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DEPARTMENT OF ECONOMICS

MONETARY POLICY IN A DEREGULATED COMMERCIAL BANKS AND IN THE PRESENCE OF ISLAMIC BANKS

by

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To my wife, Bushro Abu Bakar;
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daughters Nur Sakinah and
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you.

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ABSTRACT

The main objective of this study is to evaluate the impact of monetary policy on bank behaviour in a deregulated environment and in the presence of Islamic banks. It is important to assess the way monetary policy works in this setting, especially for predicting the effects of financial deregulation policies and the introduction of Islamic-based banking with which Malaysia is experimenting.

The results show that, first, the process of deregulation is brought about by a number of undesirable macroeconomic outcomes. As a result, the magnitude and scope of monetary policy instruments have been changed. Second, the deregulation has resulted in an increase in the degree of competition, a reduction in liquidity, and a better allocation of portfolios. Third, interest rates and bank credit are expected to be able to interact closely with economic activity and the model of the banking firm needs to be constructed as a prerequisite for a clear understanding of the conduct of monetary policy. Fourth, within the context of an integrated portfolio which emphasises the supply of and the demand for assets and liabilities, it is demonstrated that the structural and regulatory changes can have a bearing on the appropriate choice of policy targets and instruments. Specifically, the inter-bank rate is shown to be a potentially effective target for policy in a deregulated environment.

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CHAPTER 1

INTRODUCTION

1.1 Problem Statement

Commercial banks have been, and remain, the most important type of financial institution in the Malaysian financial system. In terms of magnitudes, the total assets of commercial banks (over RM175 billion at the end of 1992) exceed the sum of the total assets of the next three largest institutions, Employee Provident Funds, Finance Companies and Merchant Banks. In terms of diversity, the assets of commercial banks include the range of assets held by all of the other more specialised institutions, and also, the liabilities of commercial banks correspond to the range of liabilities of all other financial institutions.

The importance of commercial banks in the Malaysian financial system depends, however, not only on the magnitude and diversity of bank assets and liabilities, but also on the essential role of commercial banks in the transmission of Central Bank policy. Although it has been disputed whether commercial banks should be the only financial institutions directly affected by Central Bank policy, there can be little doubt that this in fact has been the case, (see, for example Gurley and Shaw (1956), and Tobin (1963). Central Bank policy operates directly on the commercial banks through several well-known instruments of monetary policy: open market operations which affect the total amount of bank reserves, the discount rate and the availability of loans from the Central Bank, and the setting of reserve requirements. The objectives of monetary policy, as implemented through these instruments, are then achieved by attempting to control the magnitude and composition of the assets and liabilities held by the commercial banks.

It is in this setting that the importance of monetary policy and the commercial banks arises. However, the evidence indicates that during the past decade, the importance of the deregulation process for the role of market forces and the efficiency of

commercial banks has been increasingly emphasised. This has focused attention on the role of commercial banks as a factor transmitting the effectiveness of the existing instruments of monetary policy.

In the monetary literature, researchers have asked whether financial deregulation affects the transmission of monetary policy. According to a traditional view, monetary policy is transmitted to the economy through bank liabilities (Gurley and Shaw, 1960). Several recent articles examine how financial deregulation might alter those channels. For example, OECD (1989) and Blundell-Wignall, Browne and Manasse (1990) investigate whether the term structure of interest rates alters the transmission mechanism for monetary policy. Others (BIS (1984) and Kaufman (1986)) argue that financial deregulation raises risks in banking, thereby weakening the impact of monetary policy.

To investigate whether financial deregulation bears on the transmission mechanism, the impact of financial deregulation and the presence of Islamic banks in the banking system will be considered. In particular, the question is raised as to whether the impact depends on how banks behave. VanHoose (1983) has shown that the difference in market structure produces alternative forms of bank behaviour. This would affect macroeconomic variables if the interest rate is the target variable adopted by the Central Bank. In one case, Hester (1981) claims that increased competition in the banking system will serve to undermine monetary control by reducing the stability of the banking system, thereby decreasing the range of policy options available to the Central Bank. In general, the relative effect is ambigous.

In Malaysia, the banking system has been gradually deregulated. However, the process of financial deregulation has produced a market where the interest rates charged by the leader bank in the loan and in certain deposit markets can be lower or higher than the interest rates charged by the follower banks and the price takers in the reserves and securities markets. In addition, a part of the banking system is allowed to operate based on the profit-sharing system. The policy implications of these two types of markets are different.

In addition, a stable and efficient banking system is needed at the heart of the process of economic development. Funds need to be able to flow to the parts of the economy where they are most needed; funds generated by savings must be channelled into appropriate investment avenues. Unfortunately, there are times when these twin requirements of stability and efficiency seem to come into conflict. Stability may come to mean over-cautiousness, whereas efficiency may entail higher risk-taking and lead to financial fragility. It then becomes important for the Central Bank to tread a careful path between ensuring the integrity of the banking system and enabling entrepreneural risk. Allowing free market forces to have a greater strength in the allocation of funds may require a loosening of the regulations that were originally intended as protection.

Thus, it is important to assess the scope and magnitude of possible structural and regulatory changes in the commercial banks that may have affected the transmission of monetary policy. Second, to understand the nature of the financially deregulated commercial banks and the way monetary policy works in this setting is essential for predicting the effects of financial deregulation policies and the introduction of Islamic-based banking with which Malaysia is experimenting.

1.2 Objectives

The main objective of this study is to evaluate the impact of monetary policy on bank behaviour in a deregulated environment and in the presence of Islamic banks, and hence on the target variables. More specifically the objectives are as follow:

a. to analyse the changing objectives, instruments and targets of monetary policy in a deregulated environment.
b. to evaluate the process of financial deregulation which has been introduced in the Malaysian banking system.
c. to suggest an alternative model of bank behaviour in a deregulated environment. This model views banks as price takers in reserves and securities markets, and price setters in the loan markets and in certain

deposit markets.

d. to construct a model of an Islamic bank with the introduction of profit-sharing.

e. to advance hypotheses as to the methods by the banking system as a whole adjusts to changes in the instruments of monetary policy in a deregulated environment and in the presence of Islamic banks.

1.3 Organisation of the Study

Chapter 2 will examine the process of financial deregulation which has been gradually introduced in the Malaysian banking system. The focus will be on four main subjects. First, to critically evaluate whether the objectives and instruments of monetary policy have been changed by deregulation. It is hoped that such an evaluation will shed some light on the practical implications of past experience. Second, the forms of regulations will be discussed with a view towards analysing the process of deregulation. Third, the recent changes in the structure of banking with the establishment of an Islamic bank in 1983 will be investigated. Fourth, the effect of deregulation will be examined. The effect of deregulation on bank competition; the stability and financial fragility of commercial banks; and the reallocation of portfolios and liquidity in the banking system will be discussed next.

Developments in the study of the relationship between monetary policy and commercial banks will be surveyed in Chapter 3. The survey will be divided into two main sections, the first section will review the early literature and the second section will discuss more recent work. The discussion of the first section will begin with the literature contributed by Fisher, Keynes and Friedman-Shwartz. These studies will provide a platform for analysis of the relationship between monetary policy and commercial banks. This section will continue by discussing the counter-argument, led by Gurley-Shaw and others, which stresses the importance of the financial institutions, especially in the loanable funds process. The relevance for our purpose is that the subsequent sections and also the current literature incorporates many of these ideas.

The discussion of current literature will be divided into five sections. The first section will discuss the literature that examines the rationing of credit in imperfect markets. This is so because much of the new work on the relationship between monetary policy and commercial banks will rest on intuition that comes from this literature. The current work on bank structure and monetary policy will be surveyed next. The approach is to address the implications of increased competition for the effectiveness of monetary policy. The third section will discuss the basic features of what constitutes a workable and productive theory of the banking firm. Fourth, the conduct of monetary policy in an Islamic banking environment will be explored. The final section will examine the literature which has focused directly on the role of monetary policy in a deregulated environment.

The findings in Capters 2 and 3 will be used to formulate the model of bank behaviour in a deregulated market (Chapter 4) and in the presence of Islamic banks (Chapter 5). In Chapter 4, the discussion will be organised into two main sections. Section 4.2 will deal with an overview of bank modelling, that is, models which attempt to explain the development of bank modelling from liquidity management to the joint determination of the structure of assets and liabilities and their interaction in a regulated environment.

The basic approach which will be utilised in section 4.3 is as follows. In a full equilibrium model of bank behaviour, the behaviour of profit maximising banks that adopt price leadership in loan markets and in certain deposit markets, and price takers in securities markets will be examined. The market demand and supply schedules for the banks' assets and liabilities will be derived to determine the possible factors affecting their behaviour. A model of bank behaviour which incorporates outputs, inputs, monetary policy and profit-sharing will be formulated in Chapter 5.

In Chapter 6, the empirical evidence based on the model of Chapters 4 and 5 will be examined. A linear model will be used that attempts to re-enact and illustrate both the estimation techniques and the results in this chapter. Furthermore, the performance of the model will be evaluated by performing simulation within the

sample periods. Finally, simulation experiments will be conducted to obtain a better understanding of the reaction of the key variables to a range of policy changes.

Chapter 7 will concentrate on the summary and conclusions from this study.

CHAPTER 2

FINANCIAL DEREGULATION IN MALAYSIAN BANKING

2.1 Introduction

The financial deregulation has been initially introduced in the late 1970s.[1] However, the world recession in the early 1980s and the domestic recession in 1985-86 resulted in the Malaysian economy facing slow growth in GDP, high unemployment and high balance of payments deficit as percent of GDP. As a result, financial deregulation has been gradually introduced. The Central Bank now faces issues concerning how to operate monetary policy. In particular, to evaluate whether the instruments and targets of monetary policy have been changed by financial deregulation, and through this channel, may have some macroeconomic implications.[2]

In addition, the deregulation process has been reinforced by a greater reliance on prices and market forces in financial markets, and is intended to produce a better allocation of resources, more competition and as a result more output and faster growth.[3] At the same time, the deregulation process is also aimed at keeping abreast of the rapidly changing developments in the banking industry and ensuring that the

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1 During the oil price shocks (1973-1974), the most important objective of monetary policy was to keep inflation rate at a low and stable level. Since the Central Bank, as mentioned by Ismail (1993a), was not prepared to accept this phenomenon, a series of regulations were introduced. However, after 1978, these regulations were eased.

2 A discussion of the links between the operation of the financial sector and real economic activity can be found in Appendix-A.

3 Monetary policy must also evolve through the introduction of new forms of regulation to ensure that funds are appopriately allocated in the economy. Therefore, the changing forms of monetary policy may also shape the pattern of development of commercial banks in Malaysia, see Ismail and Smith (1993).

banks operate effectively within the bounds of prudent and sound banking practices.

A further complication in the case of the Malaysian banking system was the emergence of a banking operating on Islamic principles in 1983. This adds an extra element of competition in the system, together with interesting issues about how the Islamic and other commercial banks are able to co-exist and compete whilst operating in seemingly quite different ways.

The purpose of this chapter is to survey the evidence on the role of monetary policy during financial deregulation and to evaluate the extent and impact of deregulation in the Malaysian banking system. In particular, these focuses are on the mechanism whereby this policy may have affected real activity and is on the extent to which the deregulation process has contributed to competition, stability and financial fragility, and the reallocation of portfolios and liquidity in the banking industry.

The rest of this chapter is organised as follows. Section 2.2 tries to analyse how the objective variables have performed in the last few years and what reforms have been taken to achieve those objectives. Section 2.3 seeks to characterise the actual decisions of the Central Bank - how has policy deliberately altered and what are these changes intended to accomplish? Section 2.4 provides a short overview of the forms of regulations. Section 2.5 examines the establishment of Islamic-based banking to provide an opportunity for conducting finance on a permitted basis. Section 2.6 discusses the effect of deregulation and its links with competition, stability and financial fragility, and reallocation of portfolios and liquidity in the banking system. Some conclusions are given in section 2.7.

2.2 The Objectives of Malaysian Monetary Policy

The objectives of monetary policy, as mentioned in the Central Bank Ordinance of 1959, are aimed at sustaining economic growth, maintaining a high level of employment and a low level of infiation, and ensuring a reasonable position in respect of the balance of payments. In this regard, the Central Bank is instructed to issue

currency and to keep reserves safeguarding the value of that currency and to act as banker and financial adviser to the government; and in particular, to promote monetary stability and a sound financial structure, and to influence the credit situation to the advantage of the country. A major concern of the Central Bank is the effect on the various objectives as a result of the changes in economic conditions and the financial environment.

In order to permit a little reality to creep into the above discussion, Table 2.1 shows at how the objective variables have performed in the last few years. This table contains some figures of the objective variables. Thus, if the economic objectives are to have a stable price level, a low unemployment rate, along with a stable balance of payments and a consistently growth rate of GDP, then Table 2.1 is not full of cheer. In particular, in the 22 years covered (1971-1992), there was one recession, two oil price shocks and two boom periods. The economy grew at an annual average of 7.2 percent during the 1970-1992 period, with inflation and unemployment rates respectively averaging about 4.8 percent and 6.5 percent, and the external position remaining comfortable.

The Malaysian economic performance became unstable, however, during the early 1980s. The world economy in the early 1980s was characterised by the most severe and prolonged global recession since the 1930s, with high energy prices in the wake of the second oil shock of 1979-1980, severe global inflation stemming from price pressures from the major industrial countries and persistently high interest rates in both nominal and real terms.

In addition, the emergence of currency instability associated with the marked strengthening of the United State dollar, a virtual stagnation of world trade and increasing protectionist trade measures (via non-tariff barriers) in the industrial world had also contributed to the world recession. However, the Malaysian economic performance has strengthened further since the recovery emerged in 1983.

Table 2.1
The Objective Variables in the Malaysian Economy, 1971-1992.

Year	Rate of inflation	Unemployment rate	Real GDP annual rate of growth in 1985 prices	Balance of payment surplus as percent of GDP
1971	1.6	7.5	7.1	-1.1
1972	3.2	7.5	9.4	-2.3
1973	10.6	7.3	11.7	0.8
1974	17.3	5.0	8.3	-3.9
1975	4.4	7.0	0.8	-3.8
1976	2.7	6.8	11.6	3.8
1977	4.8	6.7	7.8	2.6
1978	4.9	6.8	6.7	0.6
1979	3.6	5.6	9.3	4.8
1980	6.7	5.3	7.4	-1.3
1981	9.7	5.3	6.9	-10.0
1982	5.8	5.2	5.9	-13.5
1983	3.7	6.0	6.3	-11.8
1984	3.9	5.8	7.8	-5.1
1985	1.1	6.9	-1.0	-2.1
1986	1.4	8.3	1.0	-0.5
1987	1.2	8.2	5.4	11.3
1988	2.6	8.1	8.9	7.4
1989	2.2	7.1	8.7	0.7
1990	4.0	6.0	9.8	-3.8
1991	4.5	5.6	9.0	-9.7
1992	4.8	5.4	8.5	-3.4

Source:
a. *International Monetary Fund, International Financial Statistics Yearbook 1991.*
b. *International Monetary Fund, International Financial Statistics, February 1994.*
c. *Lim, D. (1975) Readings on Malaysian Economic Development. Kuala Lumpur: Oxford University Press.*

In the mid-1980s, the sharp decline in commodity prices particularly oil prices, rising domestic inflationary pressure and the erosion of foreign demand had a significant impact on the Malaysian economy.[4] The economy took a sudden downturn in 1985-86, GDP growth faltered and unemployment increased. The desire to counter the effect of world and domestic recession encouraged the government to launch major reforms through several means; banking and financial reforms, revitalisation of the private sector, active external policies, a supportive role taken by the public sector and the rehabilitation of public enterprises.

The positive response of the Malaysian economy to these reforms was facilitated by the absence of domestic inflationary pressures and the reduction of balance of payments current account deficit as percent of GDP. A strong recovery started in 1987, led by a boom in manufactured exports. In the following years, real GDP growth picked up sharply at an average of 8.4 percent for the period 1987-1992. However, the domestic inflationary pressures which set in at the end of 1989 produced another focus of monetary policy action, especially to sustain private investment and economic growth.

2.3 Monetary Policy Instruments and Financial Deregulation

To stimulate the economic recovery in which the private sector was designed to play the leading role, banking and financial reforms through financial deregulation and the introduction of the Islamic-based banking were introduced in the 1980s.[5] In consonance with these reforms, the following discussion will concentrate on the question of whether the instruments of monetary policy have been affected by these

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4 In small, predominantly commodity-exporting countries, such as Malaysia, the variation of the exchange rate (in response to monetary policy changes) may be small relative to variations stemming from changes in world commodity prices (the terms of trade).

5 Throughout this chapter, the term 'monetary policy instruments' also applies to Islamic banks, except instruments which involve interest rate receipts and payments.

reforms and what are these changes intended to accomplish.[6]

The Central Bank relies on several interrelated instruments, namely required reserve and minimum liquidity requirements, open market operations, discounting policy, interest rates regulation, and credit control and guidelines of lending. In carrying out its policy, the Central Bank uses these instruments in a complementary fashion.

The instruments of monetary policy during the 1980s and early 1990s reflected changes in economic conditions and the financial environment. For most of the period, the instruments were generally aimed: to alleviate the tight liquidity position, to stabilise money market conditions, to promote the growth of domestic savings, to ensure that the priority sectors of the economy, namely the Bumiputera community, agricultural food production, housing buyers and small scale industries had ready access to bank credit and to improve the flow of credit to the private sectors.

In the course of recession, the Central Bank progressively moved to ease monetary policy, especially to reduce interest rates and hence, improve private sector confidence. The statutory reserve requirement was also reduced in April 1985 and again in October 1986, to signal the beginning of an easier monetary policy, (see Appendix B-1). This was followed by a downward adjustment of interest rates, first in June and October 1985 and again in December 1986, (see Appendix B-3). To further ease the liquidity conditions among the commercial banks, as shown in Appendix B-2, the minimum liquidity requirement was reduced to 18.5 percent and 17 percent in February and October 1986, respectively. Hence, potentially there would be more resources to lend for productive investments.

In a move to finance new investments in productive capacity in the agriculture, manufacturing and tourism industries, the New Investment Fund was introduced in

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[6] The banking and financial reforms have been introduced through several banking and monetary measures. Section 2.3 will concentrate on the monetary measures especially through monetary policy instruments. The banking measures will be discussed in Section 2.4.

1985. A new set of lending guidelines was also introduced every year to ensure that the priority sectors would continue to have ready access to credit at reasonable cost (see Appendix B-5).

In addition to the above policies, the open market operations, discounting policy and recycling of government deposits from and to the banking system were also used to ease the tight liquidity conditions and to exert a downward pressure on interest rates.

A further reduction of base lending rate in August 1987 and again in July 1988 was introduced to encourage private investment. Furthermore, open market operations were actively used in 1987 and 1988 (see Appendix B-4). This was aimed to improve liquidity and to avoid inflationary pressures.

In the following years, the instruments of monetary policy were centred on managing excess liquidity in the face of substantial capital inflows, internal receipts and in exerting a persistent downward pressure on domestic interest rates.[7] The instruments package involved an increase in the statutory reserve requirement, withdrawal of government deposits from the commercial banks, absorption of funds through direct borrowing by the Central Bank from the market and the liberalisation of the base lending rate.[8]

Although the Malaysian economy has achieved six consecutive years of strong growth, inflationary pressures have increased since the end of 1990. As part of the continuing effort of the Central Bank to curb inflation, the required reserve requirement has been extensively used as a tool to influence liquidity in the banking industry.

