model are normally distributed cannot be accepted, as the critical values are greater than the five percent critical chi-square value for two degrees of freedom (5.99147). However, even though our normality test shows that the disturbances are not normally distributed , the usual test is

Table 9.11
Structure and Performance in ASEAN Banking - Pooled Results (excluding the efficiency variable *i.e.*, a stochastic X-efficiency measure)

	ROA (1)	ROA (2)	ROE (3)	ROE (4)
CONSTANT	0.25934 (0.54109)	0.77068 (1.5475)	8.4049* (2.2259)	12.9720* (3.2453)
CR10	-0.0080674 (-1.4329)	-0.011971* (-2.06515)	-0.0082535 (-0.16893)	-0.041479 (-0.80848)
MSA	0.10885* (6.6370)		1.1552* (5.7657)	
MSD		0.028614* (2.1076)		0.37570* (2.3038)
GOVT	-0.51445* (-7.8727)	-0.40696* (-6.4271)	-6.1421* (-8.1636)	-5.0329* (-6.8504)
PCGNP	0.00005079 (0.71556)	-0.00004021 (-0.57401)	0.0018170* (3.0264)	0.000944 (1.5745)
ASSETS	-0.00003237* (-3.2231)	0.000001732 (0.19405)	-0.0002119** (-1.8110)	0.00009993 (0.77092)
LOANAS	0.0036388** (1.7177)	0.0031485 (1.4525)	0.021122 (1.1126)	0.017387 (0.89249)
EQAS	0.11468* (13.5278)	0.11075* (13.1788)	0.039427 (0.78999)	0.0017518 (0.034685)
D92	0.065110 (0.58097)	0.048920 (0.42555)	0.97705 (0.99669)	0.83732 (0.83915)
D93	0.17963** (1.7115)	0.14376 (1.3253)	1.8200* (1.9361)	1.4952 (1.5609)
D94	0.15890 (1.5413)	0.11599 (1.0870)	1.6655** (1.7955)	1.2901 (1.3579)
D95	0.21830* (2.1367)	0.18507** (1.7462)	1.6306** (1.7120)	1.3668 (1.3938)
$\bar{R}$- squared	0.390	0.373	0.137	0.108
F	49.6067	46.2520	13.1445	10.2754
Diagnostic tests				
Functional form	30.3116*	27.4407*	0.015638	2.5036
Normality	355.9821*	332.5342*	146.3577*	140.5528*
H-cedasticity	-	-	1.5140	0.34493
VIF range	1.2-6.9	1.0-6.7	1.1-6.9	1.1-6.9

Notes: [a] t-statistics for equations (1) and (2) are based on White's (1980) heteroscedasticity-adjusted standard errors. t-statistics are in parentheses.
*, ** significant at the five and ten percent levels
Number of observations = 837
Source: Author's own estimates

Table 9.12

Structure and Performance in ASEAN Banking - Pooled Results[a]

	ROA (1)		ROA (2)		ROE (3)		ROE (4)	
CONSTANT	-0.51036 (-0.70359)	VIF	0.064062 (0.088269)	VIF	1.0342 (0.20625)	VIF	6.2522 (1.2037)	VIF
CR10	-0.0070848 (-1.2470)	6.0	-0.011126** (-1.9030)	6.4	0.0011563 (0.023634)	6.0	-0.033443 (-0.65111)	6.4
MSA	0.11033* (6.7303)	4.5			1.1694* (5.8475)	4.5		
MSD			0.028812* (2.1095)	5.0			0.37758* (2.3197)	5.0
X-EFF	0.88631 (1.5064)	1.7	0.82335 (1.4142)	1.7	8.4873* (2.2268)	1.7	7.8299* (2.0205)	1.7
GOVT	-0.51764* (-7.9383)	1.2	-0.40849* (-6.4493)	1.1	-6.1726* (-8.2225)	1.2	-5.0475* (-6.8827)	1.1
PCGNP	0.0000559 (0.78665)	7.1	-0.0000368 (-0.52554)	6.8	0.0018662* (3.1137)	7.1	0.000976 (1.6311)	6.8
ASSETS	-0.00003292* (-3.3269)	4.2	0.00000176 (0.19894)	4.9	-0.0002171** (-1.8599)	4.2	0.000100 (0.77499)	4.9
LOANAS	0.0030848 (1.4592)	1.3	0.0026244 (1.2111)	1.3	0.015818 (0.82868)	1.3	0.012403 (0.63277)	1.3
EQAS	0.11600* (13.8736)	1.3	0.11192* (13.4836)	1.4	0.052090 (1.0395)	1.3	0.012876 (0.25389)	1.4
D92	-0.018849 (-0.14872)	2.6	-0.029352 (-0.22687)	2.6	0.17305 (0.16600)	2.6	0.092968 (0.08754)	2.6
D93	0.20955** (1.9480)	2.6	0.17097 (1.5429)	2.6	2.1065* (2.2254)	2.6	1.7540** (1.8182)	2.6
D94	0.10193 (0.91010)	3.2	0.062343 (0.53891)	3.3	1.1199 (1.1700)	3.2	0.77992 (0.79477)	3.3
D95	0.17705 (1.6248)	3.2	0.14613 (1.2964)	3.3	1.2356 (1.2782)	3.2	0.99647 (1.0006)	3.3
$\bar{R}$- squared	0.393		0.375		0.141		0.112	
F	46.06		42.87		12.52		9.79	
Diagnostic Test Statistics								
Functional Form	27.4136*		24.7510*		0.0001431		2.6034	
Normality	355.5978*		329.3076*		149.8687*		142.4585*	
Heteroscedasticity	-		-		1.5753		0.36465	

Notes: [a] t-statistics for both ROA is based on White's (1980) heteroscedasticity-adjusted standard errors.
t-statistics are in parentheses
*, ** significant at the five and ten percent level respectively
Number of observations = 837
Source: Author's own estimates

still valid because our sample size is sufficiently large, 837 banks. Secondly, the values of the Ramsey RESET tests in Equations (1) and (2) are not satisfactory from the point of view of functional form because the chi-square values do not fall within the acceptance region, suggesting that a linear functional form may be inappropriate to describe this relationship. However, for Equations (3) and (4), the chi-square values fall within the acceptance region. Thirdly, for Equations (1) and (2) the assumptions of homocedasticity in the residual variance are rejected at the one and five percent levels. We therefore use White's (1980) heteroscedasticity-adjusted standard errors in order to calculate all t-statistics for the significance of the estimated coefficients. Finally, it appears that none of the equations is there any strong evidence of multicolinearity in the variables: the variance inflationary factor (VIF) are well below 10.

We first analyse the results based on ROA as the performance measure as in Equations (1) and (2) in Table 9.12. We find that in Equation (1), the sign for the concentration measure (CR10) is negative and insignificantly related to ROA whereas in Equation (2), this coefficient is negative and statistically significant at the ten percent level. This implies that there is an inverse relationship between concentration and bank's after-tax ROA in ASEAN banking markets, contrary to the prediction of the SCP paradigm. These results are consistent with the findings of Berger (1995) on US banking, Lucey (1995) on Irish banking and Golberg and Rai (1996) on European banking. The results are in contrast to studies that have examined the structure-performance relationship for US banking (*e.g.* Rhoades, 1981) and European banking (*e.g.* Molyneux and Thornton, 1992 and Molyneux and Forbes, 1995). The market share variables, MSA and MSD, show a positive and significant relationship in both the equations which implies that market power, as reflected by large market share, may explain part of the profit-structure relationship in ASEAN banking markets, as predicted by the RMP hypothesis. This finding is similar to that of

Berger (1995). Both Smirlock (1985) and Evanoff and Fortier (1988) find similar results, although they do not include efficiency variable in their tests. The X-EFF which proxies for bank efficiency is both positive but not significant suggesting that there is no strong evidence that bank efficiency helps to explain the profit-structure relationship in these banking markets. This is contrary to our earlier findings using cost-to-income ratio as a proxy for bank efficiency which reveals strong evidence in support of the notion that efficiency leads to higher ROA in ASEAN banking. The results are in contrast with the results found in Goldberg and Rai (1996) for banks located in low concentration countries.

The coefficients on the government ownership (GOVT) are negative and significant suggesting that government controlled banks are relatively more profitable than their private counterparts and this is consistent with our earlier results. It also appears that there is no significant impact of per capita income (PCGNP) on the profitability of banks in ASEAN markets. The coefficients are positive but statistically insignificant in Equation (1) and negative but not significant in Equation (2). This is contrary to what we found earlier.

The size variable (ASSETS) is negative and significant in Equation (1) but positive and insignificant in Equation (2). The former suggests that size-induced differences between banks have a negative impact on ROA, indicating that increased diversification leads to lower risk and thus to smaller returns. The latter however contradicts our earlier findings (using cost-to-income ratio as a proxy for bank efficiency). The coefficients of the loans-to-assets ratio (LOANAS) are both positive but not significant while those for the equity-to-assets ratio (EQAS) are both positive and significant. The former implies that asset composition has no significant impact on profitability whereas the latter suggests that banks with greater equity stake are more profitable. The results for LOANAS and EQAS are similar to those when we use cost-to-income ratio as a proxy for bank efficiency.

The dummy year variables, show that ROA has not changed significantly over the years except for 1993 in Equation (1), where the t-statistic for D93 is significant at the ten percent level. [42] Finally, the explanatory power for Equations (1) and (2) is fairly good with the adjusted r-squared at 39.3 and 37.5 percent, though smaller than our earlier results based on cost-to-income ratio as a proxy for bank efficiency in which the adjusted r-squared was 49.5 percent and 48.4 percent respectively. This is in fact higher than the r-squared found in many of the US-based research who reported around 10 percent.