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[7] Internal receipts come mainly from the Employees Provident Funds (EPF), see BNM (1990), p. 27.

[8] The establishment of Islamic bank in 1983 produced a system where the return on loans/investment is determined by market forces. The liberalisation of the base lending rate in February 1991 was also intended for that purpose.

In summary, the banking and financial reforms have changed the instruments of monetary policy as a step towards financial deregulation. Furthermore, an Islamic-based system has been introduced. This is seen as desirable because the elimination of interest payment and receipt is part of deregulation process.

2.4 Forms of Regulation

The wave of financial deregulation in the West has created a new environment in the financial market. In Malaysia, since the Central Bank is not prepared to accept the consequences of this process, regulations have been eased more gradually. Below are listed the most important regulations.

a. Licensing

The Bank and Financial Institution Act of 1989 provided a limit on entry, that is, no person is allowed to open a commercial bank without obtaining a licence from the Ministry of Finance.[9] Limits on branching for foreign banks have been imposed since 1970 and also, in October 1989, the operations of foreign bank branches were given a five year transition period to be incorporated in Malaysia. Since then, foreign banks have been permitted to hold 100 percent of their equity.

b. Capital

Regulations on capital include:

i. the minimum paid-up capital for domestic banks and foreign banks is RM10 million and RM25 million respectively.

ii. commercial banks are required to transfer part of their profits into

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[9] At the same time, the commercial banks are allowed to transfer and undertake the business of a licensed bank under a scheme of reconstruction, amalgamation or merger.

reserve funds. If reserve funds are less than 50 percent of total paid-up capital, then commercial banks are required to transfer 50 percent of their profits into reserve funds. If reserve funds are more than 50 percent of total paid-up capital but less than 100 percent, then commercial banks are required to transfer 25 percent of their profits into reserve funds.

iii. since September 1989, in accordance with the Basle Agreement, domestic banks and foreign banks must maintain the minimium risk weighted capital ratio of 8 percent and 10 percent respectively, by the end of 1992 and

iv. any share transactions involving more than 5 percent of the total share for each commercial bank requires permission from the Ministry of Finance. No individual is allowed to hold more than 10 percent of the total share in each commercial bank. For any person other than an individual, the total share is limited to not more than 20 percent.

c. Required reserve requirement

Commercial banks are required to allocate a certain ratio of money at the Central Bank as a reserve requirement.[10] This ratio plays an important role in controlling the total liquidity of the banking system and the ability of commercial banks to expand loans. Therefore, the Central Bank has changed this ratio several times. All of the changes are listed in Table B-1. In addition, under the carryover provision, the daily sum of a bank's actual reserve over the bi-weekly reserve computation period must not b2e less than plus or minus 2 percentage points from the actual figure.

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[10] In history, there has been three "approaches" in required reserve computation. First, based on the percentage from total deposits (demand deposits, saving deposits and fixed deposits). Second, a modified approach adopted in 1973, based on the percentage from the total deposits and other deposit liabilities. Third, the present approach, started in 1979, which is based on the percentage of total eligible liabilities.

d. Minimum liquidity requirement

The minimum liquidity requirement is essential because commercial banks need to provide enough vault cash and other liquid assets to fulfil the demand for deposits withdrawal and loans. The same method of computation, as used in required reserve, has been applied to calculate the minimum liquidity requirement. The minimum percentage of liquid assets is given in Table B-2. The method is aimed to enhance flexibility and efficiency in fund management, and to reduce the volatility of the inter-bank rate.

e. Interest rate regulation

The main purpose of interest rate regulation is to safeguard the welfare of customers without imposing a higher lending rate. Commercial banks are also not allowed to pay higher interest rate on deposits, because this affects operating costs. In this sense, the interest rates on deposits cannot be higher than half a percentage point above that of the two largest banks in Malaysia. However, interest rates on fixed deposits of maturity more than 15 months are free. This regulation was abolished in February 1987.

Starting from November 1 1983, an interest rate on lending can be imposed up to a maximum of base lending rate (BLR) plus 4 percentage points depending on the creditworthiness of borrowers, collateral value and the duration of lending. In addition, a maximum interest rate penalty of 1 percent will be imposed on borrowers who are not paying the loans in instalments. At the same time , the establishment of Islamic-based banking in July 1983 has produced a system where its operations are not allowed to charge interest as a mechanism for allocating funds.

The maximum margin between BLR of other commercial banks and the two largest banks is fixed at 0.5 percent. This regulation does not apply to the priority sectors, (Bumiputera community, agricultural food production, housing buyer and small scale industries). However, the BLR was freed from the administrative control of the

Central Bank in February 1990.[11] And also, the maximum spread of 0.5 percentage point between the BLR of the two largest banks and the other banks was removed.

f. Regulation on lending

This regulation is provided to prevent commercial banks from taking extra risks which might jeopardise their efficiency. This includes:

i. *Loans limit*

Maximum punishment will be imposed on the commercial banks, if the approved loans exceed the limit set by the Central Bank. The maximum limit for loans for any customer is set at 30 percent of a bank's capital funds for domestic banks and 30 percent of net working funds for the case of foreign banks. This limitation is to avoid the misuse of power in granting loans, especially by bank officers who give credit facilities beyond their limit. In addition, there is a clear limit for 'big' loans, that is, where the amount of loans is more than 15 percent of the total shareholder funds, is already fixed at 50 percent of the total loans.[12] With these limitations, the excess of credit to certain borrowers can be avoided.

ii. *Loans to the banks' staff*

Under Section 62 and 64 of BAFIA 1989, commercial banks are not permitted to give loans to directors, bank officers or a private company in which they own shares. This is to avoid the conflict of

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11 Each commercial bank was free to declare its own BLR on the basis of its own cost of funds, including the cost of holding required reserves, meeting the minimum liquidity requirement, and managing admistrative and overhead costs but excluding the cost of provisions for bad and doubtful loans.

12 In aggregate, this loan cannot exceeed 15 percent of the bank's capital funds (paid-up capital and reserves) or net working funds (net foreign currency and lending in Malaysia and abroad).

interest and misuse of power in making decisions on those loans.

g. Guidelines

The Central Bank produces several guidelines to commercial banks:

i. ***Guideline on lending to the priority sectors.*** The detail of these guidelines can be seen in Table B-5.

ii. ***Guideline on provision of bad and doubtful loans.*** A loan is considered as bad or doubtful, when principal and interest rate is due for at least 6 months. The Central Bank requires the commercial banks to provide 50 percent for doubtful loans and 100 percent for bad loans.

iii. ***Guideline on interest in suspense.***
Interest from unpaid loans should be considered as income only after they receive the money.

iv. ***Guideline on investment in share.***[13]
Commercial banks are allowed to invest in Malaysian Airline System Berhad (MAS), Malaysian International Shipping Corporation Berhad (MISC), Syarikat Telekom Malaysia Berhad (STM), Edaran Otomobil Nasional Berhad (EON), manufacturing companies and selected companies and also property trust units.[14]

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[13] The first credit rating agency in Malaysia, Rating Agency Malaysia Berhad, was established in November 1990 to conduct independent credit ratings of existing prospective issues of private debt securities. This will add credibility to the market and promote investor confidence, as well as to allow highly rated corporations to have ready access to cheaper funds.

[14] Investment in trust shares is limited to 10 percent of the total paid-up capital or 10 percent of the total paid-up capital and reserve funds of the respective corporation (depends on which percentage is the lowest). The maximum

h. Other regulations.[15]

The following regulations are part of the Central Bank's continuing effort to increase the efficiency of the banking system and promote an active secondary market.

i. *Payment system*

The National Automated Cheque Clearing System (SPAN) was launched in October 1986 to speed up the process of cheque clearing in Malaysia. This new system is expected to increase efficiency and hence, reduce the cost of doing business. The implementation of SPEEDS (Sistem Pemindahan Elektronik untuk Dana dan Sekuriti), that is Interbank Fund Transfer System (IFTS) and Scripless Securities Trading (SST), has enabled the commercial banks to transfer and transact interbank funds, government papers and Cagamas bonds via computer.

ii. *Capital Market Reforms*

The commercial banks have been appointed as one of the principal dealers underwriting the primary issues of Malaysian government securities and Malaysian treasury bills. In addition, the Central Bank's open market operations have also been conducted through the commercial banks.[16] In conjunction with this reform, the National Mortgage Corporation (Cagamas) was established in December 1986

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buying of share is 25 percent of the total paid-up capital and reserve funds for domestic banks and 25 of the total net assets for foreign banks.

15 These regulations are in conjunction with the forces of change in innovation introduced by the Central Bank.

16 The Central Bank may still provide direct access to its rediscount window to commercial banks.

to promote an active secondary mortgage market.[17]

The above discussion shows that the commercial banks regulations generally fall into three broad categories, first, regulation on prices (including ceilings on bank deposit rates and lending rates), second, regulation on quantities, (such as reserve requirements and capital controls), and third, regulations governing the extensiveness and efficiencies of activities of individual commercial banks, (such as those under which commercial banks are authorised to carry out tendering functions). The nature of financial regulations in Malaysia and the speed with which they have been removed are shown in Table 2.2.

In general terms, there are considerable differences in the extent to which price regulations have been removed, and quantities and power regulations still apply. The price regulations have been removed gradually throughout the 1970s and 1980s.

2.5 Recent Changes in the Malaysian Banking System

Islam possesses its own paradigm of economic relations within the context of an entire Islamic system based on injunctions and norms called the Islamic law or Sharia.[18] *Inter alia*, the Sharia specifies rules that relate to the allocation of resources and the working of markets. Similarly, rules and requirements have been specified that define the framework within which the underlying banking system can be designed.[19] In order to fulfil the need for commercial banks based on the Sharia, an Islamic bank was established in July 1983. The main requirement of this bank is the elimination of interest as a mechanism for allocating funds. The questions arise as to the methods or instruments which could give effect to the requirements of such

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17 Cagamas was established to buy housing loans from the commercial banks by issuing bonds. This would improve significantly the bank's liquidity and quality of assets.

18 See, Presley (1988), pp. 67-68.

19 Part of these requirements is required by the Central Bank's regulations.

a system and what are other rules or requirements that govern and/or limit its operations.

Table 2.2
Process of Financial Deregulation

Type of regulations	When was abolished
A. Price regulations	
a. ceilings on deposits	From 1978
b. ceilings on loans	From 1978
c. no interest for Islamic banks	From 1983
B. Quantity regulations	
a. capital	Still apply, only the ratio always changed
b. required reserve requirement	Controls widely used in the 1980s and early 1990s
c. minimum liquidity requirement	Controls not widely used
C. Power regulations	
a. licensing	From 1989, foreign banks locally incorporated
b. investment in private debt securities	Mainly in the early 1980s

2.5.1 Elimination of interest

In disallowing interest, as a requirement, the Sharia has developed two principal methods of business transactions, *Mudharabah* and *Musyarakah*, as a means of

earning profits without having resort to charging interest.[20] In this context, the return to depositors and shareholders will be a direct function of the return to bank's asset portfolios and the assets are created in response to investment opportunities in the real sectors, thus allowing the rate of return to financing to be determined by the performance in the real sectors. Therefore, the assets and liabilities of Islamic bank are integrated based on a principle called profit-sharing.

This model allows depositors entering into a contract with a banking firm to share the profits accruing to the bank's investments. The bank, as investor, enters into another contract with an entrepreneur who is searching for investable funds and who agrees to share his profit with the bank in accordance with a predetermined percentage stipulated in the contract. The bank's earnings from all its investments are pooled, and are then shared with its depositors and shareholders according to terms of their contract. The profit earned by the depositors is thus a percentage of the total banking profits. The financial losses incurred as a result of investment activities by the bank would be distributed in proportion to the percentage of capital.

2.5.2 Access to money market

The present situation facing the Islamic bank and other financial institutions (such as Takaful and Pilgrimage Funds) is characterised by the inability to facilitate the provision of short-term liquidity through the money market, as such a market has yet to be established. Since banks require assets within the constraints imposed by the structure of their liabilities, it is conceivable that some banks may, at times, have excess funds available but no assets or no assets attractive enough in terms of their returns. At the same time, there may be banks with insufficient funds to allow them to finance all available investment opportunities or with certain investment opportunities for which they may prefer risk-sharing with other banks. Since the avenue of liquid assets requirement is currently limited to investment in cash balance,

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[20] In transactions where these methods are not applicable, as mentioned by Ismail (1993b), other methods such as Qard al-Hasanah, Bai' Bithaman Ajil, Bai'Salam, Ijarah and Jo'alah can be employed.

stock of commodities and government investment certificates. The Malaysian government's intention to set up an Islamic money market is welcome.

2.5.3 Regulation, supervision and monetary policy

The Islamic bank was set up with dual objectives. First, to achieve a degree of social justice and a specific pattern of income and wealth distribution.[21] Second, to achieve national objectives of sustaining economic growth, maintaining a high level of employment and a low level of inflation and ensuring a reasonable position in respect of the balance of payments. Hence, the Central Bank has to regulate and supervise its operations.[22] These regulations and supervision are partly conducted by the Central Bank through monetary policy. The instruments of monetary policy would operate as under a conventional bank. For example, under a fractional reserve requirement, the Islamic bank is required to allocate a certain percentage of eligible liabilities as required reserves and liquid assets. While the adoption of this policy instrument would undoubtedly strengthen the control of the Central Bank's monetary target, it would have implications for resource-allocation, especially in the absence of the money market.

Therefore, the establishment of the Islamic bank and hence, the elimination of interest, as part of the deregulation process, is expected to mean that product and organisational changes will be the focus of competition in the Malaysian banking. However, this competition from the Islamic bank perspective is limited by the absence of the money market.

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21 The objective of a specific pattern of income and wealth distribution can be achieved through tithe, where 2.5% of certain amount of deposits have to be allocated (among others) to the poor and needy person.

22 The Islamic bank, as mentioned by Presley (1988), has also to be supervised by a Sharia advisory board. This board is important where a bank operates in a society which does not fully apply Sharia law. The main function of this board is to make sure that the operations of Islamic-based banking are undertaken according to Sharia principles.

2.6 The Effect of Recent Deregulation

This section tries to evaluate the possible effects of recent deregulation on competition, stabilty and financial fragility, and on liquidity and the reallocation of portfolios in the banking system.

2.6.1 Effect on competition

The deregulation process has produced a market where three different types of banks exist, namely the leader, follower and Islamic banks. Each type of bank could charge different rate of interest or rate of return to depositors or borrowers. This has brought major changes to competition in banking. In general terms, this entails an increased degree of competition within this oligopolistic market.

When interest rates were regulated competition could only take place through other means, for example quality and convenience to clients. After the liberalisation of interest rates in 1978, the banks could also compete on the basis of price. To the extent that the degree of competition is reflected in the degree of conentration in an industry, there seems to have been little change in the period between 1984 and 1992. The level of deposits and loans comparisons seem consistent with a relatively high degree of market forces in the Malaysian banking. This can be seen by looking at the Herfindahl concentration index in Table 2.3.[23] When considering competition among groups of banks both in the deposits and loans markets, the movements are not substantial during 1984-1992.

In terms of strategies, leader banks seem to have a better market position in the retail sector in terms of quantity and quality of services, which translates into a higher accumulated stock of goodwill, but this is at the price of higher operating costs. In 1988, some 34 percent of all branches were those of the leader banks. This gives

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[23] The computation method of this index could be seen in Bailey and Boyle (1971).

them an advantage over the follower banks, whose branches are much less widely distributed geograhically.

Table 2.3
Herfindahl Concentration Index

Year	Loans markets	Deposits markets
1984	0.53	0.50
1985	0.53	0.50
1986	0.54	0.50
1987	0.55	0.49
1988	0.55	0.49
1989	0.55	0.49
1990	0.55	0.49
1991	0.55	0.50
1992	0.54	0.52

As a further consequence, a higher degree of competition will follow in the retail market and this could bring two banks to merge to become the sixth largest bank in Malaysia.[24] This merger is a result of two factors. First, the government seems to believe that a larger size is needed to compete in the expanding economy. Second, on the other hand, they can be seen as an attempt to realise necessary economies of scale and scope and to shake up inefficient management (especially the former), in order to face the competition of an expanded market. As a result of merger activity, the number of banking firm is reduced, but the number of branches is expected to expand.

The merger can also be seen as a defensive response of certain banks, accustomed to a regulated environment in which they could easily coordinate their actions, when faced with the prospect of fierce competition by would-be more efficient and sophisticated banks. In this sense, the extensive branching network and the

[24] These two banks are the United Asian Bank Berhad and the Bank of Commerce Berhad where in 1988 they were in the ninth and fifteenth positions respectively.

Automated Teller Machine (ATM) systems, together with consumer inertia and the goodwill of established banks, may indeed prove to be formidable barriers to entry in the retail business.

Follower banks, dominated by foreign banks, have an edge in wholesale business such as international operations. The limited size of domestic markets has forced the follower banks to be more innovative in the mobilisation of deposits and provision of certain services, for example the widespread use of ATM.[25]

The Islamic banks, on the hand, provide an opportunity for conducting finance on a permitted (halal) basis. This represents a substitute for or alternative to conventional banks. In fact, some conventional banks seem to run a dual counter: interest-based banking at one counter and Islamic-based banking at another.

In summary, the competition in wholesale banking competition will tend to be mainly between the leader banks and a few of follower banks, with the Islamic-based banking being expected to play an increasingly important roles. This part of the market is the one that will be the most affected by any further process of deregulation.

2.6.2 The Effect on Bank Stability and Fragility

During the 1980s the Central Bank had to face 4 problem banks. By the end of 1989, all of these banks had been reorganised by the Central Bank, including Bank Bumiputera Malaysia Berhad (BBMB), the nation's largest bank. There has been substantial bank instability. The question is how can we identify the factors responsible for bank instability?

Three major factors have been identified as the causes of the changing nature of bank stability: (a) economic recession in 1985-86, (b) the decline in assets quality, and (c)

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[25] See, Ismail and Smith (1993), where the foreign banks have not been allowed to open new branches since 1970.

inefficient management and malpractice. The first two factors contributed to financial fragility which is currently a common underlying force at work in bank instability.[26]

a. Asset quality and economic recession

In the early 1980s, commercial banks suffered from poor quality loans. The major problem here was extensive lending to sectors that were particularly sensitive to the economic recession that occurred between mid-1985 and December 1986. The problem loans were those to the property, commerce and share-based sectors. For example, the borrowers who buy property at the peak of boom may face difficulties.[27] If a decline in lending to such a sector causes asset prices to fall, this will heighten the degree of fragility. A further fall in asset prices will drive the nominal asset values below the nominal amount of outstanding loans, thus increasing the incentive to default on interest and principal, leaving the banks to dispose of the collateral. The difficulty faced by the banks is to increase provision for losses on such assets.

b. Inefficient and malpractice management

In addition, the above factors have been worsened by weaknesses, malpractice and mistrusted management. The shortage of experienced staff and inadequate controlling systems have caused weaknesses in management. Futhermore, some of the bank officers acted beyond their power and provoked mistrust. For example, in the BMF scandal, a subsidiary of Bank Bumiputera Malaysia Berhad in Hong Kong, an amount of about RM2.5 billion was given to only three customers.