The results using ROE as the performance measure, are presented in Table 9.12 for Equations (3) and (4).The coefficient for CR10 is positive but insignificant for Equation (3) suggesting that concentration has no significant impact on banks' profitability. For Equation (4), this coefficient is negative but not significant implying an inverse relationship between concentration and after-tax ROE. This suggests that the traditional SCP paradigm is not supported in ASEAN banking. Both the market power variables; that is, MSA and MSD, are positive and significant indicating that the Relative Market Power hypothesis also holds, consistent with our earlier findings using cost-to-income ratio as a proxy for bank efficiency. The results are similar with the findings of Berger's (1995) study of US banking. The coefficients for X-EFF which proxies for bank efficiency are positive and significant in both equations, which strongly suggests that that efficiency also helps to explain the profit-structure relationship in these banking markets and confirms the prediction of the Relative Efficiency hypothesis, conform to those reported by Berger (1995) on US banks and Lucey (1995) on Irish banks. When ROE is used as the

42 We also run the test by dropping the dummy years and the F-tests show that there are no yearly effects in the data; *i.e.*, the parameter estimates are not significantly different across the years The F-tests for Equation (1) is 2.23, Equation (2) is 1.62. The 5% critical values for an F-distribution with the relevant degrees of freedom is 2.37.(see Appendix 5).

performance measure, the effects of concentration, market share and X-efficiency are similar when we test the effect using cost-to-income ratio as a proxy for bank efficiency.

The coefficients for GOVT are similar to those for ROA as the dependent variable: negative and significant for both equations, suggesting smaller profits earned by government-owned banks than their private counterparts. This is also consistent to our earlier results. Market demand conditions as proxied by the (PCGNP) variable has a strong positive impact on ROE for Equation (3) and positive but not significant for Equation (4).The positive and significant PCGNP suggests that the higher the demand for financial services, the higher the profits earned by banks in these markets. This is in contrast to what we found earlier using cost-to-income ratio as a proxy for bank efficiency where the coefficient was negative and significant.

The coefficients for ASSETS are negative and significant for Equation (3), which implies that increased diversification leads to lower risks and thus to lower returns. For Equation (4), this coefficient is positive but not significant. The loans-to-assets ratio (LOANAS) is positive but insignificant for both equations suggesting that assets composition in the form of loans has no significant impact on ROE. The strong positive relationship found between equity-to-assets ratio and ROA disappears when ROE is the dependent variable, confirming an earlier finding by Molyneux (1993).

The t-statistics for the dummy year variables are all insignificant except for D93, indicating that there are no yearly effects; *i.e.*, that our year by year estimates are not significantly different. [43] Finally, the explanatory power of these two equations is much lower than in

[43] The F-tests in which we drop the dummy variables for years, show that there is no evidence of yearly effects in the data. The F-tests for Equation (3) is 1.76 and 1.19 in Equation (4). (see Appendix 5)

the case of ROA, with adjusted r-squared of 14.1 percent in Equation (3) and 11.2 percent in Equation (4) implying that there is less explanation of ROE than ROA in this case. However, the explanatory power when the cost-to-income ratio is used is very much higher with adjusted r-squared values of 28.3 percent and 29.5 percent, respectively.

To conclude, it can be seen from the pooled results using stochastic X-efficiency as an indicator for bank efficiency, do not provide support for the traditional SCP paradigm. Our results generally provide evidence that both market share and managerial efficiency influence performance of individual banks in ASEAN banking markets between 1991 to 1995, confirming the predictions of the RMP and the RE hypothesis. There is also evidence that there is less explanation of ROE than ROA as shown by the adjusted r-squared values. The results also show that there are no substantial yearly effects in the estimates.

The coefficients for government ownership (GOVT) are negative and significant suggesting that government-owned banks earned smaller profits than their private counterparts, similar to results found earlier. In fact, these coefficients are the only coefficients that exhibit similar results based on cost-to-income ratio as a proxy for bank efficiency. In contrast, the coefficients for per capita income (PCGNP) are mixed; therefore it is rather difficult to draw conclusions regarding this variable.

The size variable (ASSETS) is negative and significant in two of the four equations which suggests that size-induced differences between banks have a negative impact on ROA (diversification effects). Asset composition in the form of loans has little impact on profitability as evidenced by the positive but insignificant loans-to-assets ratio (LOANAS). The equity-to-asset ratio (EQAS) is positive and significant when ROA is the performance measure and becomes insignificant when ROE is the dependent variable.

9.4.2 Yearly Estimates

The effects of market structure and bank performance in the ASEAN banking markets using a stochastic X-efficiency measure as a proxy for managerial efficiency is further investigated for each year from 1991 to 1995. Tables 9.13 and 9.14 report the results for the yearly estimations using ROA as the dependent variable while Tables 9.15 and 9.16 present the results using ROE as the performance measure. Equations (1) and (3) utilise market share based on assets (MSA) and Equations (2) and (4) use deposit-based market share (MSD) as proxies for market power.

We will first consider some general observations from Tables 9.13 and 9.14 before drawing any statistical inferences from the parameter estimates. Firstly, the diagnostic tests for normality show that for Equations (1) and (2), the null hypothesis that the residuals in the model are normally distributed cannot be accepted, as all the chi-square values are significantly high. Secondly, for both the equations, in all years except 1992, the values of the Ramsey RESET tests are lower than the one percent critical chi-square value for one degree of freedom of 6.6349; thus the hypothesis that the functional is linear in the model cannot be rejected, implying that a linear functional form is appropriate to describe this relationship for 1991, 1993, 1994 and 1995. Thirdly, in all cases except for 1992 and 1994, the assumptions of homocedasticity are rejected. We therefore use White's (1980) heteroscedasticity-adjusted standard errors in order to calculate all t-statistics for the significance of the estimated coefficients for the other three years, 1991, 1993 and 1995.Finally, there is no strong evidence of multicollinearity in the variables for 1991 and 1992 for both Tables 9.13 and 9.14. However, multicollinearity seems evident

Table 9.13

Structure and Performance Relationship - Yearly Results (ROA as the dependent variable [a])

Dependent variable is ROA (1)	1991	1992	1993	1994	1995
Constant	2.9815 (1.0529)	-0.69713 (-0.39949)	-1.6134 (-1.2484)	-7.0520* (-5.1333)	0.40081 (0.16894)
CR10	-0.052858* (-3.1662)	-0.0060831 (-0.38260)	0.017140 (1.0784)	0.088486* (4.8929)	-0.026524 (-1.3474)
MSA	0.17048* (2.7829)	0.15239* (2.4867)	0.19465* (4.0197)	0.21649* (4.5289)	-0.025898 (-0.79667)
X-EFF	-0.71777 (-0.37032)	1.4455 (1.1225)	-0.087538 (-0.11922)	0.20702 (0.27678)	2.5739 (1.4103)
GOVT	-0.75520* (-4.4510)	-0.57303 (-2.3777)	-0.72019* (-5.9097)	-0.56234* (-4.0081)	-0.24897* (-2.0040)
PCGNP	-0.0007331* (-2.6164)	0.00002211 (0.087560)	0.0005230* (2.0451)	0.0010476* (6.0408)	-0.0002475 (-1.3411)
ASSETS	-0.00007389 (-1.2190)	-0.000089** (-1.9119)	-0.00008873* (-2.3811)	-0.00007715* (-3.0945)	0.00002903* (2.1285)
LOANAS	0.021350* (3.7137)	0.0021781 (0.30587)	0.0021275 (0.51341)	0.0005628 (0.15135)	-0.0038476 (-0.86613)
EQAS	0.14808* (5.0680)	0.092092* (6.4746)	0.11596* (6.0542)	0.14199* (14.8748)	0.11324* (7.0233)
$\overline{R}$- squared	0.536	0.264	0.366	0.538	0.445
F	13.55	7.39	14.50	32.16	21.20
n	88	144	188	215	202
Diagnostic Tests Statistics					
Functional Form	0.0022978	7.9976*	4.9013	0.15338	2.9149
Normality	22.3241*	85.1957*	63.7442*	26.9577*	228.7556*
Heteroscedasticity	-	3.0476	-	3.8777	-
VIF Range	1.2-6.4	1.4-9.4	1.2-11.1	1.1-17.0	1.2-20.4

Notes: [a] t-statistics for 1991, 1993 and 1995 are based on White's (1980) heteroscedasticity-adjusted standard errors.
t-statistics in parentheses
*, ** significant at the five and ten percent respectively
Source: Author's own estimates

Table 9.14

Structure and Performance Relationship - Yearly Results (ROA as the dependent variable [a])

Dependent variable is ROA (2)