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26 A financially fragile situation is one in which the non-financial sectors in the economy find it difficult to meet debt repayment commitments, and as a result, banks face increased defaults.

27 This argument can be generally extended to other sectors, for example in the commerce sector where supply is relatively inelastic in the short-run and where corporate bankruptcies, leaving further unoccupied space, may aggravate excess supply arising from earlier overbuilding.

This loan was greater than the paid-up capital and reserve of BBMB.

Since an unanticipated increase in defaults associated with the realisation of financial fragility and "bad management" has direct effects on the profitability of banks, banks have to cover bad loans and suspend the interest rate. Tables 2.4 and 2.5 give the amount and the ratio of bad loans and interest in suspense to the total loans for the years from 1984 to 1992. Bad loans have increased from RM1,112 million or 2.6 percent of the total loans as at the end of 1984 to RM4,380 million or 7.6 percent of the total loans as at the end of 1989 and reduced to RM5,161 million or 4.7 percent of the total loans as at the end of 1992. In 1985, commercial banks were also directed to suspend the interest rate on unpaid loans for more than 12 months (or more than 6 months in 1989). Consequently, interest in suspense has increased from RM575 million or 1.4 percent of the total loans as at the end of 1984, to RM5,326 million or 7.9 percent of the total loans as at the end of 1989 and reduced to RM5,556 million or 5.1 percent of the total loans as at the end of 1992.

Table 2.4
Commercial Banks: Total Bad Debt Provision

Year	Bad debt RM million	% from total loans
1984	1112	2.6
1985	2098	3.8
1986	3156	5.7
1987	4035	7.3
1988	4380	7.6
1989	4545	6.8
1990	4926	6.1
1991	4708	4.8
1992	5161	4.7

Source: *Bank Negara Malaysia, Annual Report (1984-1992).*

Table 2.5
Commercial Banks: Total Interest in Suspense

Year	Interest in suspense RM million	% from total loans
1984	575	1.4
1985	1178	2.1
1986	2395	4.3
1987	3296	6.0
1988	4499	7.9
1989	5326	7.9
1990	5759	7.2
1991	5508	5.6
1992	5556	5.1

Source: *Bank Negara Malaysia, Annual Report (1984-1992).*

In view of the increase of bad loans and interest in suspense, it is also interesting to see what happened to the capital adequacy ratio.[28] Table 2.6 shows the capital adequacy ratios for the commercial banks for the years from 1984 to 1992. These ratios should be interpreted in light of the minimum of capital adequacy ratio of 8 percent and 10 percent for domestic and foreign banks respectively, as required by the Central Bank. In order to maintain the capital adequacy ratio, this may require banks to slow or even reverse the balance-sheet expansion.

In summary, there appears to be a case that generally the risk exposure of the commercial banks had increased in the 1980s. However, some of this additional risk might be the result of the financial fragility and a significant portion might be the result of exogenous events, such as "bad management". The question arises as

[28] Davis (1992) argues that the increase of bad loans and interest in suspense may also lead to systemic risk for the financial system including collapse of liquidity in securities markets.

whether the occurance of such events has been a cause of financial crisis and halted economy recovery. The financial crisis drew attention to the cause of deposits runs and bank failures which led to contractions in money supply.[29] Hence, it affected monetary policy. This phenomenon occurred as a direct result of the increase in the public's demand for currency (and other safe assets) relative to bank deposits, and as a consequence commercial banks increased the desired reserve to deposits ratio. The decline in money supply had been accompanied by a reduction in the velocity of money as shown in Figure 2.1. The general tendency showed that the velocity of money for the period of 1985-1987 reached the lowest point in 23 years. Since deposits rates remained low during that period, this might also be regarded as helping

Table 2.6
Commercial Banks: Capital Adequacy Ratio

Year	Capital adequacy ratio		
	Total	Domestic banks	Foreign banks
1984	6.8	6.2	8.2
1985	7.5	6.6	9.7
1986	7.0	5.7	10.2
1987	7.3	6.4	9.8
1988	7.3	6.3	9.8
1989	10.7	10.2	12.1
1990	10.8	9.9	12.9
1991	10.7	10.2	12.2
1992	11.7	10.8	14.1

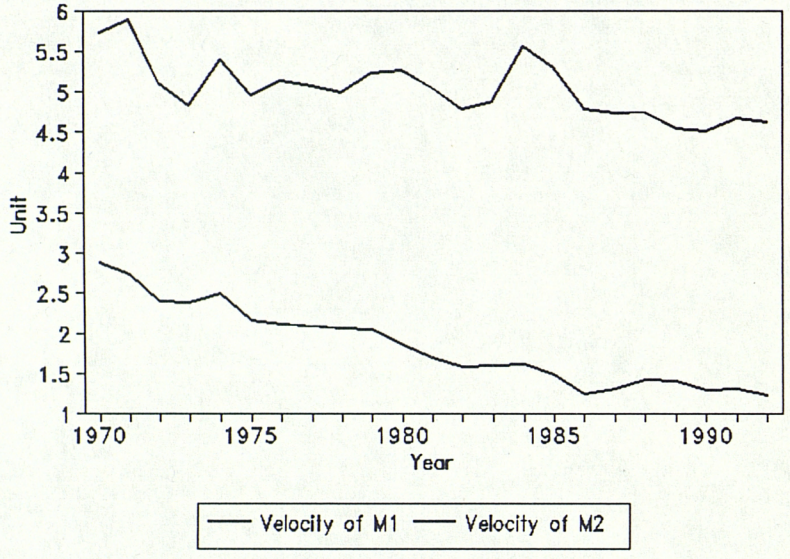
Source: *Bank Negara Malaysia, Annual Report (1984-1992).*

to explain the decline in velocity from 1985-1987. The possibilities of deposit runs and bank crisis provides clear reason for improving policies and/or institutional changes designed to reduce crisis frequency and to maintain depositors' confidence

[29] See, Friedman and Schwartz (1963). However, Davis (1992) further argues that bank runs may lead to the interruption of production as banks call in loans. As banks contract credit, the money supply may fall and real interest rates rise, thus discouraging spending.

in the commercial banks. Two measures to reduce the risk of crisis in a deregulated environment have been introduced by the Central Bank, namely (a) restructuring the management, and (b) lending money (lender of last resort) or injecting capital.

Fig. 2.1: Velocity of Money, 1970–1992



In order to maintain public confidence following the instability of several commercial banks induced by financial crisis, relief has been provided by the Central Bank either through loans or the injection of capital. Commercial banks under capital reduction cannot support assets expansion. Futhermore, this affects the allocation of resources. Bank runs do not occur as the Central Bank has extended emergency loans or has injected capital.[30] For example, the Central Bank injected capital to three commercial banks, namely the Perwira Habib Bank Berhad, the Sabah Bank Berhad, and the United Asian Bank Berhad by buying RM672 million shares and giving

[30] If this money is publicly funded, then financial fragility may affect on public expenditure.

RM401 million subordinate loans.[31] In the case of BBMB, the government persuaded PETRONAS (the National Oil Company Berhad) to buy bad loans to the value of RM1,295 million, and 87 percent share from Permodalan Nasional Berhad, and also to inject capital of RM300 million.

The objective in saving the problem banks is to safeguard the depositors, but a moral question arises in allowing the shareholders (which are responsible for the problems of the commercial banks) to get benefit through equity holding. Thus, the Central Bank has added a provision in Central Bank Ordinance of 1958 by incorporating Section 31C. This section enables the Central Bank to get permission from the High Court to reduce the capital value of any problem banks. In November 1988, the Central Bank took over the Oriental Bank Berhad by restructuring their capital losses through reduction in capital from RM45 million to RM2.25 million.

In conclusion, the deregulation has had two implications for monetary policy. First, the government has been concerned about the possibility that the past crisis may lead to another crisis as deregulation proceeds. As a result, the commercial banks' problems of the 1980s led directly to the legislation of Section 31A and 31C of the Central Bank Ordinance, and new legislation for financial institutions, that is, Bank and Financial Institution Act 1989 or simply BAFIA 1989. The need for Central Bank to respond quickly to the commercial banks crisis is to avoid chain-failures and the resulting implications for the effectiveness of monetary policy. Second, the commercial banks crisis is a vital element in understanding the contribution of monetary policy to such events.

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31 For the Sabah Bank Berhad, the Central Bank bought RM110 million shares with an agreement that the main shareholder would buy it back in the future. In the case of the Perwira Habib Bank Berhad and the United Asian Bank Berhad, the Central Bank injected capital of RM200 million and RM362 million respectively, and given loans of RM300 million and RM101 million respectively.

2.6.3 Effect on Reallocation of Portfolios and Bank Liquidity

Financial regulations have the effect of constraining liquidity. For example, interest rate ceilings potentially restrict commercial banks in attracting deposits to fund their lending, while reserve requirements limit the extent to which lending can be financed.

In the absence of interest rate ceilings, quantitative restrictions, and power regulations, commercial banks are supposed to be able to engage in liabilities management through buying liabilities needed to finance lending in the domestic markets. Hence, financial markets become more integrated and interest rates more interdependent. At the same time greater competition stimulates innovation, progressively enlarging the means for risk and liquidity management. For example, in liquidity management, a greater variety of highly liquid assets, such as inter-bank funds and discounted instruments, have become available as alternatives to bank deposits. While discounted instruments has permitted individual commercial banks to diversify their risks and at the same time enabled them to tap supplies of credit from sources where they have a comparative cost advantage.

As a result, the price of liquidity in the banking industry is reflected in the interest rates in the inter-bank markets and in the discounted instruments, while the inter-bank market is effective in facilitating the sharing of liquidity within the banking industry. Therefore, the process of deregulation has reduced the influence of liquidity constraints, giving greater scope to the commercial banks to achieve their portfolio objectives and to diversify their portfolio risks which are reflected in interest rates.

As deregulation reduces liquidity constraints and increases the role of market forces, interest rates are better able to interact with expectations about future economic activity and inflation in responding to new information. Interest rates move to new levels in response to new information. For example, if the Central Bank suddenly tightens monetary policy by restricting liquidity to the economy, this may be translated as new information. Interest rates may immediately increase, and therefore become better indicators of expected future economic activity and inflation. For the

Islamic banks, the transmission of monetary policy is expected to work through money supply and/or bank credit.

2.7 Conclusion

The introduction of financial deregulation in the late 1970s and the establishment of an Islamic bank in July 1983 are aimed to produce better allocation of resources, more competition and as a result more output and faster growth. These changes are also aimed to produce improvements in efficiency within the bounds of prudent and sound banking practices. The results of the analysis in this chapter indicate that the deregulation process has produced: first, an increase in the degree of competition and a reduction in liquidity, and a better reallocation of banks' portfolios. Second, financial fragility and poor assets quality (the result of recession), together with bad management have forced the Central Bank to take further steps to maintain public confidence and speed-up recovery. Third, interest rates are expected to be able to interact closely with economic activity and inflation. Therefore, this new relationship has to be explored and the relationship between monetary policy and commercial banks need to be placed in perspective.

CHAPTER 3

MONETARY POLICY AND COMMERCIAL BANKS: A SURVEY

3.1 Introduction

The relationship between monetary policy and economic activity is one of the basic questions of macroeconomics. Economists have addressed this question in a number of ways. The traditional, and most familiar analysis of monetary policy focuses on the quantity of the medium of exchange, arguing that the Central Bank policy can affect the economy only through its effect on this quantity. The liability side of the bank balance sheet receives special attention in this approach, because demand deposits are a large part of conventionally defined money.

The quantity of the medium of exchange is certainly not without significance. However, as originally argued by Gurley and Shaw, the traditional approach becomes less relevant as the number of substitutes for conventionally defined money increases in consumers' portfolios. An alternative to the traditional approach is to take into account bank assets as well as bank liabilities. In this alternative approach, monetary policy matters to economic activity primarily because it affects the structure of assets and liabilities, not because it only affects the quantity of the medium of exchange. This differentiation may be of practical importance, for example in the implications for monetary policy of changing bank regulations or changing banks structure.[1]

Recently, discussion of the question of the relationship between monetary policy and commercial banks has gone further to include both credit rationing and bank structure. Interest has also grown in exploring the possible links between Islamic banks and monetary policy, and the deregulation process in the banking system. This

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[1] See Bernanke and Gertler (1987), pp. 108-109.

interest reflects the ongoing beliefs of economists and policymakers that interest-free banking and the role of market forces deserve serious attention. This chapter is directed toward that purpose.

So, in this chapter, developments in the study of the relationship between monetary policy and commercial banks will be surveyed. The current position will be placed in perspective. The survey will be divided into two parts, the first part reviews the early literature and the second part discusses more recent work.

3.2 The Early Studies

The discussion of this section begins with literature contributed by Fisher, Keynes, and Friedman-Schwartz. They have provided a platform for analysis of the relationship between monetary policy and commercial banks. Then, this section continues by discussing the counter-argument, led by Gurley-Shaw and others, which stresses the importance of the financial institutions, especially in the loanable funds process. The relevance for our purpose is that the subsequent sections and also the current literature incorporate many of ideas in this literature.

3.2.1 The Importance of Money Supply

The literature on monetary policy and commercial banks as interrelated phenomena is not new. It can be traced to the contribution of Fisher (1911).[2] He clearly states that bank liabilities are special because they serve as money. The expansion of these liabilities produces a new term known as credit creation. However, the expansion of credit is limited by banking policy, such as variation in the reserve to deposits ratio. The aim of this policy is to avoid the riskiness of insolvency and insufficiency of

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[2] Johnson (1970) claims that the Fisher idea has provided the intellectual foundations of the Radcliffe position on monetary theory and policy, p. 101.

cash.[3] It literally means that the Central Bank can directly expand or contract money supply at will through monetary policy.

The commercial banks did not have such an explicit important role in Keynes's General Theory (1936). However, commercial banks have been seen as an integral part of the broad picture, that is, as intermediaries between savers and investors. He claims that the creation of credit by the banking system allows investment to take place with an equal amount of savings. In this simple approach, monetary policy operates through changes in the rate of interest. The change in the volume of money, via the liquidity effect, alters the rate of interest.[4] Thus, the interest rate is viewed as an indicator of the stance of monetary policy.

Friedman and Schwartz (1963) argue that the Central Bank can excercise effective control over the money supply. Their argument is based on the assumption that the behaviour patterns of the banking system are stable and predictable enough to permit the Central Bank to control the money supply. As an example in the Great Depression 1929-1933, they concluded that the Central Bank should have emphasised the money supply, and as a consequence, the significance of all other aspects of commercial banks was deemphasised.

In summary, Fisher, Keynes, and Friedman and Schwartz have provided a platform for exploring the relationship between monetary policy and commercial banks. The commercial banks have been given attention because part of their liabilities are included in the money supply.

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3 Insolvency refers to the condition when loans are extended with insufficient capital, whereas insufficiency of cash refers to the condition when commercial banks are unable to meet the deposit withdrawals. Because of the riskiness of these phenomena, banks are required to provide a greater amount of capital and cash reserves.

4 Keynes (1936) argues that this special connection arises from the fact that the banking system and the Central Bank are dealers in money and debts, p. 205.

3.2.2 Loanable Funds Approach and Credit Creation

The above discussion treats the commercial banks as of secondary importance. Beginning with Gurley and Shaw (1956), an attempt was made to redirect attention towards the analysis of the role of finance and particularly of financial institutions in economic development which has important implications for monetary theory. They try to emphasise the role of financial institutions in the credit supply process as opposed to the money supply process.

They began by discussing the following difference between developed and developing countries. In the former, there typically exists a highly organised and broad system of financial institutions designed to facilitate the flow of loanable funds between surplus units and deficit units. Hence, the implication is that the role that financial institutions play in improving the efficiency of intertemporal transactions is an important factor governing general economic activity.

The next argument is that restricting attention to the money supply makes it impossible properly to characterise the link between monetary and real variables, and that this distortion worsens as the economy evolves financially. In the early stages of financial development, Gurley and Shaw noted, commercial banks are the only major form of financial institutions, so that most financial institutions provide both transactions and lending facilities. In this environment, money supply might be a useful proxy for the monetary aggregate since the supply of inside money (bank liabilities) is closely related to the whole liabilities of financial institutions.

However, as the financial institutions evolve, and other lending institutions with nonmonetary liabilities arise, the exclusive focus on money supply becomes less justified. The importance of money diminishes for two reasons, first, the money supply becomes a less exact measure of the flow of financial institutions' credit, and second, the liabilities of the nonbank financial institutions act as substitutes for money in transactions, precautionary and speculative demands.

They, thus, show that financial competition may prevent the growth of the commercial banks and weaken the grip of monetary policy on the economy.[5] At the same time, other financial institutions would become more attractive channels for transmission of loanable funds. Therefore, they suggest that the controlling powers of the Central Bank should be extended beyond the commercial banks to other financial institutions.[6] As a result, the debate on the effectiveness of monetary policy has ranged widely, including such issues as whether existing controls over commercial banks are really discriminatory, given that commercial banks enjoy the privilege of creating money, (see Aschheim (1959)) and whether the imposition of credit controls on financial intermediaries would improve the effectiveness of monetary policy or the competitive position of the commercial banks (see Alhadeff (1960)).

An extension study was undertaken by Smith (1956) to show the effects of monetary policy on the supply of loanable funds. Three factors have been identified, first, through the changes in the value of bank assets, second, through the changes in interest rates, and third, the difficulties in marketing new issues of securities. For the first effect, he claims that the increase in interest rates, as a result of the Central Bank action, encourages the banks to sell short-term securities to meet an increasing demand for credit. This is especially so for banks which are required to allocate assets to the minimum liquidity requirement, and commonly hold large portfolios of short-term government securities.[7]

In the second effect, as a result of a small change in interest rates, credit restraint can

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5 Authors, like Birnbaum (1957) and Brainard (1967), still maintain that the growth of nonbank financial institutions has not narrowed the scope for effective monetary control by the Central Bank.

6 A different argument has been introduced by Minsky (1957), to the implementation of the lender of last resort function to the financial institutions and not merely the commercial banks, p. 186. And a similar argument to those of Gurley and Shaw, and Minsky can be found in Smith (1956), p. 606.

7 This is also means that commercial banks can supply more loanable funds by selling government securities.

be effective in controlling funds borrowed from banks. First, this works through rationing of credit and screening of borrowers. For example, this could occur if the demand for credit increases substantially while at the same time the aggregate volume of banks' reserves is held constant by the Central Bank policy. Although the immediate effect is that the commercial banks have to ration credit by tightening credit, in the long-run lending rates have to be changed. Second, banks may sell some of their liquid assets in the open market. Hence, interest rates in the open market will rise, and the interest they charge borrowers will also increase.

In the third effects, tight credit conditions may discourage the floatation of new issues of securities.[8] A large quantity of unsold securities may result in security prices falling. The rapidly rising interest rates may affect the restrictive credit policy. This shows that the extent to which monetary policy may affect loanable funds depends on the existence of a well-developed money market and the abolition of ceilings on lending rates.

Tobin (1963) tries to incorporate the idea of Gurley and Shaw into the theory of credit creation. According to his argument, the essential function of commercial banks is to satisfy simultaneously the portfolio preferences of surplus units and deficit units.[9] These asset transformations produce an expansion of the liabilities of the commercial banks.[10] Without monetary policy, the expansion of credit and deposits is limited by the availability of assets at an interest rate sufficient to compensate banks for the costs of deposits.

When monetary policy, for example reserve requirements, is effective the marginal

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8 This possibility has also been discussed in Keynes (1971), pp. 367-369.

9 McKenzie and Thomas (1990) argue that the liabilities of the banking system provide banks with a supply of loanable funds which determine aggregate expenditure.

10 The expansion of credit is not limited to the ability of commercial banks to acquire additional assets but also to finance the purchase of "old" securities, see Tussing (1966), pp. 5-6.

rate of return on bank loans and investment exceeds the marginal cost of deposits. In these circumtances, a reduction in the required reserve ratio encourages banks to acquire additional earning assets.[11] In general, this process reduces interest rates and hence, induces the public to hold additional deposits.

The major arguments and findings from the idea of Tobin are, first, the interest rate difference, that is, between lending rates and deposit rates, allows the bank reserves to generate additional loans and deposits. Second, the willingness of commercial banks to hold excess reserves and to loan up depends on the availability of assets to banks. Third, the commercial banks should adjust both assets and liabilities as a result of the changes in monetary policy.

3.2.3 The Cases of Developed and Developing Countries

The idea that has been brought forward by Gurley and Shaw has manifested itself differently in different circumstances; thereby producing two separate, but very important regimes, namely, developed and developing countries.

In developed countries with highly organised money markets, a broad consensus on the nature of the transmission mechanism has existed for some time, see for example Mann (1968), Meltzer (1969), Park (1972), and Laidler (1978). When financial markets are highly organised, an expansionary monetary policy undertaken, for example, through an increase in bank reserves supplied by the Central Bank via an open market purchase, leaves the commercial banks with too much money in its portfolio relative to other assets. In restructuring to attain portfolio equilibrium, commercial banks increase the amount of credit, thereby lowering their respective rates of return. In this way, an open market purchase of securities results in a decline in interest rates. Therefore, interest rates represent the key link between monetary policy and macroeconomic objectives.

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[11] Commercial banks can also obtain additional reserves by borrowing from the Central Bank, and by selling short-term securities. In short, additional reserves are also available at the discount window and in the money market.

In developing countries on the other hand, the picture is somewhat different, see Montiel (1991).[12] In the first place, the menu of assets available to commercial banks is very limited. The organised money markets in which the Central Bank can conduct open market operations scarcely exist in many developing countries. In general, individuals can hold currency, savings and fixed deposits issued by the commercial banks, and they can borrow from commercial banks. However, informal markets still emerge, resulting in financial disintermediation through informal markets for deposits and loans. Finally, even in the case of those assets and liabilities available to individuals, such as demand deposits, saving deposits and fixed deposits, and bank loans, formal regulations often determine the interest rates paid and charged by the commercial banks, although a variety of methods of avoiding interest rate controls typically tend to emerge.[13]

Park (1973) argues that monetary policy in such a regulated environment operates primarily through a non-price credit-rationing channel. One possible explanation for this outcome is the existence of an insatiable demand for credit at the prevailing interest rates in the credit market that remains continously unsatisfied. In these circumstances, borrowers will be constrained not by the cost of borrowing but by the unavailability of credit. On the other hand, the role of interest rates is still pertinent depending upon the extent of avoidance of direct controls through informal and less-regulated markets. Changes in the supply and allocation of credit, brought about through formal regulations, have direct effects on aggregate demand. Hence, those commercial banks who have made credit available to borrowers are able to expand demand.

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12 The same viewpoint can also be found in Khatkhate (1972), p. 533 and Park (1973), p. 399.

13 The desire of developing countries to impose the ceiling rates on deposits and loans may be attributed to (a) the desire of the Central Bank to have an interest rate structure similar to that prevailing in the developed countries, (b) have low and stable interest rates in order to promote economic development, and (c) the notion that savings are insensitive to changes in interest rates, see Park (1973), p. 386. The establishment of Islamic banks is also identified as one way to avoid the interest rate regulations.

3.2.4 McKinnon-Shaw and Neo-structuralist Approaches

In the early 1970s, new developments and innovations in the instruments of monetary policy emerged, such as interest rate ceilings, heavy reserve requirement on bank deposits, and compulsory credit allocations. Accordingly, McKinnon (1973) and Shaw (1973) conclude that in such repressed commercial banks, real deposit rates are often negative. As a consequence, first, the flow of loanable funds through the banking system is reduced, forcing potential borrowers to rely more on self-finance. Second, lending rates vary arbitrarily from one class of borrowers to another. Third, the process of self-finance is weakened. If the deposit rates are negative, firms cannot accumulate liquid assets in preparation for making discrete investment. Fourth, when firms become illiquid, open market operations require monetary stability. In consequence, McKinnon and Shaw proposed the use of an alternative monetary policy, that is, by increasing nominal deposit rates.[14] Concomitant with this increase in real deposits, commercial banks are able to increase the supply of real bank credit.

An extension to this approach has been introduced by Kapur (1976), Galbis (1977), Mathieson (1980) and Fry (1980).[15] In his analysis of deposit rates as a stabilization policy instrument, Kapur (1976) makes three assumptions, first, commercial banks are in competitive equilibrium with zero excess profits. Second, the Central Bank pays no interest on bank reserves. Third, the costs of the monetary system are a constant fraction of the real money supply. Hence, in order to maintain the banks' profits, any change in deposit rates requires a concomitant change in lending rates. However, the expected real lending rate cannot exceed the real rate of profit on

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[14] Initially, as argued by McKinnon, the economy is in inflationary equilibrium, with high growth rate of money supply and of inflation, and the Central Bank tries to reduce the money supply expansion. Although this policy is aiming to induce an appreciable decline in the expected rate of inflation, the immmediate effect is a reduction of real bank credit. This is especially so for developing countries, where firms are heavily reliant on credit from the commercial banks.

[15] A comprehensive survey of this approach has been carried out by Fry (1982).

working capital, otherwise firms would not be willing to borrow from the banks.[16]

A new approach to examining the relationship between financial institutions and real development was postulated by Galbis (1977). Two main characteristics of his new approach are aggressive regulation taken by the government and the existence of fragmented economies. In the latter characteristics, the surplus units save in the commercial banks depends on the real deposit rates which represent the opportunity cost of self-investment. On the other hand, the deficit units borrow from the commercial banks depends on the real lending rates.[17] For an equilibrium between the supply and the demand for loans funds, a higher level of lending rate is expected in order to equal the marginal propensity to consume and the marginal efficiency of investment.

However, government regulations on the commercial banks have contributed significantly to the inefficient use of funds. For example, if the deposit rates are fixed by the Central Bank below their equilibrium levels, then the lending rate is also above its equilibrium rate. The widening gap between lending rate and deposit rate produces an excess demand for funds, so that the market does not automatically clear.[18] So, it should be noted that, when interest rates are highly regulated, a kind of equilibrating credit restriction through credit rationing is expected to be workable.

However, Mathieson (1980) argues that the excess demand for bank credit can be satisfied by increasing deposit rates. A higher lending rate is also required in order to ensure at least a zero level of profits in the banking system. Since deposit rates and lending rates increase sharply once interest rate ceilings are removed, there may be

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16 Kapur (1976) also assumes that all working capital are financed by the commercial banks, p. 780.

17 Galbis assumes that the surplus units and deficit units as backward sector and advanced sector respectively.

18 The widening gap between deposit rates and lending rates has generally led, (a) to a widening of the existing gap between the demand for and the supply of funds, and (b) to the existence of informal financial markets.

a concern that banks hold a large portion of their assets as long-term loans which bear the old lending rates may find it unprofitable to pay the new competitive deposit rates. The effect would be on deposit withdrawals. As a consequence, the Central Bank must either accept the possibility of widespread failures or must inject funds into the commercial banks. The first solution would unquestionably create the type of chain-failures which distorts the flow of funds. The second solution may cause the Central Bank to lose control over the money supply.

As the effects of financial reform are quite costly, Mathieson suggested that interest rates should be gradually changed, with deposit rates moving in line with the expected rate of inflation and the lending rates changing more rapidly than the expected rate of inflation.

Fry (1980) argues that interest rates are usually held below market equilibrium levels and the Central Bank does not permit interest rates to move sufficiently to clear financial markets. Hence, the Central Bank creates the supply of credit more or less independently of deposits.[19] If ceiling rates are also imposed on lending, then non-price credit rationing must occur.

Thus the McKinnon-Shaw approach maintains that the controlled raising of interest rates need not be contractionary, because in a rationed regime the induced increase in deposits will result in an increase in bank loans. On the other hand, the neo-structuralist approach, for example Taylor (1981), van Wijnbergen (1983), and Buffie (1984), emphasises the importance of informal loan markets when bank interest rates are subject to Central Bank ceilings.[20] In this case, they argue that increases in bank

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19 The same argument has been raised by Leff and Sato (1980), p. 171. They, further, argue that any changes in the supply of credit are also determined by the government policy to curb the inflation rate and stabilise the balance of payment.

20 The McKinnon approach based on the assumption that the portfolio shift into bank deposits is coming out of an asset such as gold, cash and commodity stocks. But, neo-structuralists argued that in most less-developed countries there are still existing unorganised money market, providing the

interest rates will shift out funds from informal markets, thereby increasing the marginal cost of funds and resulting in a contractionary effect on the net supply of credit.[21] However, if higher bank interest rates result in a shift out of cash rather than out of the informal market, the net supply of credit will increase.

3.3 Recent Studies

The discussion of the recent literature will be divided into five sections. It is useful to begin with the literature that examines the rationing of credit in imperfect markets. This is so because much of the new work on the relationship between monetary policy and commercial banks rests on insights that come from this literature (see Gertler (1988). The current work on bank structure and monetary policy is surveyed next. The approach is to address the implications of increased competition for the effectiveness of monetary policy. The following three sections discuss, first, the basic features of what constitutes a workable and productive theory of the banking firm. Second, the conduct of monetary policy in an Islamic banking environment is explored. The final section examines literature which has focused directly on the role of monetary policy in a deregulated environment.

3.3.1 Credit Rationing and Imperfect Information

The removal of credit and interest rate ceilings, and the supporting financial deregulation would change the transmission channel for monetary policy from predominantly direct credit rationing as discussed in Sections 3.2.3 and 3.2.4, to predominantly price rationing through market-determined interest rates. This idea was introduced by Jaffee and Russell (1976), and has been popularised by Stiglitz and

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disintermediation, see Van Wijnbergen (1983), p. 434.

[21] Here the net supply of credit will relatively decline because shift out of funds from informal market, resulting an increase in bank deposits, and a portion of these amount goes to reserves.

Weiss (1981).[22] Because of asymmetric information between lenders and borrowers, much of the analysis of credit rationing focuses on a situation of imperfect information.

Stiglitz and Weiss (1981) produce a convincing explanation for why there may be credit rationing in markets with imperfect information. Their argument starts with a claim that raising the lending rate charged does not produce a proportionate increase in the receipts of the lender, because the probability of default may rise. If the probability of default rises sufficiently, the rate of return to the lender may decrease. Therefore, at the quoted lending rate, the lender's expected return is maximised, (as shown in Figure 3.1).

In a situation where the demand for credit at point B, exceeds the supply of credit at point A (credit rationing may persist), the lender will raise the lending rate charged, which will increase the supply and decrease the demand, until the market is cleared at point C (Figure 3.2). However, at the quoted lending rate no bank has an incentive to raise its lending rate, because doing so only reduces its receipts. Thus, after the quoted lending rate point r_l^*, further increases in the lending rate may lower the lender's expected return, making the loan supply curve bend backwards. In this case, when the loan demand and supply curves do not intersect, rationing arises-where some borrowers are arbitrarily denied credit.

Therefore, for credit rationing to arise, it is required that the relationship between the expected return of the banks is not monotonic with respect to the lending rate. The relationship between lending rate charged and the expected return may not be monotonic because of adverse selection effects and adverse incentive effects. The adverse selection effects occur when the mix of borrowers changes adversely following an increase in the lending rate; good quality borrowers drop out of the

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22 Although credit rationing has been mentioned as early as Rosa (1952) and subsequent articles, for example Smith (1956), Tussing (1966), and Jaffee and Modigliani (1969), the emphasis is on non-price credit-rationing and symmetric information.

Figure 3.1

The relationship between quoted lending rate and expected return to the bank.

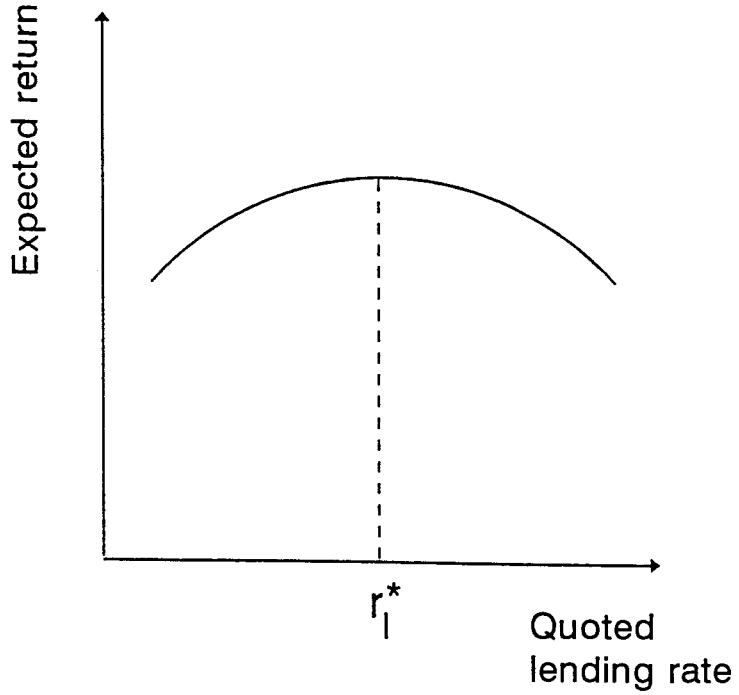
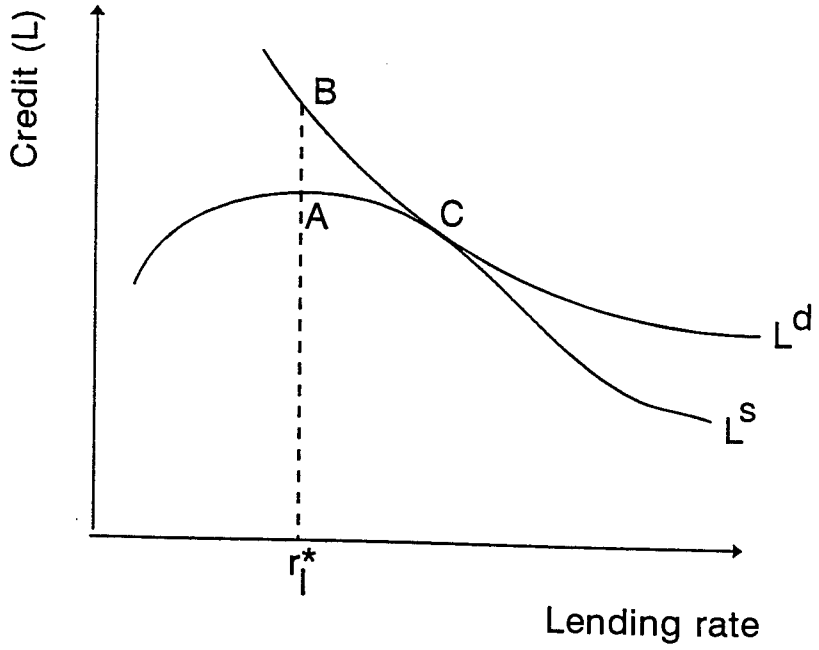


Figure 3.2

Credit Rationing Model

(Stiglitz and Weiss (1981))



market. The adverse incentive effects occur if borrowers undertake riskier projects if the lending rate is increased.

Subsequent papers concentrate on criticism levelled against credit rationing theories, especially on informational asymmetries posed between borrowers and lenders, and on why an increase in the lending rate might have adverse selection and incentive effects, so that banks might choose not to increase the lending rate charged, even when there is an excess demand for credit. For example, Williamson (1987) constructs a credit market model, and shows how it is possible to explain the type of credit rationing defined by Stiglitz and Weiss, without a priori restrictions on financial contracts. Credit rationing may occur, (with an assumption that borrowers are identical ex ante, but lenders vary according to their opportunity costs of funds), because the expected default costs stemming from costly state verification may make it prohibitively expensive for borrowers to obtain funds from lenders with high opportunity costs.[23] With this assumption, some borrowers may receive loans, while other borrowers do not. This is in contrast to the type of credit rationing characterised by Jaffee and Russell (1976), and Gale and Helliwig (1985) where borrowers are rationed in the sense that they cannot borrow all they would like given the quoted lending rate. As with Gale and Hellwig (1985), banks have to face an increase in the cost of funds because of the informational problems.

In contrast to Stiglitz and Weiss, Mankiw (1986) analyses a credit market in which borrowers have greater information on the probability of default than do lenders and shows how small increase in the riskless interest rate can lead to a large reduction in credit, possibly even a collapse. This phenomenon occurs because the increase in riskless interest rate pushes up the lending rate, which reduces the quality of

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[23] A detailed explanation about costly state verification, where the lender must pay a fixed cost to observe the returns to the borrower's project can be found in Townsend (1979).

borrowers as mentioned by Stiglitz and Weiss.[24] If the lending rate is high enough, the credit market will collapse. Hence, Mankiw suggests that government intervention in the allocation of credit is important, especially in the markets for loans to students, farmers, and homeowners.

The basic theory of credit rationing has been applied in different institutional settings. In the context of a borrower who faces costs of default that exceed the benefits of default, the inability to pay may produce the result that borrowers lose their reputation (see Eaton and Gersovitz (1981)). If the default is caused by the borrower searching out a new source of lending, then the penalty for default is much smaller (see Allen (1983)).

In addition, the default may not occur if the lender has an incentive to postpone a default by extending additional credit to the borrower. The lender may also promise to provide the borrower with funds, up to a limit, for the term of the agreement (see Sofianos, Wachtel and Melnik (1990)). As has been proposed by Eaton, Gersovitz, and Stiglitz (1986), a mutual agreement should be agreed by both party to avoid default loans. The lender may refuse to continue to extend further credit on terms of contract which are not acceptable to the borrower. Stiglitz (1972) points out that the cost of bankruptcy must also be taken into account in the mutual agreement renegotiation. The question also arises as to why other banks would not provide the credit, if one bank cut off credit? Here, Stiglitz (1985) argues that when credit has been terminated by one lender, no other lender would be willing to lend to the individual.

Rothschild and Stiglitz (1971) present the argument that the banks could offer a set of self-selecting contracts. Hence, Bester (1985) and King (1986) suggest that credit rationing may also occur when the borrower is required to produce different collateral requirements. However, Stiglitz and Weiss (1986, 1987) find that the equilibrium,

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[24] A rise in the interest rate lowers the average borrower quality, as those with relatively safe projects are the first to drop out, see Stiglitz and Weiss (1981), p. 408.

in which interest rates and collateral requirements both simultaneously exist, may take two different forms. First, it could be that both types of borrowers adopt the same contract, where interest rates and collateral are not increased. There are only two types of borrowers existing in the market, that is, high-risk and low-risk borrowers. The high-risk borrower chooses a contract with a lower interest rate and higher collateral requirement, and vice-versa, the low-risk borrower chooses a contract with a higher interest rate and lower collateral requirement. Since the interest rate and collateral have not increased, the incentive effects and adverse selection effects respectively are still present.