	1991	1992	1993	1994	1995
Constant	3.9864 (1.3892)	0.19888 (0.11012)	-0.33066 (-0.25795)	-6.3327 (-4.2948)	0.58199 (0.24776)
CR10	-0.058940* (-3.3422)	-0.015139 (-0.90366)	0.0063570 (0.37999)	0.081835* (4.1850)	-0.028562 (-1.4757)
MSD	0.029537 (0.77667)	0.038057 (0.75808)	0.054889 (1.5459)	0.10272* (2.6276)	-0.032562 (-1.2564)
X-EFF	-0.74460 (-0.36845)	1.5141 (1.1520)	-0.33004 (-0.45302)	0.12854 (0.16667)	2.5437 (1.3933)
GOVT	-0.54797* (-2.7707)	-0.38717** (-1.6652)	-0.54580* (-4.8977)	-0.41297* (-2.9610)	-0.25994* (-2.2146)
PCGNP	-0.0009702* (-3.5254)	-0.00012756 (-0.69297)	0.0002786 (1.0985)	0.0009138* (5.0694)	-0.0002556 (-1.4958)
ASSETS	0.00001807 (0.49650)	-0.00002034 (-0.40513)	-0.00002273 (-0.83976)	-0.0000454 (-1.5887)	0.00003695* (2.3031)
LOANAS	0.019873* (2.6501)	0.0016054 (0.21988)	0.0027526 (0.65918)	0.0009758 (0.25402)	-0.0040985 (-0.91920)
EQAS	0.13596* (4.7751)	0.087030* (6.0401)	0.10837* (5.8944)	0.13849* (14.0928)	0.11231* (6.8630)
$\bar{R}$- squared	0.495	0.233	0.325	0.508	0.446
F	11.66	6.43	12.28	28.68	21.29
n	88	144	188	215	202
Diagnostic Tests Statistics					
Functional Form	0.52663	9.6105*	4.1954	0.28740	2.9148
Normality	13.3002*	81.5262*	57.9109*	25.5420*	234.5726*
Heteroscedasticity	-	2.9341	-	3.9762	-
VIF Range	1.1-5.2	1.1-9.1	1.1-10.5	1.1-17.1	1.2-17.9

Notes: [a] t-statistics for 1991, 1993 and 1995 are based on White's (1980) heteroscedasticity-adjusted standard errors..
t-statistics in parentheses
*, ** significant at the five and ten percent respectively
Source: Author's own estimates

in 1993, 1994 and 1995 for both Equation (1) and (3), as the values of the VIF are higher than 10.

It can be seen from Equation (1) in Table 9.13 and Equation (2) in Table 9.14 that the coefficients for CR10 are negative and significant for 1991 and negative but insignificant for 1992 and 1995, implying that concentration is inversely related to ROA. CR10 is however, positive and significant for both Equations (1) and (2) in 1994 supporting the prediction of the SCP paradigm. This coefficient is positive but not significant in 1993. The market share (MSA) variable, on the other hand, are positively and significantly related to ROA for Equation (1) in all years apart from 1995. For Equation (2) we find that market share (MSD) is positive and statistically significant only in 1994. As for the X-EFF variable, which proxies for bank efficiency, we find that for both Equations 1 and 2, the coefficients are positive but not significant in 1992, 1994 and 1995. In 1991 and 1993, the sign is negative but insignificant for both the equations. Thus, the yearly results using ROA as the performance measure do not indicate support for the notion that higher profits are attributable to bank efficiency as predicted by the Relative Efficiency hypothesis. These results are less clear cut compared to our earlier findings using cost-to-income ratio as a proxy for bank efficiency.

The coefficients for government ownership GOVT are seen to have a negative and significant impact on ROA in all years for both Equations (1) and (2). The signs for the PCGNP are rather mixed: negative and significant in 1991 for both the equations and positive and significant in 1993 and 1994 for Equation (1) and only in 1994 for Equation (2). The former result indicates support for the maturity hypothesis that the banking systems of countries with a higher per capita income operate in a more mature environment which in turn leads to more competitive profit margins whereas the latter indicates that the higher the per capita income, the greater will be the demand for financial services resulting in higher after-tax ROA.

For Equation (1), the coefficients for ASSETS are negative and significant in 1992, 1993 and 1994, suggesting that increased diversification leads to lower risk and therefore to lower after-tax ROA. For both the equations, it is positive and significant in 1995, suggesting that significant economies of scale lead to greater returns during this particular year. LOANAS is positive and significant for both equations only in 1991. Equity-to-assets ratios is positive and significant for both equations across all years - the only variable that have the same positive and significant impact across every years, a result also confirmed by Molyneux (1993) on European banking.

The results using ROE as the performance indicator are presented in Tables 9.15 and 9.16. Passing through the diagnostic tests, we find that, firstly, in the majority of cases, the null hypothesis that the residuals in the model are normally distributed cannot be accepted. However, our sample is still considered large. Secondly, in the majority of cases, the values of the Ramsey RESET tests fall within the acceptance region at the one percent level of 6.6349 thus accepting the linear functional form of the model. Thirdly, the assumptions of homocedasticity are rejected only in 1993 and 1994 for Equation (3) and in 1993 for Equation (4). Finally, evidence of multicollinearity is present in 1993, 1994 and 1995 for both equations, as the VIF values are greater than 10.

If we compare the results of both Tables 9.15 and 9.16, we will see that the signs of the concentration ratio (CR10) are negative and significant in 1991 and 1995 for both equations, which means that concentration is inversely related to ROE. However, CR10 is positively and significantly related to ROE in 1994 for both Equations (3) and (4), thus

Table 9.15

Structure and Performance Relationship - Yearly Results (ROE as the dependent variable [a])

Dependent variable is ROE (3)

	1991	1992	1993	1994	1995
Constant	25.9011	-3.3069	-12.4153	-51.2482*	23.8519**
	(1.3605)	(-0.20217)	(-1.1914)	(-3.7044)	(1.7168)
CR10	-0.39442*	0.032313	0.22177	0.78549*	-0.29574**
	(-2.7887)	(0.21682)	(1.6279)	(4.0943)	(-1.8626)
MSA	2.0780*	1.5222*	1.9911*	2.1083*	-0.22747
	(3.2289)	(2.6500)	(4.2359)	(5.0425)	(-0.52630)
X-EFF	0.66995	12.5283	3.0702	0.96520	18.2054*
	(0.040895)	(1.0379)	(0.49481)	(0.13601)	(2.6375)
GOVT	-7.9556*	-7.8744*	-7.9487*	-6.5614*	-3.4004*
	(-3.2273)	(-3.4859)	(-6.1917)	(-5.3933)	(-2.5870)
PCGNP	-0.0056178*	0.0022920	0.0061926*	0.0099770*	-0.0019897
	(-2.1808)	(0.96827)	(2.8631)	(5.4324)	(-1.3265)
ASSETS	-0.0008402	-0.0007597**	-0.0007616*	-0.0005859*	0.0004045*
	(-1.6152)	(-1.7392)	(-2.1728)	(-2.9029)	(2.1784)
LOANAS	0.18614*	0.011827	0.015265	0.0095165	-0.044850
	(2.2246)	(0.17719)	(0.39579)	(0.28250)	(-1.2752)
EQAS	0.32413**	-0.020864	0.071744	0.22755*	-0.098535
	(1.7097)	(-0.15650)	(0.66190)	(2.5672)	(-0.99155)
$\bar{R}$- squared	0.214	0.088	0.203	0.286	0.146
F	3.97	2.73	6.94	11.72	5.32
n	88	144	188	215	202
Diagnostic Tests Statistics					
Functional Form	1.2866	3.8624	3.7597	3.1114	0.041512
Normality	11.1875*	40.4012*	35.6474*	3.4350	29.1096*
Heteroscedas-ticity	0.035737	0.78726	-	-	0.32994
VIF Range	1.2-6.4	1.4-9.4	1.2-11.1	1.1-17.0	1.2-20.4

Notes: [a] t-statistics for 1993 and 1994 are based on White's (1980) heteroscedasticity-adjusted standard errors.
t-statistics in parentheses
*, ** significant at the five and ten percent respectively
Source: Author's own estimates

Table 9.16

Structure and Performance Relationship - Yearly Results (ROE as the dependent variable [a])

Dependent variable is ROE (4)

	1991	1992	1993	1994	1995
Constant	36.3124** (1.7718)	3.1270 (0.18480)	0.20997 (0.020739)	-42.5122* (-3.0096)	24.2141** (1.7487)
CR10	-0.45299* (-2.9066)	-0.029556 (-0.18830)	0.11715 (0.83473)	0.69889* (3.7309)	-0.29933** (-1.8985)
MSD	0.48429 (1.0300)	0.57684 (1.2264)	0.59881 (1.5912)	0.90661* (2.4209)	-0.21535 (-0.59145)
X-EFF	0.37738 (0.021797)	13.0152 (1.0569)	0.57102 (0.094867)	0.13803 (0.018683)	18.0273* (2.6073)
GOVT	-5.3780* (-2.1562)	-6.1384* (-2.8179)	-6.1841* (-5.2807)	-5.0837* (-3.8048)	-3.5253* (-2.7990)
PCGNP	-0.0082684* (-3.1572)	0.0007204 (0.30346)	0.0037721** (1.7728)	0.0084738* (4.9073)	-0.0019362 (-1.3750)
ASSETS	0.0001576 (0.29506)	-0.0002503 (-0.53207)	-0.0001154 (-0.44145)	-0.0002145 (-0.78339)	0.0004354* (2.0105)
LOANAS	0.17274** (1.9291)	0.0095187 (0.13915)	0.021964 (0.56947)	0.013037 (0.35426)	-0.046445 (-1.3157)
EQAS	0.18958 (0.96086)	-0.063236 (-0.46843)	-0.0042209 (-0.040937)	0.18929* (2.0107)	-0.10155 (-1.0157)
$\bar{R}$- squared	0.122	0.051	0.136	0.233	0.147
F	2.52	1.96	4.66	9.16	5.34
n	88	144	188	215	202
Diagnostic Tests Statistics					
Functional Form	1.5079	0.35433	0.30770	0.18510	0.16301
Normality	5.7127	39.0987*	34.4428*	5.5442	30.2171*
Heteroscedas-ticity	0.45685	1.4319	-	3.7941	0.38702
VIF Range	1.1-5.2	1.1-9.1	1.1-10.5	1.1-17.1	1.1-17.9

Notes: [a] t-statistics for 1993 is based on White's (1980) heteroscedasticity-adjusted standard errors.
t-statistics in parentheses
*, ** significant at the five and ten percent respectively
Source: Author's own estimates

supporting the SCP paradigm during this particular year. The results also show that the coefficients for MSA are positive and significant in all years except 1995 for Equation (3) suggesting that the fact that RMP may explain part of the profit-structure relationship. However, for Equation (4), MSD is positive in all years apart from 1995 but only significant in 1994. The coefficients for X-EFF which is a proxy for managerial efficiency are positive and significant in 1995 for both the equations implying that during 1995, bank efficiency had a significant influence on the after-tax ROE; higher profits are the result of greater efficiency of banks.