Second, where there are multiple contracts, some rich borrowers who undertake risky projects may have to accept low collateral and high interest rate contracts. Thus, as a result of such adverse selection effects, it is desirable to ensure that the expected return on a low collateral contract equals the expected return on a high collateral contract as a measurement of the percentage of each type of contracts.

In summary, the variations in the availability of credit have been considered as an important transmission channel for the effects of monetary policy (see Jaffee and Stiglitz (1990), and Modigliani and Papademous(1987)). This view has implications for the choice of monetary variables as targets of monetary policy, and calls for more explicit attention to bank regulations, bank behaviour, and credit market conditions in formulating and analysing monetary policy. Villanueva and Mirakhor (1990) also mention that the relative importance of credit rationing and price rationing as channels of monetary policy will be affected not only by the degree of progress toward interest rate deregulation, but also by the financial structure that govern bank behaviour toward credit allocation.

3.3.2 Bank Structure and Monetary Policy

The literature on credit rationing implicitly assumed that credit is created through a competitive banking system. This section tries to look at the effects of bank market structure on monetary policy. Current research on the implications of bank market

structure incorporates many of the earlier ideas of Aftalion and White (1977).[25] It stresses the effects of monetary policy under both perfectly and imperfectly competitive banking system.[26]

Hester (1981) claims that increased competition in the banking system will serve to undermine monetary control by reducing the stability of the banking system and thereby decreasing the range of policy options available to the Central Bank. But, VanHoose (1983) raises another significant issue that had not been addressed, namely the implication of increased competition for the effectiveness of monetary policy. He argues that the short-term effects of policy actions as transmitted via interest rates on securities and loans have two implications. First, bank structure can affect the types of equilibrium adjustments which follow specific policy instruments, at least to the extent that different structures produce alternative forms of bank behaviour. Second, differences in bank structure and behaviour affect the macroeconomic variables, if the interest rate is the target adopted by the Central Bank.

A suprising implication produced by VanHoose (1983) is that the interest rate instrument does not produce short-term effects in a competitive banking system. The reason is that the 'feed-back effects' via the interest rate are more likely to produce indeterminate equilibrium security rate adjustments when markets are competitive. In contrast, currency and excess reserves can be used as effective instruments under either form of bank market structure.

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25 Although there have been many studies of the effect of bank market structure, the emphasis was more on individual loan or deposit markets, for example Edwards (1964), Flechsig (1965), Kaufman (1966) and Aspinwall (1970). A useful survey of bank market structure and competition can be found in Gilbert (1984).

26 In general banking markets are not perfectly competitive, but authors like Niehans (1978) and Baltensperger (1980) assume that banks are perfectly competitive.

3.3.3 Models of Commercial Banks

In spite of the importance of commercial banks as an important link in the monetary transmission process, there is little consensus as to what constitutes a workable and productive theory of the banking firm. For example, the neoclassical economists (for example Phillips (1923) and Rogers (1933)) are rarely invoked to explain bank behaviour, primarily because there is so little agreement on fundamental concepts.[27] In the face of conceptual difficulties, some authors like Porter (1961) concentrates on the allocation of banks' funds among various types of assets.[28]

On the other hand, there has been much analysis relating to the impact of bank market structure and bank performance.[29] Both ideas have been combined by Klein (1971) to produce a theory of a banking firm which describes bank behaviour in a monopoly environment. Such an environment is mostly determined by bank regulation.[30]

Baltensperger (1980) claims that the model developed by Klein is as a result of the independence of a bank's optimal assets management and optimal liability management. As originally argued by Gurley and Shaw (1960), the functions of banks are those of consolidating and transforming assets. This idea is incorporated into Baltensperger's model. Uncertainty, informational problems, and adjustment costs have also played an important role, especially in the credit market where transaction

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27 For example, they were still questioning whether stock or flow variables measure the relevant concepts of bank output and input.

28 The same approach can be found in Orr and Mellon (1961), Poole (1968), Frost (1971), Pringle (1974), Hester and Pierce (1975), Koskela (1976) and Niehans (1978). The models of bank reserve and liquidity management developed by these authors are originally based on Edgeworth (1888).

29 For example, Flechsig (1964), Kaufman (1966) and Aspinwall (1970), or for more detail see footnote 25.

30 VanHoose (1985) mentions that the deregulation of banking and various forms of financial innovations may have also altered the competitive environment in banking, p.298.

and information costs are involved.[31]

Imperfect information about various aspects of banks' activities also plays a central role in the model of banks' behaviour. As argued by Santomero (1984), imperfect information should be included in the disscussion of banks' assets. King (1986) was the first to examine this view, which argues that the variation in the quantity of bank credits caused by reserve changes might explain the real impact of monetary policy.

The above discussion shows that monetary policy matters by affecting both bank liabilities and bank assets. The empirical evidence produced by King (1986) shows that bank assets do not play a significant role in the transmission of monetary policy. Part of the reason may be due to the insignificance of credit rationing in the model of bank lending.

3.3.4 Islamic Banks and Monetary Policy

The growing establishment of Islamic banks in 1980s has brought forward two basic issues concerned with the conduct of monetary policy, first, where the banking system is prohibited from paying and receiving interest, and second, where the Islamic banks have to coexist with the conventional banks.[32]

The prohibition of interest, which effectively rules out the existence of debt, means that Islamic banking system has to be entirely equity-based and work on the basis of profit and loss sharing (see Ahmed (1989)).[33] Given this setting and the available instruments, how would monetary policy be expected to operate in an interest-free banking system?

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31 These elements produce two different types of risks, i.e, default risk and liquidity risk.

32 Except in Pakistan and Iran.

33 However, the experience of Pakistan and Iran (Ahmed (1989), pp-164-165) and Malaysia (Naughton and Shanmugam (1990), p. 27) show that the uses of funds are mainly channeled to the deferred payments.

Under the Islamic system, Khan and Mirakhor (1987) argue that the banking operations will undoubtedly be more varied and complex, as compared to the conventional banking system. The viability and profitability of specific projects being proposed are emphasised, rather than the creditworthiness of the borrower that underlies the conventional banking system. In addition, banks have to consider a different rate of return for each economic project. On the liabilities side, the rate of return on deposits is determined as a proportion of profit. Therefore, the rate of return on deposits should be competitive with the interest rate offered by the conventional banks if the Islamic banks have to coexist with the former.

However, issues concerning suitable instruments of monetary policy have been addressed recently in a number of papers. For example, Khan and Mirakhor (1987) examine the implications of introducing a central bank in an Islamic financial system. They suggest that the conventional instruments of monetary policy that would still be available to the Central Bank would be the monetary base, required reserve requirement, credit control (the maximum limit for the amount that banks can allocate to profit-sharing activities), moral suasion, and the regulation of profit-sharing ratios between banks and depositors and between banks and borrowers.[34] Other conventional instruments, such as open market operations and discounting policy, as pointed out by Akhram Khan (1982) and Siddiqui (1982) are also applicable if they do not bear a fixed rate of return. In addition, Khan and Mirakhor further argue that the performance of the Central Bank's regulatory, supervisory and control functions can continue to strengthen its influence on the banking system.

A comparison has been carried out by Khan W. (1987) involving equity-based banking and interest-based banking, based on the assumptions that the supply of loanable funds is fixed, the number of mutually uncorrelated investment projects is

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[34] The issue of changing the pre-determined profit-sharing ratio is still controversial. Some scholars believe that it would be inappropriate to change a contractually determined ratio. While, some scholars argue in favour of regulating the ratio, provided such actions affect only new deposits and loans, see Khan and Mirakhor (1987), p. 165.

large and the ability of lenders to put money into each project is infinitely small. Initially, if interest rates and profit-sharing ratios are set such that the expected return in both cases are equivalent, lenders will be indifferent between these two facilities and borrowers' preferences will determine the choice between the two facilities. However, if borrowers are risk-averse, then the profit-based facility is Pareto-superior to the interest-based facility, and full equity is also superior to any combination of debt and equity, since equity spreads risk more optimally than debt.

He further discusses the model in which lenders can observe the outcome of investment projects only at a cost, and there is a tradeoff between the incentive effects of debt and the benefits of risk-spreading under equity. In general, these models show that the expected monitoring costs are lower under the interest-based facility than the profit-based facility. The reason is that in the interest-based facility, only reported returns below the fixed interest rate are regarded as suspicious by the lenders. The choice of interest-based versus profit-based facility depends on a consideration of the costs of less-than-optimal risk-sharing versus the benefits of less monitoring costs in the interest-based facility. If the degree of risk-aversion is low, the interest-based facility dominates, perhaps explaining its prevalence in the non-Islamic world and the coexistence of Islamic banks with conventional banks.

A different study has been carried out by Haque and Mirakhor (1987) to show the consequences of risk-sharing between lenders and borrowers on aggregate investment. They claim that with profit-sharing, optimal investment would occur at the point where the marginal product of capital is equal to unity. However, this result is based on the assumption that the profit-sharing ratio offered by a borrower to lenders is independent of the level of investment, a situation which cannot be obtained in a general equilibrium (as argued by Ahmed (1989)). Since the lender's return depends on both the level of profits and the profit-sharing ratio, the value of the later offered to a lender to provide a minimum level of expected utility would not be independent of the expected level of investment. The general conclusion shows the aggregate level of investment would be different with profit-sharing would still hold.

The effect of moral hazard as a result of imperfect information has also been discussed. The imperfect information is only posed by the borrower. Haque and Mirakhor (1987) conclude that market failure need not result from moving to an Islamic system even with imperfect information, if appropriate contingent contracts are used.

3.3.5 Models of Financial Deregulation

In the 1980s, several suggestions have been made to abolish interest rate ceilings and mandated credit allocations, and heavy reserve requirements. A new term, known as financial deregulation, has emerged. The current research in this area tries to identify whether bank deregulation has any consequences for the riskiness of banking. Several authors, like BIS (1984) and Kaufman (1986) find that the deregulation raises risks in banking. On the other hand, Hall (1984) and Benston (1986) maintain that the riskiness of banking is bearing no relationship to deregulation. Although the result is mixed, Melitz and Bordes (1991) suggest that the Central Bank has also to consider the change as a certain risk for their banks, especially the interest risks.

In this regard, the link of deregulation to monetary policy can be easily seen. The Central Bank affects interest rate variability by controlling the excess reserves of the commercial banks. For example, an increase in bank reserves brought about by open market purchases of government bonds would decrease short-term interest rates, which if perceived to be a lasting effect, would move along the yield curve to influence the medium-term and long-term rates as well.

In an economy with relatively open foreign exchange markets, but with fixed exchange rates, capital flows would prevent the domestic interest rates from deviating substantially from world interest rates (see Villanueva and Mirakhor (1990)). The resulting capital inflows would negate both the initial reduction in reserves and the initial increase in the domestic interest rates. In these circumstances, the Central

Bank do not fully control the supply of money.[35]

Therefore, in a deregulated financial environment the term structure of interest rates is also an important aspect of the transmission mechanism for monetary policy, since financial deregulation is likely to affect the yield curve (see OECD (1989)). Whether the relationship between short-term rates and long-term rates is affected or not depends on two interdependent factors, namely, the direct liquidity effect and the effect of the inflationary expectations-monetary policy credibility.

Under the first effect, Blundell-Wignall, Browne and Manasse (1990a) show that the short-term rates are negatively related to discretionary monetary policy. Under the second effect, two outcomes emerge, first, a credible restrictive monetary policy which is perceived to be anti-inflationary will be likely to reduce the inflation premium built into long-term rates. Second, a contractionary monetary policy that lacks credibility will do relatively little in affecting long-term rates. Since, in a deregulated financial market, banks have greater freedom to manage their portfolios, including the maturity structures, any policy-induced increase in short-term interest rates would be dampened by substitution away from long-term assets in the expectation of higher yields.

In response to changes in bank reserves, the short-term rates and the relationship between short-term and long-term rates may also be affected by the endogenous behaviour of the components of the money multiplier to initial changes in the short-term rates. The changes in interest rates on treasury bills and government securities associated with open market operations affect bank deposits and lending rates, and hence, the currency and excess reserve ratios.

The relative importance of liquidity effects in financially deregulated financial market can be ascertained from the relationship between long-term and short-term rates (see

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[35] The same argument has also been pointed out by Freedman (1989), Friedman (1989) and Goodhart (1989).

OECD (1989)). The sensitivity of long-term rates and short-term rates is reduced during financial deregulation. This suggests that financial deregulation increases the relative importance of inflationary expectations in interest rate determination, while the impact of domestic liquidity on the slope of the yield curve becomes weaker.

3.4 Conclusion

The changing structure and environment in the banking system have changed the transmission mechanism of monetary policy. In traditional monetary analysis, monetary policy affects economic activity through changes in the supply of money. At the same time, economists have been increasingly concerned with the composition and behaviour of banks' portfolios. Economists like Gurley and Shaw (1960), and Stiglitz and Weiss (1981), share a view that credit can be considered as an important transmission mechanism for the effects of monetary policy. This occurs because bank assets mainly consist of loans.

Recently the development in Islamic banking and deregulation processes have created large changes in the operations and riskiness of the banking system. As a result, the role of money supply as an operating target of monetary policy has been undermined. Finally, the deregulation of commercial banks has changed the transmission mechanism for monetary policy from money supply to interest rates and bank credit.

CHAPTER 4

DEREGULATION AND BANK BEHAVIOUR IN THE MIXED MARKETS

4.1 Introduction

Chapter 3 detailed past research on the relationship between monetary policy and commercial banks. The evidence indicated that during the past decade, the importance of the deregulation process for the role of market forces and the efficiency of commercial banks has been increasingly emphasised.[1] This trend towards deregulation of the banking system, both through removal of interest rate ceilings, and through quantitative and power regulations, has produced an environment in which the commercial banks are likely to adjust more freely to market forces.

In Malaysia, the commercial banks are still subject to the condition that the interest rates on loan and certain deposit markets would not be allowed to exceed the interest rates charged by the two largest banks. In this context, there is a need to formulate a model of bank behaviour in this type of deregulated environment under the assumption of a price taker in the securities market, and a duopolistic price setter in the loan markets and in certain deposit markets. This model appears as an important prerequisite for a clear understanding of the conduct of monetary policy.

The discussion of this chapter will be organised into two main sections. Section 4.2 deals with an overview of bank modelling, that is, models which attempt to explain the development of bank modelling from liquidity management to the joint determination of the structure of assets and liabilities and their interaction in a regulated environment. Section 4.3 discusses the full equilibrium model of bank behaviour, the behaviour of profit maximising banks that adopt price leadership in

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[1] See, for example BIS (1984), Hall (1984), Benston (1986), and Melitz and Bordes (1991).

loan markets and in certain deposit markets, and price takers in securities markets will be examined. The market demand and supply schedules for the commercial banks' assets and liabilities will be derived to determine the composition of assets and liabilities. In addition, the relationship between cost of funds and rate of return will be combined in the equilibrium model as the channel for monetary policy.

4.2 Overview of Bank Modelling

The capacity of commercial banks to extend credit is determined by their reserve position. If they have excess reserves the banks can make more loans and purchase more securities. Hence, the reserves position affects the flow of credit and money.

Authors, like Dewald (1963) and Saving (1977), have shown that the banks' demand for excess reserves affects money supply. They stress that any changes in the reserves position of commercial banks will influence the money supply. Here, the amount of reserves is considered to be an important asset in the banks' portfolio so that the level of such reserves is an important variable for the commercial banks.

As mentioned by Baltensperger (1980), the first analytical models of bank behaviour are models of bank reserve and liquidity management. He elaborates on why a large proportion of the previous studies dealing with bank behaviour on a firm-theoretic level arise in connection with a bank's reserve and liquidity management, which plays a central role in most economist's view of the money supply mechanism.

On the other hand, the effects of various types of regulatory constraints imposed on banking firms need to be handled in a model of a banking firms in an integrated way. Such a view, as mentioned in Mingo and Wolkowitz (1977) and Baltensperger (1980), is also important for certain kinds of monetary policy questions, as the portfolio reaction of banks to monetary policy instruments is influenced by the amount and structure of assets and liabilities.

The modelling of bank behaviour in the face of regulation has been addressed in the

work of Silber (1975), Baltensperger (1980), Fama (1980), and Kane (1981). They argue that the unique feature of the banking system relates to the regulatory system.[2] There are regulations concerning what types of securities can be held in the bank portfolios against total deposits; there are regulations limiting the returns that can be paid on deposits; and there are regulations concerning how the banks' assets should be allocated. These changing regulatory systems have changed the structure, the riskiness and assets diversification of the banking firm. Therefore, these elements should be included in modelling the behaviour of banking firms.

4.3 A Model of Bank Behaviour in a Deregulated Environment

The recent trends toward deregulation, through the relaxation of price, quantity and power regulations, are producing an environment in which the commercial banks are likely to adjust more freely to market conditions. Hence, the commercial banks can freely determine the payment and receipt of interest, operate with low ratios of required reserves and liquidity requirements, and are given more power in the secondary market.

However, studies of bank behaviour in a deregulated environment have been limited to partial equilibrium models. For example VanHoose (1988) provides a partial equlibrium model of the market for bank deposits in a deregulated environment. In addition, he includes the assumption that banks behave oligopolistically where exit and entry are freely permitted. One key element of this study is the assumption that the number and relative size of bank competitors in bank deposit markets are endogenously determined.[3]

One of the motives for financial deregulation is to make banks more independent

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2 The question of whether and how financial institutions should be regulated has been considered by Tobin (1963), when he analyses whether banks are regulated because they are unique or are unique because they are regulated.

3 VanHoose (1988) produces evidence that the number of banks in the market and the equilibrium quantity of deposits are positively correlated.

through interest rate competition. However, the banking industry in Malaysia (and other developing countries) presently is subject to the condition that the payment and receipt of interest would not be allowed to exceed the interest rates charged by the two largest banks. Hence, there is a need to formulate a model of bank behaviour in this type of deregulated environment under the assumption of a price taker in the securities market, and a duopolistic price setter in the loan market and in certain deposit markets.

The basic approach utilised in this section is as follows. In a full equilibrium model, the behaviour of profit maximising banks that adopt price leadership in loan markets and in certain deposit markets, and price takers in securities markets will be examined. A market demand and supply schedules for the commercial banks' assets and liabilities will be derived to determine the variables which affect the quantity of assets and liabilities.

4.3.1 Balance Sheet Constraint

The commercial banks are assumed to have n types of liabilities, LC_n: the capital originally invested in the bank is denoted as KC; borrowed funds secured through the issuance of i types of deposits are denoted as DC_i; the payable amount, denoted as PAC; discounting instruments is denoted as DIC; and other liabilities, denoted as OLC. Then, the liability constraint can be written as

$$\sum_{n} LC_n = KC + \sum_{i} DC_i + PAC + DIC + OLC \qquad (4.1)$$

Funds secured from capital and the issuance of deposits are allocated among four classes of assets: required reserves, liquid assets, receivable amount, loans and other assets. Consequently, the banks' uses of funds are composed of required reserves (RRC), j types of liquid assets (LAC_j), receivable amount (RAC), loans (P) and other

assets (OAC).[4] Therefore, the equation for the total assets (A_m) is given by

$$\sum_m AC_m = RRC + \sum_j LAC_j + RAC + P + OAC \qquad (4.2)$$

Let ρ and τ denote the proportion of total eligible liabilities (ELC_k) allocated to required reserves and liquid assets, respectively. The commercial banks are presumed to have a behaviour pattern such that $P+OAC = (1-\rho-\tau)\Sigma ELC_k$, where $(1-\rho-\tau)$ is the marginal propensity to acquire additional loans and other assets. Hence, the constraints for each asset can be shown as:[5]

$$RRC = \rho \sum_k ELC_k \qquad (4.3)$$

$$\sum_j LAC_j \geq \tau \sum_k ELC_k \qquad (4.4)$$

$$P+OAC = (1-\rho-\tau)\sum_k ELC_k \qquad (4.5)$$

Equations (4.1) to (4.5) can be combined to represent the balance sheet constraint:

$$RRC + \sum_j LAC_j + P + OAC = KC + \sum_k ELC_k + OLC \qquad (4.6)$$

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4 Here, the definition of liquid assets is equivalent to the definition of minimum liquidity requirement as already mentioned in Section 2.4 and given by equation (4.7).

5 In equation (4.4), the symbol of equal and greater than shows that banks normally hold more liquid assets than the required ratio as an excess reserves.

In equation (4.6), *LAC* and *ELC* are defined respectively as:

$$\sum_j LAC_j = VCC+BCB+MC+TB+GSC \tag{4.7}$$

and

$$\sum_k ELC_k = \sum_i DC_i+NPC+DIC \tag{4.8}$$

where *VCC* is vault cash, *BCB* is the balance with the Central Bank, *MC* is money at call, *TB* is treasury bills, and *GSC* is government securities, *NPC* is the total net payable (the different between payable amount and receivable amount) and *DIC* is the discounting instruments. From here, excess reserves can be defined as the total amount of vault cash and balance with the Central Bank.[6]

4.3.2 The Model of Price Leadership in a Duopolistic Market

There have been many studies of the effect of bank market structure on the bank behaviour, the emphasis has been more on the presence of monopoly power. These studies include, for example, the well-known models by Klein (1971) and Baltensperger (1980).

This section tries to formulate a model in which commercial banks have to operate in a deregulated environment. This is a model of price leadership based on the size of firms, in which the two banks with the largest assets in Malaysia become endogenous price leader and provide a "guidance" under which the other banks may

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[6] Banks hold a balance with the Central Bank as a means of reducing the cost of meeting their reserve requirements in an environment in which they are faced with random eligible liabilities flows.

price their loans and deposits.[7] In this model, banks with less assets strictly follow set prices.[8] This demonstrates that the amount of assets plays an important role in establishing the existence and identity of a price leader. In addition, this model is designed for a market in which there is no price competition.

The model that will be developed in this chapter is based on the assumption that the price charged by the leader bank can be less or greater than the price charged by the follower banks as shown by the following equations:

$$r_i^0 = (r_i^1 + \theta) \qquad \textbf{(4.9)}$$

and

$$r_l^0 = (r_l^1 + \theta) \qquad \textbf{(4.10)}$$

where Θ is constant, *0* and *1* are symbols denoting bank as a follower and leader, respectively.

Both equations will also be included in our model to specify what happens if a bank reacts sluggishly to changes in the costs of funds and hence, it will result in a lagged effects on lending and deposit rates, and consequently on the behaviour of lenders and depositors. For this reason, a rationing scheme is needed where the banks are rationed in response to the changes in monetary policy.

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7 Although Ono (1982) has classified three types of price leadership: dominant, collusive and barometric price leadership, the model of price leadership developed by Deneckere and Kovenock (1992) describes duapolistic markets with more than one large firm. This model still maintains the spirit of the traditional model by Markham (1951).

8 The reason is to avoid an attempt to determine exogenously the timing of price announcements, see Deneckere, Kovenock, and Lee (1992), p. 152.

4.3.3 The Model of the Whole Banking Firm

Following Sealey and Lindley (1977), Baltensperger (1980) and Elyasiani (1983) it is assumed that the production for bank z of all different liability and asset types can be represented as:

$$Q^z = Q^z(AC^z_m, LC^z_n, I^z_{m,h}, I^z_{n,h}) \tag{4.11}$$

where $I_{m,h}$ and $I_{n,h}$ denote the quantity of input type h employed with asset type m and liability type n, respectively.

Then, the banks' profit function can be represented as π^z is equal to:

$$[r_l^z P^z + r_j \sum_j LAC_j^z] - [r_i^z(\sum_i DC_i^z) + r_b NPC^z + r_d DIC^z + C^z(I^z_{m,h}, I^z_{n,h})] \tag{4.12}$$

subject to the technical constraint (4.11), a balance sheet constraint (4.6) and unregulated interest rates, r_l, r_j, r_i, r_b and r_d, where r_l, r_j, r_i, r_b and r_d are the interest rates on loans, the j types of liquid assets, the i types of deposits, inter-bank rate and discount rate, respectively. The cost of using input type h is denoted by C. Note that the bank is a price setter in the loan and deposit markets, hence r_l and r_i are superscripted by z.

Equation (4.12) shows that the structure of assets and liabilities is integrated. Such an integration includes the effects of various instruments of monetary policy and various types of regulatory constraints imposed on banking firms. Such a view is also important for the transmission mechanism of monetary policy questions, as the portfolio reaction of banks to monetary policy instruments is influenced by the regulation factors.

In order to maintain maximum continuity with an earlier work, the following model uses the standard model of banking firm introduced by Besanko and Thakor (1992)

and VanHoose (1983). However, the framework is modified in three ways: the introduction of a deregulated environment, the assumption of a duopolistic market and the diversification of assets and liabilities plus the monetary policy constraint as shown in equations (4.1) to (4.8).

4.3.3.1 Duopolistic Models in the Loan Markets

Assume an economy consisting of two classes of agents - borrowers and banks. There are two categories of banks, that is, the leader banks and the follower banks.[9] Borrowers have limited initial endowments and have to borrow from banks to finance the project. With an assumption that there are only two types of borrowers (B_b) - low-risk (B_1) and high-risk (B_2). There are N_b borrowers of type b. For any loans $P_b \in [0, \infty)$, a borrower receives a return of $Y(P_b) \equiv Y$ with probability $\wp_b \in (0,1)$ and a return of zero with probability $1-\wp_b$, where $\wp_2 > \wp_1$.

The banks compete for borrowers by offering a contract spesifying an interest charged $r_{b,l}$ and a borrowed amount P_b. Thus, the return on loans is given by

$$R(P_b) = (1+r_{b,l})P_b \qquad (4.13)$$

Banks are assumed to discriminate on the basis of the quality of borrowers, so each type b borrower receives a different loan contract $(r_{b,l}, P_b)$. The banks collect the return $R(P_b)$, if the borrower's project is successful but collect nothing, if the borrower's project is unsuccessful.

To develop the demand for loans, the borrower is assumed to choose the contract which yields the highest expected utility. This expected utility for type b is given

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[9] The discussion here will be limited to the conventional banks, since the behaviour of Islamic banks will discussed in Chapter 5.

by[10]

$$EU_b(R(P_b),P_b)-r_{b,l}P_b \equiv \varrho_b[Y(P_b)+R(P_b)] \tag{4.14}$$

As mentioned in section 2.4, the lending rate is determined by the cost of funds. Therefore, any increase in the cost of funds will increase the lending rate. However, the lending rate charged by the follower banks cannot be greater than 0.5 percentage point of the leader banks. Thus, if the leader banks reduce their rate, the follower banks and Islamic banks must follow to fulfill this requirement and vice versa, if the leader banks increase their rate, the follower banks and Islamic bank must not necessarily follow. If we assume that the leader bank offers a loan contract $(r_{b,l}^{\ 1},P_b^{\ 1})$, a borrower will choose the leader bank if and only if

$$EU_b(R(P_b^1),P_b^1)-r_b^1P_b^1 \geq EU_b(R(P_b^0),P_b^0)-r_b^0P_b^0 \tag{4.15}$$

The number of type-b borrowers who choose the leader bank is

$$B_b(R(P_b^1),P_b^1,R(P_b^0),P_b^0)\equiv N_b[EU_b(R(P_b^1,P_b^1)-EU_b(R(P_b^0,P_b^0)-r_{b,l}^1P_b^1+r_{b,l}^0P_b^0] \tag{4.16}$$

From equations (4.15) and (4.16), it can be derived that $\partial B_b/\partial r_{b,l}^{\ 1}<0$, $\partial B_b/dP_b^{\ 1}>0$, $\partial B_b/dR(P_b^{\ 1})>0$, $\partial B_b/\partial r_{b,l}^{\ 0}>0$, $\partial B_b/\partial P_b^{\ 0}<0$ and $\partial B_b/\partial R(P_b^{\ 0})<0$. Thus, as leader bank makes its loan contract more favourable (lower $r_{b,l}^{\ 1}$, and higher $P_b^{\ 1}$) or as a follower bank makes its loan contract less favourable, the leader bank attracts more borrowers. In addition, as the income of borrower increases, the demand for loans will increase.

However, the above conclusion needs careful consideration. First, as shown in equations (4.9) and (4.10), the leader bank may charge three differents interest rate on loans, that is, the same rate, or a greater or smaller rate than is charged by the follower bank. Second, as argued by Borgers (1992), if the leader bank attracts more

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[10] Each borrower compares the expected returns with the expected interest payments.

demand than it can serve two types of rationing emerge, that is, proportional rationing and surplus-maximising rationing. In this study, only the model in which borrowers are rationed according to the surplus-maximising rationing will be specified.

Consider next the role of capacity as implied by the above argument. While there are many alternative routes by which a relationship between the loan rate and capacity may be derived, the following derivation is chosen because it relates most directly to the assumption of surplus-maximising rationing. First, if we assume that the leader bank (with the greatest capacity) charges a low interest rate, borrowers borrow from the cheapest bank. When the leader bank cannot satisfy all demand at that price, some borrowers will be left for the follower bank.[11] How much this bank will actually lend depends upon how the loans of the leader bank are rationed. Second, if we assume the follower bank charges a low interest rate, borrowers borrow from the follower bank.

Third, if we assume $r_{b,l}^{\ 1} = r_{b,l}^{\ 0}$, the capacity constraint may play an important role in determining the share of each leader and follower. The leader bank is assumed to be the largest capacity. This, in turn, implies that $P_b^{\ 1} > P_b^{\ 0}$. Since leader will never face a demand below $P_b^{\ 1}$, follower need never undercut $P_b^{\ 1}$. The equilibrium interest rates must be contained in $[r_{b,l}^{\ 1}, r_{b,l}^{\ 0}]$.

4.3.3.2 The Model of Price Taker in the Reserves and Securities Markets

The pioneering work of Edgeworth (1888) on the theory of banking indicated (among other things) that money supply contractions were preceded by declines in the rate of growth of bank reserves and that money supply expansions were preceded by an acceleration of the growth of the bank reserves. This finding encouraged several authors to examine the behaviour of bank reserves. In one such early study, Orr and

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[11] In this case, Stiglitz and Weiss (1981) mention that the equilibrium of credit rationing may exist, see for more detail in section 3.3.1.

Mellon (1961) hyphotesised that if the Central Bank increases or reduces the required reserve ratio to adjust bank reserves and, eventually, the money supply, the initial impact would be on the deposits markets. That is, the initial effect would be felt on the amount of deposits and only subsequently on the money supply. Subsequently, a number of researchers focused on specialised issues in the behaviour of bank reserves. For example, Poole (1968) claimed that the significance of bank borrowing from the Central Bank (the federal fund market) and the Central Bank lending rate in determining the level of reserves.

Baltensperger (1980), Santomero (1984) and Evanoff (1990) specifically focused on how to manage the reserve position by incorporating opportunity and adjustment costs, and uncertainty in the flow of deposits. A number of researchers have also investigated the effect of changes in the methods of reserve computation on banks' reserve positions; Friedman and Robert (1983), and Chen and Mazumdar (1992) summarise much of the relevant evidence.

In Malaysia, as part of their continuing effort to provide more freedom to the banking system, the Central Bank of Malaysia introduced a measure in September 1979 to replace total deposits in favour of total eligible liabilities as the denominator in calculating the amount of reserves. In addition, under the carryover provision, the daily sum of a bank's actual reserve over the bi-weekly reserve computation period must not be less than plus or minus two percent from the actual figure. A potential by-product of the new regime is an increase in the volatility of the inter-bank market as banks "rush" to cover their position towards the close of a reserve settlement period. The Central Bank presumably would deal with this by tightening administration of the discount window.

Therefore, the purpose of this section is to evaluate the impact of the new regime in the context of a model of bank reserve adjustment behaviour and to find theoretically the factors affecting bank reserve behaviour.

The objective of managing the balance sheet components is to maximise and maintain

the spread between interest earned and interest paid, while ensuring that adequate resources exist to pay off maturing liabilities and to fund assets growth.[12] It encompasses the management of banks' liquidity position by managing the assets and liabilities to provide adequate resources to meet anticipated funding needs. To meet deposit withdrawals and to satisfy loan demands, banks rely on their holdings of liquid assets and their capacity to borrow funds from various money markets.[13]

The risk is that these pools of asset and liability liquidity may not be sufficient to meet imperative claims for cash payments. This forces a bank to hold excess reserves as a bumper for this uncertainty. In the case of deficient reserves a bank has to sell off less liquid earning assets at a loss or to borrow funds at high cost. Therefore, the literature on bank reserve management, for example Baltensperger (1980), Santomero (1984), and Evanoff (1990) focuses on how to manage the reserve position by incoporating opportunity and adjustment costs, and uncertainty in the flows of deposits.

With the introduction of the carryover provision, banks have an incentive to alternate between reserve excesses and reserve deficiencies. If the amount of reserves is always in excess, as in the case of Malaysia, there is no adjustment cost involved in the reserve position.[14] Furthermore, it can be postulated that the carryover provision tends to induce reserve position adjustments even in the absence of changes in the level of eligible liabilities. Therefore, the carryover provision reduces the impact of interest-rate changes on the desired level of excess reserves.

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12 Banks also incur other operating expenses and derive noninterest income from fees and service charges, the net interest margin is the most important component of a bank's earning performance.

13 Poole (1968) and Baltensperger and Milde (1976) consider this situation as uncertainty in the bank reserve managemnet.

14 The carryover provision can be used by bank to hedge reserve adjustment costs.

From the above discussion, the behaviour of bank reserves can be generally represented as:

$$RC_t = f(ELCB_t, OPC_t) \qquad (4.17)$$

where *OPC* is the opportunity cost, *ELCB* is the amount of eligible liabilities and *RC* is the amount of reserves. Equation (4.17) shows that in examining the banks' reserves behaviour, it appears reasonable to assume that the banks' reserve adjustment of its reserve position takes into account the inter-bank funds, the borrowing amount from the Central Bank, the investment avenues and loans portfolio.

In the above discussion, banks are allowed to hold a variety of different types of liquid assets. Baltensperger (1980) mentions that banks can diversify their assets by considering the risk-return in line with general portfolio theory. The application of this approach is based on the idea of risk aversion and the assumption of price takers.[15]

The amount of liquid assets acts as an intermediate output. In this case, Elyasiani (1983) claims that more risk averse banks make fewer loans and hold a larger share of their assets as cash. Explicitly, risk averseness depends on the uncertainty in the deposit and loan markets.[16] Therefore, the demand models for liquid assets and other assets which use the theory of portfolio behaviour under assumptions of risk aversion depends on the own return, the closest substitutes, the constraint variable which is expected to have a positive sign.

4.3.3.3 Duopolistic Models in the Deposit Markets

The tendency of deposits to fluctuate with changing market and economic conditions

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15 Elyasiani (1983) points out that the models of banking firm based on risk neutrality will be misspecified.

16 This is another way to show the intergration of assets and liabilities.

has produced an element of uncertainty in that markets. In dealing with this uncertainty, banks have to rely on other sources of funds, for example, borrowing from other banks (interbank funds, Eurodollar deposits) or repo transactions. In this section it will be shown how the bank offers the prices it will pay for various types of deposits and other components of eligible liabilities, and how these prices determine the size and composition of the banks' eligible liabilities.

The banks are assumed to issue two types of deposits DC_i, namely, demand deposits (*DD*) and time deposits (*TD*). The depositor faces a two-step decision problem. First, the depositor must choose which bank to use. The relative return of these deposits will be evaluated by the depositor in order to decide where to save. Second, the depositor must decide how much to save. If a depositor chooses leader bank offering a deposit return r_i^1, the depositor will choose the deposit amount $DC_i^1(r_i^1)$ to maximise the sum of liquidity benefit $LB(DC_i^1)$ and the net income of deposits $(r_i^1-1)DC_i^1$, that is

$$DC_i^1(r_i^1) = \max_{DC_i^1} [LB(DC_i^1)+(r_i^1-1)DC_i^1] \tag{4.18}$$

Since the liquidity benefit is assumed to be increasing and concave, therefore $LB'>0$ and $LB''<0$, it follows that $DC_i^{1\prime}(r_i^1)>0$.

The maximal utility a depositor obtains when facing a deposit rate r_i^1 can be represented as

$$EU(r_i^1)\equiv LB(DC_i^1(r_i^1))+(r_i^1-1)DC_i^1(r_i^1) \tag{4.19}$$

From equation (4.19) and the assumption of liquidity benefit, the following conditions can be obtained, i.e, $EU'(r_i^1)=DC(r_i^1)>0$ and $EU''(r_i^1)=DC''(r_i^1)<0$. A depositor chooses the bank that makes $EU(r_i^1)$ as large as possible. By the same logic as in the section 4.3.3.1, the deposit supply function $D_i^1(r_i^1,r_i^0)$ for the leader bank offering a

deposit rate r_i^1, when follower banks are offering deposit return r_i^0, is given by

$$DC_i^1(r_i^1, r_i^0) = D_i^1(r_i^1)[EU(r_i^1) - EU(r_i^0)] \quad (4.20)$$

From equations (4.19) and (4.20), a bank's deposit supply is expected to increase in the own rate r_i^1 and decrease in the rival's rate r_i^0, and as income increases, the deposit supply will also increase.

On the other hand, banks have access to supply inter-bank funds to other banks to facilitate the adjustment of their eligible liabilities.[17] In addition, banks can obtain discounting facilities at the Central Bank.[18]

Our central hypothesis is that if deposits are expected to be relatively expensive, banks would compete more aggressively for other sources of funds, namely net payable and discounting instruments.[19] However, the bank's ability to supply these funds depends on the excess amount of assets.

4.3.3.4 Cost of Funds and Lending Rate

The reason that monetary policy is reflected most prominently and immediately in the inter-bank market, which anchors other interest rates. So, in this section, the relationship between the cost of funds and the rate of return will be constructed as the channel for monetary policy. In addition, if the commercial banks are sluggish in adjusting their rates, then distortions such as credit rationing could persist in the market.

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17 Banks acquire additional funds through these channel partly because interest rates on deposit are pegged to two largest banks.

18 This facility is only a privilage and not as a right.

19 Flannery (1982) argues that banks can acquire additional funds through new deposit accounts. However, this transaction involves adjustment costs as well as paying interest of the balances attracted. Furthermore, this new deposits amount is not so much.

The previous models of price setting behaviour by the banking firm are based on the contention that the inter-bank rate serves as the cost of funds for the commercial banks as they set their loans rate and deposit rates.[20] These models simply postulates that the loan rates and deposit rates are determined by deposit rates and the inter-bank rate, respectively. Thus,

$$r_i = f(r_b) \tag{4.21}$$

$$r_l = f(r_i) \tag{4.22}$$

In summary, equations (4.21) and (4.22) show that the inter-bank rate and deposit rates serve as the basis for influencing the spectrum of interest rates. In this type of model, any shift in the inter-bank rate and deposit rates would shift all other interest rates especially those quoted by the commercial banks.