The government ownership variable GOVT is negative and significantly related to ROE for both the equations for the entire period 1991 to 1995 - the only variable that has the same negative impact across all years using either ROA or ROE as the performance measure. The coefficients for PCGNP are ambiguous with evidence of strong positive relationship in 1993 and 1994 and the opposite in 1991. Similarly, the ASSETS variable is negative and significant in 1992, 1993 and 1994 but positive and significant in 1995 for Equation (3). For Equation (4), the coefficients for ASSETS are negative but not significant in 1992 to 1994 and positive and significant only in 1995.

The impact of loan composition on profitability is not significant in any of the years except 1991 for both the equations. EQAS is positive and significant in 1991 and 1994 for Equation (3) and positive and significant in 1994 for Equation (4).

Finally, the explanatory power for these two equations is much smaller than that of the ROA equations, with the adjusted r-squared ranging from 8 percent to 28.6 percent for Equation (3) and from 5 percent to 23.3 percent for Equation (4). Despite the fact that our t-statistics on dummy year and F-statistics show that there is no strong evidence of yearly effects, our result indicate that there are evidence of instability in some of the parameter estimates.

9.4.3 Individual Country Estimates

The estimation using X-EFF as indicator for managerial efficiency is further investigated for Malaysia (193 banks), Thailand (173 banks), the Philippines (127 banks) and Indonesia (344 banks). Table 9.17 reports the results based on ROA as the performance measure while Table 9.18 presents the results with ROE as the dependent variable. Before drawing any inferences from the estimations, some general observation should be made. Firstly, it can be seen from Tables 9.17 that in all cases, the hypothesis of normality in the residuals cannot be accepted as the values of t-statistic are greater than the critical 5% value of 5.99147. However, Table 9.18 shows that the chi-square values for Thailand are smaller than the critical 5% percent, therefore accepting the null hypothesis that the residuals in the model are normally distributed. Secondly, in the majority of cases, a linear functional form may be appropriate to describe this relationship as the t-statistics fall within the acceptance region, except for Indonesia. (See Table 9.17). Thirdly, Table 9.17 shows that the assumptions of homocedasticity are rejected for Malaysia, Thailand and Indonesia whereas Table 9.18 indicates that, in all cases, these assumptions can be accepted. Finally, in all the ASEAN countries except the Philippines, we find evidence of multicollinearity in the variables, as the VIF have critical values which are greater than 10.

We will first analyse the results based on ROA as performance measure, shown in Table 9.17. For all the countries concerned, it appears that there is an inverse relationship between CR10 and ROA for banking markets of Malaysia, Thailand and the Philippines

Table 9.17

Structure and Performance Relationship - Individual Country Results (ROA as the dependent variable [a])

	Malaysia		Thailand		Philippines		Indonesia	
Constant	1.1464 (0.68014)	1.2165 (0.72328)	45.9403* (4.8628)	45.6644* (4.8495)	11.8949** (1.7425)	12.873** (1.8978)	-3.6358 (-1.5374)	-3.2845 (-1.367)
CR10	-0.031023 (-0.57817)	-0.03192 (-0.59707)	-0.52475* (-5.2498)	-0.5203* (-5.2265)	-0.17585 (-1.5808)	-0.18169 (-1.6400)	0.023331 (1.1027)	0.02166 (1.0114)
MSA	-0.014142 (-0.51834)		-0.12486* (-3.1669)		0.027772 (0.27962)		0.13865* (3.0695)	
MSD		-0.017531 (-0.99455)		-0.1493* (-3.7060)		-0.04321 (-0.9261)		0.01706 (0.5085)
X-EFF	-0.47972 (-0.79386)	-0.46249 (-0.77121)	1.4960 (1.2147)	1.5434 (1.2634)	1.7011* (2.2362)	1.6822* (2.2183)	0.31579 (0.4035)	0.28374 (0.3588)
GOVT	-0.15916* (-2.1273)	-0.15961* (-2.1475)	-0.45216** (-1.7889)	-0.5329* (-2.0795)	-0.30470 (-1.0435)	-0.33068 (-1.1406)	-0.3548* (-3.0571)	-0.3191* (-2.676)
PCGNP	0.000315* (4.3864)	0.000301* (4.2746)	-0.00723* (-5.4942)	-0.0072* (-5.5139)	-0.00220* (-2.4715)	-0.0027* (-3.3612)	0.00223* (3.5138)	0.0019* (3.0012)
ASSETS	0.000011 (0.81234)	0.000022 (1.1401)	0.000050* (3.2575)	0.00008* (3.6632)	0.000051 (0.27072)	0.000202 (1.5595)	-0.0000* (-2.4847)	0.00000 (0.1631)
LOANAS	-0.000399 (-0.18254)	-0.000479 (-0.22074)	-0.000209 (-0.01509)	-0.00040 (-0.0287)	-0.010323 (-1.3215)	-0.01183 (-1.5073)	0.003219 (1.0786)	0.00376 (1.2441)
EQAS	0.07425* (4.0279)	0.074172* (4.0256)	0.15725* (6.9335)	0.15427* (6.8414)	0.10734* (7.7201)	0.10502* (7.4976)	0.09178* (10.443)	0.0910* (10.339)
$\bar{R}$-sq.	0.195	0.196	0.424	0.434	0.380	0.384	0.461	0.455
F	6.82	6.87	16.86	17.49	10.66	10.83	37.65	36.86
n	193	193	173	173	127	127	344	344
Diagnostic Test Statistics								
Functional Form	0.20192	0.24391	2.5906	1.1705	1.9816	3.0824	5.3175*	3.6178*
Normality	6.2694*	5.9958*	18.0607*	21.8752*	28.2382*	24.1111*	86.3435*	87.687*
Heteros-cedasticity	-	-	-	-	0.53475	0.52374	-	-
VIF Range	0.9-17.4	0.9-17.1	1.0-68.4	1.0-67.8	1.1-12.4	1.1-5.8	1.1-32.3	1.1-12.8

Notes; [a] t-statistics except for the Philippines banks are based on White's (1980) heteroscedasticity-adjusted standard errors.
t-statistics in parentheses
*, **, significant at the five and ten percent level respectively
Source: Author's own estimates

whereas in Indonesia, this coefficient is positive but not significant. This is similar to our earlier findings using the cost-to-income ratio as a proxy for bank efficiency. MSA as a proxy for market power is only positive and significant in Indonesia, suggesting that only in Indonesia is there evidence that RMP can explain the profit structure relationship. As for the Malaysian banking market, these coefficients are negative but insignificant whichever proxies are used for market power. MSA and MSD are, however, negative and significant for banking market in Thailand. The sign for market share changes from positive (using MSA) to negative (using MSD) in the Philippines banking market. The coefficients for X-EFF is positive and significant in the Philippines market using either MSA or MSD and this indicates that higher profits are the result of greater efficiency as predicted by the Relative Efficiency hypothesis, between 1991and 1995. These coefficients are negative but insignificant in Malaysia and positive but not significant for the banking markets in Thailand and Indonesia. Overall, these results concerning market power and bank efficiency variables are quite unsatisfactory which may be explained by the fact that this model is not appropriate to test the structure-profit relationship for each individual country in ASEAN banking markets.

The signs for dummy variable GOVT for Malaysia, Thailand and Indonesia are negative and significant suggesting that in Malaysia, Thailand and Indonesia, government controlled banks earn smaller profits than the private banks. The coefficients for PCGNP are positive and significant in Malaysia and Indonesia but negative and significant in Thailand and the Philippines. These two results are similar to those found earlier (using cost-to-income ratio as a proxy for bank efficiency).

The coefficients for ASSETS are positive and significant in Thailand, suggesting significant economies of scale in this country which lead to higher returns. In Indonesia, this coefficient is negative and significant suggesting that increased diversification leads to lower risk and thus lower returns. For Malaysia and the Philippines, size-induced differences between banks have little impact on the ROA of banks. The results shown in Table 9.17 also show that loan composition, indicated by the loan-to-assets ratio, (LOANAS), has no significant impact on profitability in any of these four ASEAN banking markets. The coefficients for EQAS are positive and significant in these four ASEAN markets indicating that the higher the equity stake the higher the after-tax ROA. Only for EQAS do we find results which are consistent with our earlier findings using cost-to-income ratio a proxy for bank efficiency.

Finally, the results show that overall, the explanatory power for Indonesia, Thailand and the Philippines are reasonably good: 46 percent, 43 percent and 38 percent respectively. The adjusted r-squared for Malaysia is about 20 percent which is lower than that found earlier.

Next, we analyse the results based on ROE as the performance indicator which are presented in Table 9.18 below. In Malaysia, Thailand and the Philippines, it appears that there is an inverse relationship between CR10 and profitability, contrary to the prediction of the SCP paradigm. In Indonesia, when MSA is used as an indicator for market power, there is evidence that concentration has an influence on the after-tax ROE, supporting the SCP paradigm. The coefficients for MSAS are positive and significant in the Philippines and Indonesia suggesting that RMP may also explain part of the profit-structure relationship. The variable that proxies for managerial efficiency (X-EFF) is positive for Thailand, the Philippines and Indonesia but significant only in the latter. The results for Indonesia, where all three hypotheses explain the structure-profitability in the banking market, are quite surprising.

Table 9.18

Structure and Performance Relationship - Individual Country Results (ROE as the dependent variable)

	Malaysia		Thailand		Philippines		Indonesia	
Constant	14.3446 (0.60900)	16.7083 (0.71104)	491.694* (5.1999)	488.523* (5.2152)	127.915* (2.4252)	136.919* (2.5689)	-30.963** (-1.9165)	-27.18** (-1.670)
CR10	-0.023128 (-0.03179)	-0.055201 (-0.0724)	-5.5221* (-5.1820)	-5.4715* (-5.1861)	-1.7722* (-2.0619)	-1.8380* (-2.1116)	0.28356* (1.7276)	0.26542 (1.6042)
MSA	-0.59876 (-0.73119)		-1.1469** (-1.7450)		1.5616* (2.0350)		1.4204* (2.1910)	
MSD		-0.62494 (-1.5526)		-1.4262* (-2.4462)		0.39618 (0.94687)		0.13934 (0.3444)
X-EFF	-7.0447 (-0.82302)	-6.5122 (-0.76487)	13.4887 (1.2977)	13.9942 (1.3582)	8.2615 (1.4057)	8.8211 (1.4805)	6.7617** (1.7071)	6.4156 (1.6082)
GOVT	-2.4329* (-2.1645)	-2.4530* (-2.1946)	-5.0339** (-1.8156)	-5.8037* (-2.0999)	-8.9464* (-3.9657)	-7.8322* (-3.4386)	-3.2789* (-3.0491)	-2.9373* (-2.640)
PCGNP	0.004283* (4.0754)	0.003867* (3.6885)	-0.07619* (-5.5426)	-0.0762* (-5.5961)	-0.01457* (-2.1106)	-0.02013* (-3.1458)	0.02031* (4.0133)	0.0173* (3.4223)
ASSETS	0.000432 (1.0119)	0.00076** (1.8073)	0.00059* (2.3146)	0.00091* (2.9005)	-0.000961 (-0.6536)	0.001008 (0.98867)	-0.00078 (-1.4062)	0.00028 (0.7984)
LOANAS	-0.012375 (-0.42309)	-0.015164 (-0.51987)	0.075065 (0.62702)	0.07272 (0.6131)	-0.071986 (-1.1927)	-0.076346 (-1.2379)	0.014272 (0.6117)	0.02014 (0.8585)
EQAS	-0.0.6807* (-3.1216)	-0.68283* (-3.1485)	0.27504 (1.4702)	0.24448 (1.3130)	-0.074527 (-0.6937)	-0.072627 (-0.6599)	-0.03996 (-0.7445)	-0.0483 (-0.891)
$\bar{R}$-sq.	0.214	0.221	0.191	0.205	0.282	0.263	0.097	0.084
F	7.54	7.85	6.09	6.55	7.21	6.63	5.62	4.96
n	193	193	173	173	127	127	344	344
Diagnostic Test Statistics								
Functional Form	0.44377	0.49195	1.1290	0.46493	0.006327	0.48398	0.24839	0.00478
Normality	23.9831*	22.9630*	3.2192	2.7271	56.5983*	44.1868*	25.2983*	27.694*
Heterosce -dasticity	1.2602	1.3932	1.3723	1.5643	0.049772	0.002600	0.000192	0.07083
VIF Range	0.9-17.4	0.9-17.1	1.0-68.4	1.0-67.8	1.1-12.4	1.1-5.8	1.1-32.3	1.1-12.8

Notes; t-statistics in parentheses
*, **, significant at the five and ten percent level respectively
Source: Author's own estimates

The dummy variable GOVT is negative and significant for all countries and this indicates that in ASEAN countries, government-owned banks earn smaller profits than their private counterparts. The market demand variable, PCGNP is positive and significant in Malaysia and Indonesia but negative and significant in Thailand and the Philippines.

We find evidence of economies of scale in Malaysia and Thailand where ASSETS are positive and significant. In the Philippines and Indonesia, size-induced differences between banks have no significant impact on profitability. The coefficients for LOANAS are negative but statistically insignificant in Malaysia and the Philippines and positive but insignificant in Thailand and Indonesia suggesting that asset composition in the form of loans has no significant impact on after-tax ROE in these four ASEAN countries. When ROE is used as the dependent variable, the coefficients for EQAS change sign from positive and significant for banking markets in Malaysia to negative and significant. However, in the Philippines and Indonesia, this coefficient is negative but statistically insignificant. In Thailand, EQAS remains positive but insignificant.

Finally, the explanatory power of country estimations using ROE show that there are marked differences between the estimates of member states. The adjusted r-squared for ROE is much smaller than the adjusted r-squared for ROA in Thailand, the Philippines and Indonesia whereas in Malaysia the explanatory power for ROE is a little higher than for ROA (22 percent and 20 percent respectively).

Despite the facts that multicollinearity in the variables is present when testing the relationship between market structure and performance in the four ASEAN banking markets under consideration, by and large, the results provide evidence that, between 1991 and 1995 both market share and managerial efficiency had an influence on the profitability of individual banks in the Philippines and Indonesia as predicted by the Relative Market Power and the Relative Efficiency hypotheses. The results also reveal that there is no evidence to support the SCP paradigm in these four ASEAN banking.

9.4.4 Conclusion on the Structure and Performance Relationship using a stochastic X-efficiency measure as indicator for efficiency

In conclusions, the overall results using pooled estimates provide evidence that both market share and managerial efficiency can explain the performance of individual banks in the ASEAN banking markets between 1991 and 1995, confirming the predictions of the RMP and the RE hypothesis. However, the explanation of the relationship between market structure and performance assumed within the SCP paradigm is not present in the ASEAN banking markets. These results indicate that higher profits are the results of the efficient operation of large banks, particularly of private banks which obtain a large market share.

The coefficients for the dummy variable (GOVT) are negative and significant suggesting that government-owned banks earned smaller profits than their private counterparts between 1991 and 1995, as found in our first analysis. The coefficients for per capita income (PCGNP) are mixed contrary to our results; therefore it is rather difficult to draw conclusions regarding this variable.

The size variable (ASSETS) is negative and significant in two of the four equations suggesting that size-induced differences between banks have a negative and significant impact on ROA (diversification effects). Assets composition in the form of loans is found to have little impact on profitability as evidenced by the positive but insignificant LOANAS.

The EQAS is positive and significant when ROA is the performance measure and becomes insignificant when ROE is the dependent variable. The strong positive relationship between EQAS and ROA disappears when ROE is the dependent variable, as has also been shown earlier.

Finally, there is also evidence that there is less explanation of ROE than of ROA as shown by the adjusted r-squared values. These findings are consistent with those obtained earlier when cost-to-income ratio was used as a proxy for bank efficiency.

Overall, the results at the individual country level using a stochastic X-efficiency measure are less clear cut. While the results show evidence that both market share and managerial efficiency explain the performance of banks in the Philippines and in Indonesia, this relationship is not substantiated for banking markets in Malaysia and Thailand.

9.5 Conclusion

In this chapter, we have tested the empirical evidence concerning market concentration, market share and efficiency in the ASEAN banking markets based on two different proxies for bank efficiency: cost-to-income ratio, where data is available for all the five ASEAN countries, and a stochastic X-efficiency measure, where Singapore has been omitted due to data shortages. These tests are estimated using pooled-time series, for individual years and for each ASEAN country.

Based on using cost-to-income ratio as indicator for bank efficiency, our pooled results indicate strong evidence that both market share and managerial efficiency explain the profit-structure relationship in ASEAN banking markets between 1991 and 1995, confirming the predictions of the Relative Market Power and Relative Efficiency hypotheses. However, the link that was assumed within the Structure-Conduct-Performance paradigm is not present amongst ASEAN banks. This is contrary to the findings of many of the US based studies and for European studies.

In addition, we find that the dummy variables GOVT and PCGNP are negative and significantly related to profitability. In the majority of cases, the size variable ASSETS is negative and significant, suggesting that size-induced differences between banks have a significant impact on bank profitability: increased diversification leads to lower risks and therefore lower returns. Loan composition in the ASEAN banks' balance sheet has little impact on profitability. The equity-to-asset ratio, on the other hand, is sensitive to which performance measure is used: it is positive and significant for the ROA and negative and significant when ROE is used. The estimates using ROE perform less well than of ROA as the performance measure.

In general, the results for individual countries within ASEAN show that there is no support for the traditional SCP paradigm. The results also reveal that market share has an influence on the profitability of banks only in the Philippines between 1991 and 1995, as predicted by the RMP hypothesis. However, the predictions of the RE hypothesis seem evident in all the five ASEAN countries implying that for all the countries concerned, efficiency is strong driver for higher profits in these banking markets.

The second part of this chapter tested the three joint hypotheses using the stochastic X-efficiency measure as an indicator for managerial efficiency. Generally, our pooled estimates did not find any support for the SCP paradigm. The results reveal that market share is positively and significantly related to profitability, implying that in the ASEAN banking markets, banks with large market shares are able to gain higher profits, and this supports the predictions of the RMP hypothesis. Our results also show that managerial efficiency influences bank performance, as predicted by the RE hypothesis. These findings are consistent with our earlier results using cost-to-income ratio as a proxy for bank efficiency.

In all cases, the coefficients for GOVT are negatively and significantly related to profitability. The results for the market demand variable, PCGNP, and the size variable, ASSETS, are inconclusive, contrary to what we found earlier. The loans-to-asset ratio is positive but not significant implying that loan composition has no significant impact on profitability. EQAS is positive and significant, suggesting that banks with greater equity stake are more profitable. Our results also show that there are instability in the parameter estimates across countries.