4.4 Conclusion

The motives of financial deregulation are to make banks more independent through interest rate competition, operate with low ratios of required reserves and liquidity requirements, and given more power in the secondary market. However, the banking industry in Malaysia is presently subject to the condition that the payment and receipt of interest would not be allowed to exceed the interest rates charged by the two largest banks. As a result, a model of bank behaviour in a deregulated environment has to be constructed under the assumption of a price taker in the securities markets, and a price setter in the loan markets and in certain deposit markets. Our analyses show, first, close integration between assets and liabilities which incorporates instruments of monetary policy. Second, the leader banks and the follower banks interact competitively. Finally, the results have implications for the issue of the appropriate monetary instruments. Specifically, the results indicate that use of

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[20] For example, Simon (1989), VanHoose (1991) and Scholnick (1993).

monetary instruments designed to affect the target variables relies on the bank market structure. Under price leadership, changes in interest rates can produce either stabilising or destabilising effects. It might be argued that the sluggishness of response of commercial banks to changes in the inter-bank rate shows that the changes in monetary policy would have only slowed effects on lending and deposit rates, and thus on the target variables.

CHAPTER 5

PROFIT-SHARING IN A MODEL OF BANK BEHAVIOUR[1]

5.1 Introduction

The growing establishment of Islamic banks in several Muslim countries and non-Muslim countries, as mentioned in Chapter 3, has brought forward two basic issues. First, there are questions concerning the operation of a banking system which is prohibited from paying and receiving interest rates. Second, how would monetary policy be expected to operate in an interest-free banking system? The first and second issues have been addressed by Mohsin (1982) and Khan and Mirakhor (1987b), respectively. However, a model of bank behaviour which incorporates outputs, inputs, profit-sharing and monetary policy has not been formulated. Therefore, this chapter is directed towards that issue.

The discussion will be organised in the following way. Section 5.2 will deal with a brief discussion on the concept of profit-sharing. Two issues concerning Islamic banks will be discussed in section 5.3. A simple model of workable Islamic banks will be developed in section 5.4. The model that will be developed here is a simple one that is able to highlight the principal questions of concern.

5.2 The Concept of Profit-Sharing

In general the operations of an Islamic banking would have the following features. Besides its own shareholder funds, the main sources of funds would be two forms of deposits, that is, demand deposits and investment deposits. Demand deposits are directly related to payment. Although Islamic banks would guarantee the nominal

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[1] Most of this chapter has been extracted from Ismail (1993b).

value of the deposits, they would pay no return on these deposits. Investment deposits constitute the main sources of funds for Islamic banks. These deposits enable depositors to participate in Islamic banks' investment rather than fixed and saving deposits. Therefore, depositors would be treated as shareholders and entitled to a share of the profits or losses made by the bank. The distribution of profits or losses has to be agreed on in advance of the transaction between the bank and the depositors and cannot be changed during the life of the contract.

The Islamic banks usually use the profit-sharing method as the main principle in acquiring assets. Two principal methods of financing in profit-sharing are *Mudharabah* (commenda) and *Musyarakah* (partnership). Under the provisions of *mudharabah* excess funds are made available to the borrower to be invested in a productive enterprise in return for a predetermined distribution of the profits earned. Financial losses are borne exclusively by the lender, and the borrower loses only the time and effort invested in the venture.

Under *musyarakah* (partnership), there is more than one contributor of funds. All contributors invest in varying proportions, and the profits (or losses) are shared strictly in relation to their respective capital contribution.

In transactions where profit-sharing is not applicable, other methods of financing can be employed, which include the following. First, *Qard al-Hasanah* (benevolent loans) where these are zero-return loans that make available to those who need them. Commercial banks that provide these loans are permitted to charge the borrower a service charge to cover the administrative costs of handling the loans.[2]

Second, *Bai' Bithaman Ajil* (deferred payment sales). This method allows the sale of a goods on the basis of deferred payment in instalments or in a lump sum payment. The price of the goods is agreed on between the buyer and the seller at the time of the sale and cannot include any charges for deferring payments.

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[2] This cost should not be related to the amount or the time period of the loans.

Third, *Bai' Salam* or *Bai' Salaf* (purchase with deferred delivery). In this method the buyer pays the seller the full negotiated price of goods that the seller promises to deliver at a future date. This method is limited to goods whose quality and quantity can be fully specified at the time the contract is made, such as agricultural and manufactured goods.

Fourth, *Ijarah* (leasing). In this method, a person leases a particular good for a specific sum and a specific period of time. They can also negotiate for lease-purchase of the good, where each payment includes a portion that goes towards the final purchase and transfer of ownership of the goods.

Fifth, *Jo'alah* (service charge). This is a method in which one party undertakes to pay another a specified sum of money as a fee for rendering a specific service in accordance with the terms of the contract negotiated between two parties. This method facilitates activities, such as consultation, fund placements, and trust activities.

In summary, first, the contract between depositors and bank, and bank and borrowers are not limited by the above methods, because under Islamic law the freedom of contracts provides both parties with a flexibility that allows a variety of forms of financial transactions. The law does not constrain the Islamic bank from creating any contractual form as long as its does not include interest, and both parties are fully informed of the details of the contract. Second, the interaction between assets and liabilities is mainly devoted to profit-sharing. The detailed discussion on this interaction will be considered in more detail in sections 5.4 and 5.5.

5.3 Two Issues concerning Islamic Banks

The growing establishment of Islamic banks in the 1980s has brought two broad issues. First, there are questions concerning the operation of a banking system which is prohibited from paying and receiving interest. This issue includes the coexistence

of Islamic banks with the conventional banks.[3] Second, there are issues concerning the instruments of monetary policy and how these instruments work in the Islamic banks.

The prohibition of interest means that an Islamic banking system has to develop alternative financial transactions that do not bear predetermined interest rates. This question has been examined by several authors. Mohsin (1982) suggests a clear way out of the interest rate system. The depositors, the shareholders, the borrowers and the banks share the risks and rewards in proportion to the contribution made by each agent. Furthermore, as part of its business activity, the bank may charge commission and fees for the banking and non-banking activities.

In an attempt to structure its assets and liabilities, the bank is subject to the monetary policy imposed by the Central Bank. Given this setting, what should be the instruments of monetary policy? How would monetary policy be expected to operate in an interest-free banking system?

The issues concerning suitable instruments of monetary policy have been addressed recently in a number of papers. For example, Khan and Mirakhor (1987b) examine the implications of introducing a central bank in an Islamic financial system. They suggest that the conventional instruments of monetary policy that would still be available to the Central Bank would be the required reserve requirement, credit control (the maximum limit for the amount that banks can allocate to profit-sharing activities), moral suasion, and the regulation of profit-sharing ratios between banks and depositors and between banks and borrowers.[4] Other conventional instruments, such as open market operations and discounting policy, as pointed out by Akhram

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3 Except in Pakistan and Iran.

4 The issue of changing the pre-determined profit-sharing ratio is still controversial. Some scholars believe that it would be inappropriate to change a contractually determined ratio. While, some scholars argue in favour of regulating the ratio, provided such actions affect only new deposits and loans, see Khan and Mirakhor (1987), p. 165.

Khan (1982) and Siddiqui (1982) are also applicable if they do not bear a fixed rate of return.

Khan and Mirakhor (1987b) also argue that the banking operations will undoubtedly be more varied and complex, as compared to the conventional banking system. The viability and profitability of specific projects being proposed are emphasised, rather than the creditworthiness of the borrower that underlies the conventional banking system. In addition, banks have to consider a different rate of return for each economic project. On the liabilities side, the rate of return on deposits is determined as a proportion of profit. Therefore, the rate of return on deposits should be competitive with the interest rate offered by the conventional banks if the Islamic banks have to coexist with the former.

5.4 The Model

The discussion in section 5.3 shows that the operations of Islamic banks are entirely worked on the basis of profit- and loss-sharing and have to compete with the conventional banks. In addition, Islamic banks are still subject to the same monetary policy. This means that Islamic banks have to adjust their portfolio according to the changes in monetary policy. The purpose of this section is to integrate all the liabilities, assets, profit-sharing and monetary policy constraint aspects of bank behaviour into a unified framework.

5.4.1 Jointness of Production and Profits

Islamic banks are assumed to obtain inputs from n types of liabilities , LI_n: borrowed funds secured through the issuance of i types of deposits, DI_i (demand deposits (CA) and investment deposits (IA)), capital from shareholders (KI) and other liabilities (OLI). The demand deposits are interest free as in the conventional banking system, while for investment deposits, depositors participate in the outcomes of the banks' investment at a rate which is predetermined as a profit- or loss-sharing ratio. The same basis will be used to calculate the return to the equity holders. Then, the

liability constraint can be written as

$$\sum_{n} LI_n = KI + \sum_{i} DI_i + OLI \tag{5.1}$$

Funds secured from capital, the issuance of deposits and other liabilities are used to produce four classes of assets: required reserves (*RRI*), j types of liquid assets (LAI_j), loans (*PIB*) and other assets (*OAI*). The holding of liquid assets and loans includes the holding of excess reserves and provisions of interest-free loans, respectively. Therefore, the equation for the total assets is given by

$$\sum_{m} AI_m = RRI + \sum_{j} LAI_j + PIB + OAI \tag{5.2}$$

Let ρ and τ denote the proportion of the total eligible liabilities (ELI_k) allocated to required reserves and liquid assets, respectively. The banks are presumed to have a behaviour pattern such that $PIB+OAI=(1-\rho-\tau)\Sigma ELI_k$, where $(1-\rho-\tau)$ is the marginal propensity to acquire additional loans. Hence, the constraints for each asset can be shown as:

$$RRI = \rho \sum_{k} ELI_k \tag{5.3}$$

$$\sum_{j} LAI_j \geq \tau \sum_{k} ELI_k \tag{5.4}$$

$$PIB+OAI = (1-\rho-\tau)\sum_{k} ELI_k \tag{5.5}$$

Equations (5.1) to (5.5) can be combined to represent the balance sheet constraint:

$$RRI+\sum_{j} LAI_j+PIB+OAI = KI+\sum_{k} ELI_k+OLI \qquad (5.6)$$

In equation (5.6) *LAI* and *ELI* are defined, respectively as

$$\sum_{j} LAI_j = VCI+BICB+SCI+GIC+OII \qquad (5.7)$$

and

$$\sum_{k} ELI_k = \sum_{i} DI_i+NPI \qquad (5.8)$$

where *VCI* is vault cash, *BICB* is the balance with the Central Bank, *SCI* is stock of commodities, *GIC* is government investment certificates, *OII* is other investments and *NPI* is the total net payable (the different between payable amount and receivable amount).

By the same argument as in the section 4.3.3, it is assumed that the production of all liabilities and assets can be represented as

$$Q = Q(AI_m, LI_n, I_{m,h}, I_{n,h}) \qquad (5.9)$$

where $I_{m,h}$ and $I_{n,h}$ denote the quantity of input type h employed with asset type m and liability type n, respectively.

From equation (5.9), product integration becomes an important element when deposits or a combination of deposits and capital are used to produce more than one product. However, banks acquire the right to use their deposits only for as long as owners of deposits allow.

In the banking system, profits and losses are to be shared between bank and depositors, and bank and borrowers according to certain predefined rules.[5] Furthermore, the small-denomination deposits will be invested economically in the large-denomination investment that facilitate under Islamic law. It allows depositors to participate indirectly in large diversified investment in which the return will be shared between bank and depositors. Therefore, the costs of funds depend on the rate of return on banks' loans and investments. From here, the profits function can be written as[6]

$$\pi = [e_j\tau + e_l(1-\rho-\tau)]IA - [e_iIA + C(I_{m,h}, I_{n,h}] \qquad (5.10)$$

subject to the technical constraint (5.9), and the balance sheet constraint (5.6) and the rate of return from investment (e_j), rate of return from loan (e_l), rate of return on deposits (e_i) which are related as

$$e_i = p_0 e_l \qquad (5.11)$$

$$e_i = p_1 e_j \qquad (5.12)$$

where p_0 and p_1 depend on the percentage ratio that has been determined during the signing of contract.

5.4.2 A Model of Islamic Bank Behaviour

The aim to be achieved by the equation (5.10) is to determine the combination of the rate of return on investment/loans and deposits, and the composition of portfolio that

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5 See section 5.2 for more detail.

6 Other objectives might exist, such as to achieve social justice and a specific pattern of income and wealth distribution, perhaps this objective is the most easy to identify and other objectives can be identified through the allocation of assets.

will maximise the return to equity holder. This requires the construction of a model for each component of asset and liability which is the main purpose of this section.

5.4.2.1 Loan Demand

Assume an economy consisting of two classes of agents - entrepreneurs and banks. Entrepreneurs have limited initial endowments and must finance the project by borrowing. For simplicity, suppose there are two types of projects - low-risk (J_1) and high-risk (J_2).[7] There are J_b projects of type b. For any investment $I \in [0,\infty)$, a borrower receives a return of $R(I_b) \equiv Y$ with probability $\wp \in (0,1)$ and a return of zero with probability 1-$\wp_b$, where $\wp_2 > \wp_1$.

The bank is assumed to have no access to monitor the project. This is based on the assumption that a loan is given on the basis of the viability and profitability of a project, (see Khan and Mirakhor (1987b)). The bank offers a contract by specifying a proportion of profits p_b and a borrowed amount I_b. Thus, the return on loans is given by

$$e_{b,l} = \frac{p_b R(I_b)}{I_b} \tag{5.13}$$

We assume the bank can distinguish among borrowers on the basis of the quality of projects, so each type b borrower receives a distinct loan contract (p_b,I_b). When a borrower's project is successful, the bank collects the return $Y(I_b)$. When a borrower's project is unsuccessful, the bank suffers loses which depend on the proportion of loans.

To develop the demand for loans, we assume that borrowers choose the contract

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[7] See section 5.3, where the viability and profitability of specific projects being proposed are emphasised, rather than the creditworthiness of the borrower.

which yields the highest expected utility. This expected utility for type b is given by

$$EU_b(R(I_b),I_b)-e_{b,l}I_b \equiv \wp_b[R(I_b)+e_{b,l}] \tag{5.14}$$

If we assume that the conventional banks offer a loan contract $(P_b, r_{b,l})$, a borrower will choose the Islamic banks if and only if

$$EU_b(R(I_b),I_b)-e_{b,l}I_b \geq EU_b(R(P_b),P_b)-r_{b,l}P_b \tag{5.15}$$

The number of type-b borrowers who choose the Islamic banks is

$$B_b(I_b,e_{b,l},P_b,r_{b,l}) \equiv N_b[EU_b(R(I_b),I_b)-EU_b(R(P_b),P_b)] \tag{5.16}$$

From equations (5.15) and (5.16), it can be derived that $\partial B_b/\partial e_{b,l}<0$, $\partial B_b/\partial I_b>0$, $\partial B_b/\partial Y>0$, $\partial B_b/\partial r_{b,l}>0$, $\partial B_b/\partial P_b<0$ and $\partial B_b/\partial Y<0$. Thus, as an Islamic bank makes its loan contract more favourable (lower $e_{b,l}$, and higher I_b) or as a conventional bank makes its loan contract less favourable, the Islamic bank attracts more borrowers. Furthermore, as the income of borrower increases, the demand for loans will increase.

5.4.2.2 Reserves and Liquid Assets Demands

In the basic model, as discussed in section 4.3.3.2, the bank's demand for reserves and liquid assets is viewed as part of monetary policy requirements. The bank is assumed to be a price taker in the these markets. The bank then maximises the expected utility of profits from this portfolio, subject to the balance sheet constraint. The optimal composition of these portfolio then depends on the own return, substitute return and an exogeneous variable.

Formally, let y and x denote the $Mx1$ and $Nx1$ vectors of endogeneous and exogeneous variables, and e_j and e_s denote the own return and substitute return. The

system of asset demand equations is

$$y = \alpha_0+\alpha_1 x+\alpha_2 e_j+\alpha_3 e_s+u \qquad (5.17)$$

where α_i (i=0, ...3) are the vector of coefficients. The coefficients of α_1 and α_3, and α_2 are expected to have positive and negative signs, respectively, and u represents the error terms.

Given the constraint involvement of Islamic bank in the money market and investment avenues for liquid assets, the general thesis of a structural change in the liquid assets/eligible liabilities relationship is certainly limited. This implies a small change in the composition of reserves and liquid assets. Its can also be argued that changes in the liquid assets/eligible liabilities relationship will occur marginally, as monetary policy instruments change.

5.4.2.3 Deposit Supply

A two-step decision problem faces the depositor. First, the depositor must choose which bank to use. The relative return of these deposits will be evaluated by the depositor in order to decide where to invest. Second, the depositor must decide how much to invest. Suppose a bank offers a contract specifying the proportion of profits to be allocated to the depositor as p_i and receives an amount of deposit DI_i. The depositor will choose the deposit amount $DI(p_i)$ to maximise the sum of liquidity benefit $LB(DI_i)$ and the net income of deposits $(e_i-1)DI_i$, that is

$$DI_i(e_i) = \max_{DI_i} [LB(DI_i)+(e_i-1)DI_i] \qquad (5.18)$$

The same conditions as equation (4.18) are imposed on equation (5.18) and it follows that $DI'(e_i)>0$.

The maximal utility a depositor obtains when facing a deposit rate e_i can also be

represented as

$$EU(e_i) \equiv [LB(DI_i(e_i))+(e_i-1)DI_i(e_i)] \quad (5.19)$$

From equation (5.19) and the assumption of liquidity benefit, the following condition can be obtained, i.e, $EU'(e_i)=DI'(e_i)>0$ and $EU''(e_i)=DI''(e_i)>0$. A depositor chooses the bank that makes $EU(e_i)$ as large as possible. Therefore, the deposit supply function $DI(e_i,r_i)$ for an Islamic bank offering deposit return e_i, when conventional banks are offering deposit rate r_i, is given by

$$DI(e_i,r_i) = DI(e_i)[EU(e_i)-EU(r_i)] \quad (5.20)$$

From equations (5.19) and (5.20), a bank's deposit supply is expected to increase in the own rate e_i and decrease in the rival's rate r_i, and as income increases, the deposit supply will also increase.

5.4.2.4 Profit and Cost of Funds

The deposit return is reflected in the bank's profit from loans and investment. This is based on the contention that the cost of funds is determined by the proportion of profits from investment and loans that will be shared between bank and depositor. This model simply postulates that the deposit return is influenced by the bank's profit. Thus,

$$e_i = f_1(e_i) \quad (5.21)$$

$$e_i = f_2(e_j) \quad (5.22)$$

where f_1 and f_2 are determined by the ratio of profit that will be divided between bank and depositors.

In summary, equations (5.21) and (5.22) show that any changes in the rate of return on investment and loans will influence the rate of return on deposits.

5.5 Conclusion

The establishment of Islamic banks has been a dominant theme in Muslim countries and among Islamic economists over the last decade. It is reflected in the increasing number of banks as well as more works published in the literature. As a result, several issues have been raised concerning the credibility of a banking system without interest and the coexistence of Islamic banks with conventional banks. In this chapter, the effect of profit-sharing in banking has been examined. Our analyses show: first, competitive interactions between assets and liabilities, and between Islamic banks and conventional banks. Second, the rate of return on investment is determined by market forces, a rise in this return unambigously higher the depositor's return; while the most likely effect is an increase in the amount of deposits. This result indicates that the higher return on investment is more prone to an expansion in bank credit.