Despite the fact that the results for each individual country in ASEAN are less clear cut, in general, the estimates do not support the SCP hypothesis for banks in the four ASEAN banking markets excluding Singapore during this period. However, both market share and managerial efficiency explain the performance of banks in the Philippines and Indonesia during the period 1991-1995, confirming the predictions of the RMP and the RE hypotheses. In Malaysia and Thailand, it appears that neither of these hypotheses can confidently be substantiated in order to explain the link between the structure and performance of banks.

CHAPTER 10

CONCLUSION AND LIMITATIONS

10.1 Conclusions

This chapter contains a summary of the conclusions and main findings of this study and also its limitations. The relationship between structure and performance in banking has been widely investigated and debated by many researchers, particularly in the US banking markets. Recent interest has focussed on European banking systems, particularly in view of the implementation of the single market. However, as far as we are aware, no empirical work to date has been undertaken of the structure-performance relationship in banking markets in other economic unions. This thesis has therefore been aimed at rectifying this imbalance by investigating the relationship between structure and performance in the ASEAN banking markets and providing an in-depth, detailed and original analysis of bank efficiency in South East Asia.

The empirical evidence concerning efficiency in ASEAN banking is based on two different proxies for efficiency that have been adopted in the study. Firstly, the standard accounting approach; that is, the cost-to-income ratio, where data is available for all five ASEAN countries and secondly, the stochastic cost frontier approach (X-efficiency) where one of the five countries (Singapore) is omitted altogether because of data shortages. In this thesis, bank profitability, and its association with characteristics of ASEAN banking markets and the banks themselves (*i.e.* market concentration, market power, bank efficiency, demand condition, ownership structure, bank size and bank risk) is examined initially using pooled data for the region as a whole and for the entire time frame selected, but estimates are also reported for each of the five years from 1991 to 1995, and then for each of the ASEAN countries involved.

The general findings of the study are as follows. Firstly, when we tested for evidence of the three hypotheses: the traditional Structure-Conduct-Performance hypothesis, the Relative Market Power hypothesis and the Relative Efficiency hypothesis pooling the data across the five countries (Singapore, Malaysia, Thailand, the Philippines and Indonesia), and using the cost-to-income ratio as a proxy for bank efficiency, we found that the link between market concentration and performance that is assumed within the SCP paradigm is not present amongst ASEAN banks. However, the pooled estimates showed strong evidence that both market share and bank efficiency explain the performance of these banks, thus confirming the predictions of the Relative Market Power and the Relative Efficiency hypotheses. These findings indicate that: firstly, there is little evidence that market concentration enables banks to earn higher profits due to collusion; secondly, market share appears to reflect market power, with larger banks gaining higher profits;

and thirdly, banks operating at higher levels of efficiency (*i.e.* they have lower cost-to-income ratios) are not achieving this through over-capitalisation as returns on assets and equity are also higher.

Further analysis using a stochastic X-efficiency measure to proxy for managerial efficiency also reveals no evidence that the relationship between market structure and performance is captured by the traditional SCP hypothesis. Our results also suggest that there is strong support for the notion that market power explains part of the behaviour in ASEAN banking markets. We also find support that managerial efficiency, based on the composite measure derived through frontier analysis, explains the performance of banks in these banking markets.

Thus, the pooled estimates using either cost-to-income ratio or a stochastic X-efficiency measure provide strong evidence that both market share and bank efficiency explain the link between structure and performance, confirming the predictions of the Relative Market Power and the Relative Efficiency hypotheses. Moreover, government ownership is found to be inversely related to performance. These findings suggest that there is little evidence of anti-competitive behaviour in ASEAN banking between 1991 and 1995 and that market concentration is not a signal of collusive behaviour but rather the result of the efficient operation of large banks, particularly private banks.

If we examine the estimates for individual ASEAN countries, bearing in mind the problems related to this kind of analysis owing to imbalance in sample size and so on, our results reveal that, using the cost-to-income ratio as a proxy for bank efficiency, we find no evidence to support the SCP hypothesis in neither Singapore, Malaysia, Thailand, the Philippines nor Indonesia. However, market share is found to influence bank profitability only in the Philippines, supporting the RMP hypothesis for that country only even though there was support for the hypothesis at the level of the ASEAN economic union as a whole. Bank efficiency, however, is shown to influence the profitability of banks in all five ASEAN countries during the period under study. This confirmation of the predictions of the Relative Efficiency hypothesis imply that good management is the primary driver of bank performance.

Overall, the results at the individual country level using a stochastic X-efficiency measure are less clear cut. While the results show evidence that both market share and managerial efficiency explain the performance of banks in the Philippines and in Indonesia, this relationship is not substantiated for banking markets in Malaysia and Thailand. Nevertheless, our results overall would tentatively suggest that the merger policies encouraged by the authorities in the ASEAN markets are justified if this leads to stronger and more efficient financial institutions. In particular, it follows from the findings in this thesis that it would be in the interests of the relevant authorities in ASEAN member countries to focus the merger policy on the smaller banks in order to improve their relative efficiency.

As discussed in Chapter 3 of this thesis, the financial reforms introduced by the ASEAN authorities followed the realization that the efficiency of their banking systems could be improved to achieve better performance in aspects such as savings mobilisation, credit allocation and financial services. With regard to the analysis reported here, we have seen that it is the larger banks that tend to have the better performance. In addition, however, we have seen that managerial efficiency influences bank profitability independent of size. The main implication of these findings, therefore, is that the ASEAN authorities should not restrict their efforts to that of increasing concentration by allowing large banks to increase market share, but rather they should stimulate merger activity to bring about more larger banks which are able to gain from economies of scale.

10.2 Comparison With Prior Research

The majority of previous studies that examine the relationship between structure (either concentration or market share) and bank performance use multiple regression techniques. These studies incorporate a proxy for concentration in accordance with the traditional Structure-Conduct-Performance (SCP) hypothesis, an effect on individual bank performance that is attributable to the bank's market share as assumed under the Relative Market Power (RMP) hypothesis, and the influence of bank efficiency as predicted by the Relative Efficiency hypothesis.

Table 10.1 provides a comparison of the results of this study with those arising from relevant prior research in this area, highlighting the estimates obtained for the variables used in the present analysis and those reported elsewhere. Overall, we find that the results relat ng to the effects of concentration on profitability are similar to the results reported by Berger (1995), Lucey (1995) and Goldberg and Rai (1996). Concentration is negatively and significantly related to profitability in the studies reported by Berger (1995) and Goldberg and Rai (1996), and in Lucey's (1995) study these coefficients are negative but not significant. On the other hand, this finding is contrary to the results reported in tests of other structure-performance relationship for US banking (*e.g.* Rhoades, 1981), and European banking (*e.g.* Molyneux and Thornton,1992 and Molyneux and Forbes, 1995), where a positive relationship is found. In general, the results reported here show some consistency with the SCP literature in that coefficients of concentration tend to be

Table 10.1

Comparison with prior research

Variables	Our Study	Similar Findings	Contrary Findings
Concentration -Ten-bank concentration ratio (CR10)	Inverse relationship with profitability (-ve and significant)	Lucey (1995) - Herfindahl index and CR3 are -ve but not significant. Berger (1995) - 41 out of 60 regressions, Herfindahl index are -ve with16 are significant. Golberg and Rai (1996) - Herfindahl index is -ve and significant	Many of US-based research found these coefficients to be positively related to profitability for example, Rhoades (1981) and Smirlock (1985) when MS not included as an explanatory variable. Others *eg.* Bourke (1989). Molyneux and Thornton (1992), Molyneux and Forbes (1995).
Market Share -market share based on assets (MSA) and deposits (MSD)	+ve and significant	Smirlock (1985) and Evanoff and Fortier (1988) both report +ve and significant although they do not include efficiency variable in their tests. Berger (1995) - 45 out of 60 are +ve and 22 significant.	Molyneux and Forbes (1995) - -ve but insignificant (result for 1986), Lucey (1995)- -ve but insignificant
Efficiency -cost-to-income ratio (COSIN) and	-ve and significant		
-a stochastic X-efficiency measure (X-EFF)	+ve and significant using ROE as the performance measure	Lucey (1995), using FDH efficiency metric reports +ve and significant coefficients for banks Berger (1995) - 60 of 60 equations are +ve and 59 are significant	Lucey (1995), -ve and significant for building societies using both FDH efficiency metric and distribution-free efficiency metric.
Ownership Structure (GOVT)	-ve and significant	Short (1979), Bourke (1989), GOVT is inversely related to profitability	Molyneux (1993), +ve but insignificant, Molyneux and Thornton (1992), Molyneux and Forbes (1995), +ve and significant.

Continued overleaf

Table 10.1 (*continued*)

Variables	Our Study	Similar Findings	Contrary Findings
Demand Conditions - per capita GNP (PCGNP)	-ve and significant using cost-to-income ratio as a proxy for managerial efficiency. (the coefficients are mixed using a stochastic X-efficiency measure)	Golberg and Rai (1996) using per capita income report -ve and significant	Smirlock (1985) using percentage growth in market deposits. Bourke (1989) and Molynuex (1993) using annual growth in money supply
Bank Size -Assets	-ve and significant	Smirlock (1985) -ve and significant. Evanoff and Fortier (1988) and Molyneux and Forbes (1995) -ve but not significant. Golberg and Rai (1996) -ve and significant for high concentration countries.	Golberg and Rai (1996), +ve and significant for low concentration countries.
Risks 1. Loans-to-assets ratio (LOANAS)	+ve but insignificant		Rhoades (1985), Evanoff and Fortier (1988), Molynuex (1993) and Molyneux and Teppett (1993), loans-to-assets ratio -ve and significant. Molyneux and Forbes (1995), loans-to-deposits -ve but insignificant.
2. Equity-to-assets ratio (EQAS)	Using cost- to-income ratio, EQAS are +ve and significant when ROA is used as the performance measure -ve and significant when ROE is used +ve but insignificant when a stochastic X-efficiency measure is used as a proxy for managerial efficiency using both ROA and ROE.	Molyneux (1993) using equity-to-assets ratio. Molyneux & Teppett (1993) and Molyneux & Forbes (1995) using capital-to asset ratio, +ve and significant. (Notes: The strong positive relationship found between ROA disappeared when ROE is used as the dependent variable is similar to that reported by Molyneux (1993) for yearly estimates on European banking)	Evanoff and Fortier (1988) using capital-to-assets ratio find -ve and significant coefficients. Golberg and Rai (1996) using total liability to total assets, -ve and significant

Continued overleaf

Table 10.1 (*continued)*

Variables	Our Study	Similar Findings	Contrary Findings
Explanatory power (adjusted r-squared)	The estimates using ROE perform less well than the ROA	Bourke (1989) and Molyneux (1993)	Smirlock (1985) find similar results using either ROE, ROC or ROA. Goldberg and Rai (1996) find little difference using ROA and ROE

negatively correlated with profitability once other variables are properly accounted for (Smirlock, 1985 and Evanoff and Fortier, 1988).

The effect of market share also appears to be similar to other studies that incorporate a direct efficiency measure in the model, such as Berger (1995), and to those studies that do not include this measure, such as Smirlock (1985) and Evanoff and Fortier (1988). It is concluded in this thesis that the positive and significant coefficients suggest evidence of market power, as noted by Rhoades (1985) and Kurtz and Rhoades (1991), rather than efficiency as argued by Smirlock (1985) and Evanoff and Fortier (1988). This is because, in our case, managerial efficiency is properly accounted for in the model, as in other more recent studies. According to Berger (1995), who challenges Demsetz's (1973) view that the profits of the leading firm are due to greater efficiency rather than some form of market power, market share represents the market power of the larger firms gained through various activities such as advertising, locational networks and business connections.

The findings relating to managerial efficiency, that X-efficiency or superior management of resources among ASEAN banks is associated with higher profits, conform to those reported by Berger (1995) on US banks and Lucey (1995) on Irish banks. Goldberg and Rai (1996) also reported a positive, though not significant, relationship between X-inefficiency and profitability when pooling eleven European countries.

As for ownership structure, government control of banks is correlated inversely with profitability. This is in agreement with the results of Short's (1979) and Bourke's (1989) studies, but contrary to that reported by Molyneux and Thornton (1992) and Molyneux and Forbes (1995). That government-owned ASEAN banks earn smaller profits than their private counter parts supports Fry's (1988) assertion that many of the state banks in developing countries allocate credit on the basis of development priorities rather than credit worthiness which may lead to substantial non performing loans that depress their profit margins.

The demand for financial services, as proxied by per capita GNP in our case, has a negative impact on bank performance, a finding similar to that of Golberg and Rai (1996) who included this variable in their estimation of structure-performance in European banking. Golberg and Rai suggest that the evidence is consistent with a maturity hypothesis, that banks in countries with higher per capita income are assumed to have a banking system that operates in a mature environment resulting in more competitive profit margins.

The negative impact of ASSETS as a proxy for bank size on bank's profits was a finding confirmed in an earlier study by Smirlock (1985) and Goldberg and Rai (1996) for high concentration countries. This suggests the possibility that larger banks in the ASEAN countries are diversifying their asset portfolios, implying less risk and lower returns for these banks. Conversely, for low concentration countries, Golberg and Rai (1996) found that bank size is positively and significantly related to bank profitability. The negative impact again suggests that any positive influence on profits from scale economies may be partially offset by a greater ability to diversify assets resulting in lower risks and a lower required returns.

With regard to the influence of capital structure (equity-to-assets) on performance when efficiency is also accounted for, the results differ according to the use of either cost-to-income or stochastic X-efficiency to measure bank efficiency, and the use of either return on assets (ROA) or return on equity (ROE) to measure bank performance. Using the cost-to-income ratio, there is a positive and significant relationship between equity-to-assets and ROA, but changes sign from positive to negative and remains significant when ROE is used as the performance measure. This is consistent with the results reported by Molyneux (1993) for yearly estimates on European banking where there is also a positive effect for ROA and a negative effect for ROE. Furthermore, the positive impact of equity-to-assets on bank profitability is similar to the results in Molyneux (1993). According to Molyneux (1993), the positive impact of capital structure on profitability indicates that the cost of equity capital is relatively cheap. However, when the more comprehensive stochastic X-efficiency measure is used as a proxy for managerial efficiency, the coefficients for equity-to-assets are positive and significant when ROA is the performance measure and remain positive but insignificant when ROE is the performance measure, implying that capital structure does influence the profitability of ASEAN banks during the period under study.

Our results provide no evidence that the proportion of assets in the form of loans has a significant impact on bank profitability, contrary to the findings of Rhoades (1985), Evanoff and Fortier (1988), Molyneux and Teppett (1993) and Molyneux (1993), who all reported a negative and significant impact of loans-to-assets on bank profitability. We may infer in the case of the present study that, although loans yield a higher return than other bank assets such as investment assets, the proportion of loans in ASEAN bank balance sheets has little impact on profitability between 1991 and 1995.

Finally, overall, the estimates using ROE perform less well than ROA as the performance measure. This was a finding consistent with previous studies, *e.g.* Bourke (1989). However, our estimates contradict Smirlock (1985) who found similar results employing either of three profit measures, *i.e.*; return on equity, return on capital or return on assets. Goldberg and Rai (1996) find little difference between the results using ROA and ROE as the performance measure.

10.3 Limitations

The limitations of the analysis undertaken in this research have been mentioned throughout this thesis. Nevertheless, the main limitations will again be summarised in this section. Indeed, like any other study, this thesis is not without its shortcomings, as identified earlier in Section 6.3 and 7.5.

One major problem is the definition of the banking markets. Our empirical analysis uses total banking sector assets and total banking sector deposits and includes both the banking sector and the non-banking component of the financial sector as more detailed data is unavailable. As mentioned earlier in Chapters 2 and 3, the non-banking sectors play an important role in the financial systems in the ASEAN region, and there is much interaction between the two. Therefore, there are also arguments in favour of the more comprehensive definition. We recognise that this may not be an ideal solution, but it is certainly adequate given that the activities captured by the definition represent the financial system as a whole in circumstances where a discrete banking sector may anyway be unobservable.

Another problem is the use of country-specific variables which we replicate from previous studies on the structure-performance relationship. These variables may not take account of individual country differences in the required manner. In order to overcome this problem, we also estimate the various relationships country by country without relying on country-specific variables to discriminate between the ASEAN member states.

Our empirical analysis uses two measures to capture bank efficiency; *i.e.*, the cost-to-income ratio and a stochastic X-efficiency measure. Neither the standard approach of measuring efficiency by the cost-to-income ratio nor the stochastic X-efficiency measure may capture the component effects of efficiency in the light of economies of scale and economies of scope. However, this study does provide a starting point given that it is the first such investigation of ASEAN banking markets, and it is recommended further research should focus more on those aspects of efficiency which include the impact of scale and scope economies rather than on a single measure. This would be of particular interest to the policy makers in the ASEAN member states. Nevertheless, it must be noted that the estimation of X-efficiency is a relatively new field of research, and the comparison with the simplistic cost-to-income ratio provides a useful analysis in its own right.

Finally, the data requirements could not be met in full from standard sources. This involved an extensive programme of data collection from ASEAN banks and banking authorities, followed by validation and completion of the data set available electronically. In particular, information on ownership, size and total banking sector activities were collected in this way. A more ambitious research programme was not possible although it was planned at the outset, as certain variables (*e.g.* number of employees) could not be completed due to continuing problems with missing data as a number of banks were reluctant to divulge this information.

In general, given the above limitations, the analysis presented in this thesis gives considerable insight into the relationship between market structure and performance in the ASEAN banking markets, from which certain policy implications can be drawn. Of particular importance is the evidence that merger activity that creates more large banks is more consistent with better performance than higher concentration among the existing large banks.

Until now, no study of this kind has been undertaken in this region, previous studies having focussed on the US and European banking markets. Nevertheless, there are clear signs of growing interest in this topic beyond these advanced economies. Because the methodology relies heavily on the standard approach to testing the link between market structure and bank performance, this task is not without its difficulties and inherent limitations in the ASEAN context, as mentioned. As the first study of its kind, the findings should open a fruitful avenue of future research in the area of bank structure and performance not only in the five countries involved (Singapore, Malaysia, Thailand, the Phillippines and Indonesia) but also elsewhere.

Appendix 1

List of Data Sources From ASEAN Authorities

1. Singapore

   A. Monetary Authority of Singapore
   10, Shenton Way, MAS Building, Singapore 0207
   Robinson Road, P. O. Box 52,
   Singapore 9001
   Cables: MONETARY SINGAPORE
   Telex: "ORCHID" RS 28174
   Facsimile: 2299491, Telephone: 2255577

   B. Ms Diane Leong
   Assistant Director (Foreign Institutions)
   Banking and Financial Institution Group
   Monetary Authority Of Singapore
   Singapore

2. Malaysia
   Bank Negara Malaysia
   Jalan Dato Onn
   50480 Kuala Lumpur
   Malaysia
   Phone Number: 603 2988044
   Fax Number: 603 2912990

3. Thailand

   A. Bank of Thailand
   273, Samsen Road
   Bangkhunprom, Bangkok 10200
   Tel: 662 283-5353, 283-5010
   Fax: 662 280-0449, 280-0626

B. Mathcc Supapongse
Chief, Money and Finance Section
Economic Research Department
Bank of Thailand
Samsen Road, 273 P. O. Box 154
10000 Bangkok
Thailand
Fax Number: 662 - 282-5082

4. The Philippines

A. Bangko Sentral Ng Pilipinas
Mabini Street
Corner Vito Cruz Street
1004 Manila
Philippines
Phone Number: 63 2 50 70 50
Fax Number: 63 2 59 73 63

B. EE B. Barin
Officer-in-Charge
Public Information, Relations and Special Events Office
Bangko Sentral Ng Pilipinas
Mabini Street Corner Vito Cruz Street
1004 Manila
Philippines

5. Indonesia

S. Anton Tarihoran
Monetary Statistic Division
Bank Indonesia
Jakarta
Indonesia

Appendix 2

Consumer Price Index Deflator For ASEAN-5

Table A2.1

Consumer Price Index for ASEAN-5

	1990	1991	1992	1993	1994	1995
Singapore	3.4	3.5	2.3	2.4	3.1	1.7
Malaysia	2.8	2.6	4.7	3.5	3.7	3.4
Thailand	6.0	5.7	4.1	3.4	5.1	5.8
Philippines	12.7	18.7	8.9	7.6	9.0	8.1
Indonesia	7.8	9.4	7.5	9.7	8.5	9.4

Source: IMF (1998,1995), World Economic Outlook, May
IMF (1998), Press Information Notices, no.1, January-April.

Table A2.2

Consumer Price Index Deflator for ASEAN-5

	1990	1991	1992	1993	1994	1995
Singapore	1.175	1.136	1.098	1.073	1.049	1.017
Malaysia	1.225	1.192	1.162	1.109	1.072	1.034
Thailand	1.341	1.265	1.196	1.149	1.112	1.058
Philippines	1.847	1.638	1.381	1.267	1.178	1.081
Indonesia	1.651	1.531	1.399	1.302	1.187	1.094

Source: Using data from Table A2.1above with 1996 as the base year.

Appendix 3

Stochastic Cost Frontier Maximum Likelihood Parameter Estimates

Variable	Parameter	Coefficients	Standard Error	T-Ratio
β_0	Intercept	6.322	0.035	183.156
β_1	$\ln Q_1$	0.780	0.010	80.362
β_2	$\ln Q_2$	0.229	0.011	20.411
β_3	$\ln(P_1/P_3)$	0.655	0.018	37.253
β_4	$\ln(P_2/P_3)$	0.332	0.016	21.091
β_5	$\ln Q_1 \ln Q_1$	0.064	0.005	13.267
β_6	$\ln Q_1 \ln Q_2$	-0.132	0.011	-12.054
β_7	$\ln Q_2 \ln Q_2$	0.069	0.006	11.081
β_8	$(\ln P_1/\ln P_3)^2$	-0.063	0.009	-7.073
β_9	$(\ln P_1/\ln P_3)(\ln P_2/\ln P_3)$	0.037	0.019	1.917
β_{10}	$(\ln P_2/\ln P_3)^2$	0.020	0.011	1.720
β_{11}	$\ln(P_1/P_3)\ln Q_1$	0.141	0.011	13.073
β_{12}	$\ln(P_1/P_3)\ln Q_2$	-0.109	0.014	-7.899
β_{13}	$\ln(P_2/P_3)\ln Q_1$	-0.110	0.011	-10.228
β_{14}	$\ln(P_2/P_3)\ln Q_2$	0.085	0.012	6.996
β_{15}	lneq/ta	-0.098	0.013	-7.790
β_{16}	$(\text{lneq/ta})^2$	-0.080	0.015	-5.145
β_{17}	lnllp/loans	-1.558	0.831	-1.875
β_{18}	$(\text{lnllp/loans})^2$	28.020	6.564	4.269
β_{19}	year	-0.172	0.023	-7.443
β_{20}	year^2	0.028	0.004	7.823
sigma-sq.	$\sigma^2 = \sigma^2_v + \sigma^2_u$	0.047	0.004	10.896
gamma	$\gamma = \sigma^2_u/(\sigma^2_v + \sigma^2_u)$	0.848	0.041	20.727

Notes: Q_1 = Total Loans; Q_1 = Other Earning Assets; P_1 = Price of Funds; P_2 = Price of Labour; P_2 = Price of Capital; eq/ta = Equity-to-Assets Ratio; llp/loans = Loan-Loss-Provisions divided by Loans; year = year 1 to 5 to represent year 1991, 1992, 1993 1994 and 1995.
The original figures are deflated with a CPI deflator relative to 1996 prices.

Appendix 4

Pooled ASEAN Banks Estimates of the SCP Relationship (without the inclusion of dummy year - cost-to-income as a proxy for efficiency)[a]

	ROA (1)	ROA (2)	ROE (3)	ROE (4)
CONSTANT	2.0248* (9.5267)	1.9389* (8.9120)	31.5851* (17.5251)	30.9247* (16.9547)
CR10	-0.0060836* (-2.9150)	-0.0034871** (-1.7772)	-0.089964* (-4.5002)	-0.069426* (-3.5861)
MSA	0.07084* (5.2266)		0.61978* (4.2549)	
MSD		0.036210* (3.4851)		0.27976* (2.3902)
COSIN	-0.020956* (-11.7245)	-0.020699* (-11.3970)	-0.19433* (-12.5982)	-0.19214* (-12.2644)
GOVT	-0.48398* (-7.6663)	-0.41941* (-6.7765)	-5.5580* (-9.0478)	-5.0429* (-8.5703)
PCGNP	-0.00003443* (-10.5499)	-0.00003277* (-10.3552)	-0.0003393* (-11.6893)	-0.0003258* (-11.6306)
ASSETS	-0.00003379* (-3.7225)	-0.00001740* (-2.2294)	-0.0001306 (1.6234)	0.00000527 (0.062040)
LOANAS	0.0012395 (0.56590)	0.0003815 (0.17337)	0.017413 (0.98467)	0.010290 (0.57648)
EQASS	0.091166* (10.7428)	0.090042* (10.6323)	-0.15947* (-3.9962)	-0.16862* (-4.1836)
$\bar{R}$- squared	0.491	0.481	0.294	0.283
F	112.48	107.88	49.03	46.51
Diagnostic tests				
Functional form	20.3038*	23.2101*	0.77247	0.14436
Normality	466.2031*	464.6563*	124.3839*	128.8019*
VIF range	1.11-4.86	1.07-5.31	1.11-4.86	1.07-5.31

Notes: [a] All estimations are based on White's (1980) heteroscedasticity-adjusted standard errors.
t-statistics in parentheses
*, ** significant at the five and ten percent levels
Number of observations = 922
The F-tests for equation (1) is 2.72, equation (2) is 2.25, equation (3) is 1.44 and equation (4) is 1.07. The 5% critical values for an F-distribution with the relevant degrees of freedom is 2.37, so in all equations except equation (1) we cannot reject the null hypothesis of no seasonal affects.

Source: Author's own estimates

Appendix 5

Pooled ASEAN Banks Estimates of the SCP Relationship (without the inclusion of dummy year- stochastic X-efficiency measure as a proxy for efficiency)[a]

	ROA (1)	ROA (2)	ROE (3)	ROE (4)
CONSTANT	-0.10579 (-0.17537)	0.45045 (0.73377)	4.8543 (1.0456)	9.7132* (2.0098)
CR10	-0.0068646 (-1.2052)	-0.011249** (-1.9080)	0.0026954 (0.055998)	-0.033476 (-0.66213)
MSA	0.10140* (6.2272)		1.0960* (5.5534)	
MSD		0.021521 (1.6179)		0.32691* (2.0680)
X-EFF	0.49951 (1.1786)	0.46119 (1.0919)	5.1222 (1.6385)	4.7605 (1.4992)
GOVT	-0.50864* (-7.8033)	-0.40580* (-6.4141)	-6.0762* (-8.0913)	-5.0089** (-6.8317)
PCGNP	0.00006947 (0.99237)	-0.00002598 (-0.37308)	0.0019403* (3.2876)	0.0010440** (1.7683)
ASSETS	-0.00002833* (-2.9678)	0.00000697 (0.80981)	-0.0001826 (-1.5808)	0.0001337 (1.0600)
LOANAS	0.0031553 (1.4950)	0.0026285 (1.2268)	0.015332 (0.81084)	0.011547 (0.59580)
EQASS	0.11623* (13.9567)	0.11191* (13.5627)	0.052269 (1.0517)	0.011892 (0.23639)
$\overline{R}$- squared	0.389	0.373	0.138	0.111
F	67.57	63.31	17.83	14.08
Diagnostic tests				
Functional form	30.1113*	27.3644*	0.26605	4.1363*
Normality	314.0231*	297.1693*	132.1677*	129.4983
Heteroscedasticity	-	-	3.3546	1.0275
VIF range	1.03-6.78	1.03-6.57	1.03-6.78	1.03-6.57

Notes: [a] Estimations for equations (1) and (2) are based on White's (1980) heteroscedasticity-adjusted standard errors..
t-statistics in parentheses
*, ** significant at the five and ten percent levels
Number of observations = 837
The F-tests for equation (1) is 2.23, equation (2) is 1.62, equation (3) is 1.76 and equation (4) is 1.19. The 5 °o critical values for an F-distribution with the relevant degrees of freedom is 2.37. Therefore in all equations we cannot reject the null hypothesis of no seasonal affects.
Source: Author's own estimates

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