CHAPTER 6

AN ECONOMETRIC STUDY OF THE MALAYSIAN BANKING SYSTEM

6.1 Introduction

The initial study (as set out in earlier chapters) was mainly concerned with aspects of monetary policy, with structural and regulatory changes, and with exploring the relationship between monetary policy and commercial banks. This research has led to the development of a model of bank behaviour in a deregulated environment and in the presence of Islamic banks. This model provides a useful perspective for evaluating the impact of monetary policy in this environment. However, so far the analysis has been theoretical; it is vital also to explore the model empirically. This will be the main focus of this chapter.

The rest of this chapter will be organised as follows. Sections 6.2 and 6.3 will focus on the structure and estimation of the model, respectively. The estimation results covering the period 1985:1-1992:12 will be reported in Section 6.4. This section also sets out to examine the hypotheses that have been laid down in Chapters 4 and 5. In evaluating the model's performance, simulation experiments will be presented and discussed in section 6.5. The reaction of the monetary targets to changes in monetary policy will also be tested in this section. Conclusions will be given in section 6.6.

6.2 Structure of the Model

The models which follow have been extracted from Chapters 4 and 5. It is assumed that there are two types of agents operating in the market: the depositors and the banking firms. The depositors supply deposits and borrow from banks. Banks hold reserves and liquid assets, invest in negotiable certificates of deposit, borrow or lend via the inter-bank markets and borrow or lend via discounted instruments.

The behavioural equations which are specified in this section are designed to emphasise the allocation of assets in the context of a short-run time horizon. The approach is to develop simultaneous behavioural equations for both sets of agent which concentrate on supplies of and demands for financial assets. By adopting this approach, the models offered below take into consideration behavioural inter-relationships with respect to holdings of both liabilities and assets.

In the following discussion, the constraint variables and the own rate, and the substitute rate on the liabilities side are expected to have positive and negative signs, respectively. While on the assets side, the constraint variables and the substitute rate, and the own rate are expected to have positive and negative signs, respectively. The positive relationships are expected for the cost of funds and the rate of return. These expected signs are indicated in parentheses below the relevant coefficients. The definitions of variables are given in Appendix C.

a. Liabilities

i. *Deposit markets*

$$DDF_t = a_0 + a_1 Y_t + a_2 FDR_t + u_{1t} \qquad (6.1)$$
$$\qquad\qquad (+) \quad (-)$$

$$DDL_t = b_0 + b_1 Y_t + b_2 FDR_t + u_{2t} \qquad (6.2)$$
$$\qquad\qquad (+) \quad (-)$$

$$DDI_t = c_0 + c_1 Y_t + c_2 FDR_t + u_{3t} \qquad (6.3)$$
$$\qquad\qquad (+) \quad (-)$$

$$TDF_t = d_0 + d_1 Y_t + d_2 FD3F_t + d_3 FDR_t + u_{4t} \qquad (6.4)$$
$$\qquad\qquad (+) \quad (+) \quad (-)$$

$$TDL_t = e_0 + e_1 Y_t + e_2 FD3L_t + e_3 FDR_t + u_{5t} \qquad (6.5)$$
$$\qquad\qquad (+) \quad (+) \quad (-)$$

$$TDI_t = f_0 + f_1 Y_t + f_2 IA3_t + f_3 FDR_t + u_{6t} \qquad (6.6)$$
$$\qquad\qquad (+) \quad (+) \quad (-)$$

$$NCDT_t = g_0 + g_1 Y_t + g_2 NCD3_t + g_3 FDR_t + u_{7t} \qquad (6.7)$$
$$\qquad\qquad (+) \quad (+) \quad (-)$$

ii. *Other Liabilities*

$$PAC_t = h_0 + h_1 EXA_t + h_2 IBR3M_t + h_3 ALRF_t + u_{8t} \quad (6.8)$$
(+) (+) (-)

$$DIS_t = i_0 + i_1 EXA_t + i_2 DIR_t + h_3 IBR3M_t + u_{9t} \quad (6.9)$$
(+) (+) (-)

b. Assets

i. *Liquid Assets*

$$RI_t = j_0 + j_1 ELI_t + j_2 TB3_t + u_{10t} \quad (6.10)$$
(+) (-)

$$RC_t = k_0 + k_1 ELCB_t + k_2 SR_t + u_{11t} \quad (6.11)$$
(+) (-)

$$MC_t = l_0 + l_1 ELCB_t + l_2 MCR_t + l_3 SR_t + u_{12t} \quad (6.12)$$
(+) (-) (+)

$$TB_t = m_0 + m_1 ELCB_t + m_2 TB3_t + m_3 SR_t + u_{13t} \quad (6.13)$$
(+) (-) (+)

$$GSC_t = n_0 + n_1 ELCB_t + n_2 GS3_t + n_3 SR_t + u_{14t} \quad (6.14)$$
(+) (-) (+)

$$GIC_t = o_0 + o_1 ELI_t + o_2 TB3_t + o_3 PCPI_t + u_{15t} \quad (6.15)$$
(+) (-) (+)

ii. *Loans*

$$PF_t = p_0 + p_1 Y_t + p_2 ALRF_t + p_3 ALR_t + u_{16t} \quad (6.16)$$
(+) (-) (+)

$$PL_t = q_0 + q_1 Y_t + q_2 ALRL_t + q_3 ALR_t + u_{17t} \quad (6.17)$$
(+) (-) (+)

$$PI_t = r_0 + r_1 Y_t + r_2 ALRI_t + r_3 ALR_t + u_{18t} \quad (6.18)$$
(+) (-) (+)

iii. *Other Assets*

$$NCDA_t = s_0 + s_1\, EXL_t + s_2\, NCD3_t + r_3\, SR_t + u_{19t} \qquad (6.19)$$
$$(+) \quad (-) \quad (+)$$

$$RAC_t = t_0 + t_1\, EXL_t + t_2\, IBR3M_t + t_3\, SR_t + u_{20t} \qquad (6.20)$$
$$(+) \quad (-) \quad (+)$$

$$DISA_t = u_0 + u_1\, EXL_t + u_2\, DIR_t + u_3\, SR_t + u_{21t} \qquad (6.21)$$
$$(+) \quad (-) \quad (+)$$

c. Cost of Funds and Profit/Rate of Return.

$$FD3F_t = v_0 + v_1\, IBR3M_t + u_{22t} \qquad (6.22)$$
$$(+)$$

$$FD3L_t = w_0 + w_1\, IBR3M_t + u_{23t} \qquad (6.23)$$
$$(+)$$

$$ALRF_t = x_0 + x_1\, FD3F_t + u_{24t} \qquad (6.24)$$
$$(+)$$

$$ALRL_t = y_0 + y_1\, FD3L_t + u_{25t} \qquad (6.25)$$
$$(+)$$

$$IA3_t = z_0 + z_1\, TB3_t + u_{26t} \qquad (6.26)$$
$$(+)$$

d. Balance Sheet Constraints.

$$ELCB = DDF + DDL + TDF + TDL + NCDT + PAC - RAC$$
$$DIS - DISA \qquad (6.27)$$

$$ELI = DDI + TDI + PAI - RAI \qquad (6.28)$$

$$LACB = ERC + MC + TB + GSC + OSCB \qquad (6.29)$$

$$LAIB = ERI + SCI + GIC + OIIB \qquad (6.30)$$

$$LACS = (\tau/100)*ELCB \qquad (6.31)$$

$$LAIS = (\tau/100)*ELI \quad (6.32)$$

$$LC = KC + ELCB + OLCB \quad (6.33)$$

$$AC = RC + LACS + PF + PL + NCDA + OACB \quad (6.34)$$

$$LI = KI + ELI + OLIB \quad (6.35)$$

$$AI = RI + LAIB + PI + OAIB \quad (6.36)$$

$$L = LC + LI \quad (6.37)$$

$$A = AC + AI \quad (6.38)$$

$$A = L \quad (6.39)$$

$$EXA = AC - RC - LACB \quad (6.40)$$

$$EXL = LC - KC - ((\rho/100)*ELCB) - LACS \quad (6.41)$$

The variables *ALR* and *FDR* are defined as the lending rates and time deposits rates offered by the follower, leader or Islamic banks. In the Islamic banks, the lending rate and time deposit rate are calculated by the pre-determined ratio of profit between entrepreneur and banks, and banks and depositors, respectively. While, the variable *SR* is the substitute rate, defined as discount rate, inter-bank rate, money at call rate, treasury bills rate or government securities rates, and the u_i represents the error terms.

6.3 Estimation of the Model

The way monetary policy affects bank behaviour clearly depends on decisions made on both sides of the balance sheet. Notice that a decision made with respect to one side of the balance sheet automatically affects the other side, so a simultaneous equation model is the appropriate methodology.

A further issue of concern is the adoption of appropriate criteria for choosing between the various models. The coefficients in equations (6.1)-(6.26) were initially estimated using OLS. The diagnostic test statistics will be used to choose among alternative

results with the same functional forms.

In the second step, the presence of serial correlation seems to indicate some form of misspesification, so the equations were reestimated using a more dynamic specification. The equations were initially estimated with lag lengths of up to 12 months. In the final step, the signs and statistical significance will be examined.

Appendix D presents the most satisfactory results. The absolute t-values are given beneath each estimated coefficient. The adjusted R^2, F- and h-statistics, and diagnostic test statistics for serial correlation (χ_{sc}^2), functional form (χ_{ff}^2), normality (χ_n^2) and heteroscedasticity (χ_h^2) are also reported.

Since the coefficients of lagged dependent variables are close to unity, unit root tests were also conducted. However, the summary statistics were poorer and the functional form misspecification test rejected the null hypothesis, except in the equations for *RI*, *GIC*, *PF*, *PL* and *IA3*.

6.4 Model Estimates

The estimation period covered from January 1985 to December 1992. The sources of these data are given in Appendix C. The reestimated model using two-stage least squares is reported below. On the whole, reestimation of the model did not have much effect either on the absolute value or on the statistical significance of the estimated coefficients, indicating that the model estimates are stable. A change in the estimated coefficient sign is evident in equations (6.50) and (6.61) for *DIR*, *IBR3M* and *NCD*.

In the following, the t-statistics appear in parentheses below the parameter estimates. The asterisk sign, * and plus sign, + show that the variable is significant at 5% and 10%, respectively. In general, the adjusted R^2 statistics are quite reasonable and there is no autocorrelation shown by the h-statistics.

a. Deposit markets.

The interest rates are all significant, except in equation (6.44), thus confirming the hypothesis that demand deposits are basically determined by the rate of return on time deposits. The regression results in equation (6.42)-(6.44) also suggest that income is not significant.

$$DDF = -46.33 + 0.006\,Y - 21.39\,FD3F + 0.89\,DDF_{-1}$$
$$(0.41) \quad (1.40) \quad (1.84)^{+} \quad (16.40)^{*}$$
$$+ 0.06\,DDF_{-7} \qquad (6.42)$$
$$(0.92)$$

$$Adj.\ R^2 = 0.9876,\ h = -0.76$$

$$DDL = -76.74 + 0.005\,Y - 24.96\,FD3L + 0.73\,DDL_{-1}$$
$$(0.89) \quad (1.35) \quad (2.69)^{*} \quad (10.51)^{*}$$
$$+ 0.27\,DDL_{-9} - 168.80\,S3 - 153.05\,S10 \qquad (6.43)$$
$$(2.92)^{*} \quad (2.62)^{*} \quad (2.33)^{*}$$

$$Adj.\ R^2 = 0.9869,\ h = -1.60$$

$$DDI = 19.90 - 0.001\,Y - 0.68\,IA3 + 0.17\,DDI_{-1}$$
$$(1.61) \quad (0.15) \quad (0.71) \quad (1.69)^{+}$$
$$+ 0.26\,DDI_{-2} + 0.31\,DDI_{-8} + 0.40\,DDI_{-9}$$
$$(2.87)^{*} \quad (3.28)^{*} \quad (3.41)^{*}$$
$$- 18.14\,S10 - 23.14\,S11 \qquad (6.44)$$
$$(3.25)^{*} \quad (4.55)^{*}$$

$$Adj.\ R^2 = 0.9634,\ h = 0.86$$

Equation (6.44) indicates that the substitute rate was not significant in affecting the variation of demand deposits. This suggests that the shift from demand deposits in the Islamic banks to investment deposits is not influenced by the changes in the rate of return on investment deposits and vice versa.

The advantage of expressing time deposits as a function of both own return and

substitute rates is to compare the result of the main components of money supply and the competition among commercial banks to attract deposits. The 2SLS results for time deposits are summarised in equations (6.45), (6.46) and (6.47).

$$TDF = \underset{(0.92)}{-791.35} + \underset{(1.34)}{0.01\,Y} + \underset{(1.99)^{*}}{299.98\,FD3F} - \underset{(1.49)}{229.02\,FD3L}$$

$$+ \underset{(18.38)^{*}}{1.03\,TDF_{-1}} - \underset{(1.10)}{0.07\,TDF_{-4}} - \underset{(1.72)^{+}}{0.24\,TDF_{-10}}$$

$$+ \underset{(1.95)^{+}}{0.27\,TDF_{-11}} + \underset{(0.59)}{189.67\,S2} + \underset{(1.35)}{404.39\,S3} \qquad (6.45)$$

$$Adj.\ R^2 = 0.9879,\ h = 0.06$$

$$TDL = \underset{(1.33)}{1304.10} + \underset{(2.51)^{*}}{0.02\,Y} + \underset{(0.86)}{123.42\,FD3L} - \underset{(0.60)}{79.38\,FD3F}$$

$$+ \underset{(18.04)^{*}}{0.81\,TDL_{-1}} - \underset{(2.11)^{*}}{0.16\,TDL_{-8}} + \underset{(2.20)^{*}}{0.18\,TDL_{-10}}$$

$$+ \underset{(1.67)^{+}}{460.10\,S2} - \underset{(2.17)^{*}}{589.58\,S3} \qquad (6.46)$$

$$Adj.\ R^2 = 0.9317,\ h = 0.06$$

$$TDI = \underset{(1.67)^{+}}{128.07} + \underset{(1.73)^{+}}{0.006\,Y} - \underset{(0.57)}{7.43\,IA3} - \underset{(2.06)^{*}}{6.62\,FD3L}$$

$$+ \underset{(18.93)^{*}}{0.89\,TDI_{-1}} \qquad (6.47)$$

$$Adj.\ R^2 = 0.9854,\ h = 0.06$$

The interest rates offered by the follower (*FD3F*) and leader (*FD3L*) are statistically different from zero in equations (6.45) and (6.47), thus indicating that changes in interest rates offered by follower and leader banks will increase and decrease the amount of time deposits in the follower and Islamic banks, respectively. The income variable is only significant in influencing the amount of time deposits in the leader and Islamic banks.

As the market shares of the follower banks increase, the pool of deposits that banks could win rise in different domestic markets, and the expected cost of incremental deposits attracted through a small rate increase declines. When the leader banks choose to retaliate via interest rates, the market share of leader banks come from Islamic banks.

In the case of the Islamic bank, for many years its share of deposits in domestic markets was so small that it was not profitable for the bank to match the interest rates being offered by the leader and follower banks. However, the booming economy resulted in higher returns on investment projects which could be translated into a higher return on deposits.

$$NCDT = \underset{(1.71)^{+}}{-501.19} + \underset{(3.47)^{*}}{0.03\ Y} - \underset{(0.16)}{32.31\ NCD3} - \underset{(0.02)}{4.08\ FD3F}$$

$$+ \underset{(12.96)^{*}}{1.25\ NCDT_{-1}} - \underset{(4.26)^{*}}{0.43\ NCDT_{-2}} + \underset{(0.96)}{0.11\ NCDT_{-7}}$$

$$- \underset{(1.15)}{0.13\ NCDT_{-8}} - \underset{(1.54)}{309.17\ S1} - \underset{(2.14)^{*}}{428.95\ S7} \qquad (6.48)$$

$$Adj.\ R^2 = 0.9736,\ h = -1.08$$

Negotiable certificates of deposit are more attractive to depositors than time deposits, partly because interest rates on time deposits may reach a certain peak level. There has always been a supply of interest-bearing negotiable *NCDT*, since these certificates are highly liquid and more divisible. The market share of negotiable certificates of deposit has increased dramatically. It is successful in the sense that banks' market share of intermediation among large corporations is effectively protected as shown by the significance of income variable.

b. Other liabilities.

Nearly 97 percent and 98 percent respectively of the variations in the payable amount and discounted instruments variables are explained by the own return and substitute, excess assets, lagged dependent variables and seasonal factors, as indicated by the

coefficient of adjusted R^2. Both equations, (6.49) and (6.50), reveal that the payable amount and discounted instruments are positively and statistically driven by the own return (in equation (6.49)) and substitute, excess assets and lagged dependent variables. These results suggest that excess assets indicated are the restraining variable in both equations. The one-month and one-, five- and seven-months lagged dependent variables are also significant in equations (6.49) and (6.50), respectively.

$$\begin{aligned} PAC = {} & -3398.50 + 0.07\,EXA + 81.39\,IBR3M + 208.35\,ALRF \\ & \quad (3.38)^{*} \quad (4.65)^{*} \qquad (1.72)^{+} \qquad\quad (2.65)^{*} \\ & + 0.60\,PAC_{-1} - 384.12\,S1 - 767.84\,S2 - 353.73\,S7 \\ & \quad (6.88)^{*} \qquad (1.37) \qquad (2.76)^{*} \qquad (1.28) \\ & - 570.26\,S11 \\ & \quad (2.05)^{*} \end{aligned} \tag{6.49}$$

$$Adj.\ R^2 = 0.9673,\ h = 1.35$$

$$\begin{aligned} DIS = {} & -254.64 + 0.06\,EXA - 24.04\,DIR + 25.58\,IBR3M \\ & \quad (2.89)^{*} \quad (2.34)^{*} \qquad (0.78) \qquad\quad (1.69)^{+} \\ & + 0.93\,DIS_{-1} - 0.17\,DIS_{-5} + 0.16\,DIS_{-7} \\ & \quad (18.07)^{*} \qquad (2.14)^{*} \qquad\quad (2.18)^{*} \end{aligned} \tag{6.50}$$

$$Adj.\ R^2 = 0.9812,\ h = 0.80$$

Given the higher return of inter-bank funds (the growing gap between inter-bank rate and interest rates constraints that existed at commercial banks on time deposits), the banking system is encouraged, ceteris paribus, to increase lending of inter-bank funds and to reduce holding of reserves (equation (6.52)).

c. Reserves

All the coefficients, (except RC_{-10} and RI_{-10}) have the expected signs and are significant at 10 percent level. The results show that banks' reserves behaviour can be explained by the level of eligible liabilities, the opportunity assets, the lagged

dependent variables and seasonal factors.

$$RI = 69.88 + 0.12\,ELI - 19.52\,TB3 + 0.76\,RI_{-1}$$
$$(4.51)^{*}\quad (4.43)^{*}\quad (4.78)^{*}\quad (13.33)^{*}$$

$$- 0.07\,RI_{-10} - 21.09\,S3 - 18.14\,S4 - 20.76\,S7$$
$$(1.67)^{+}\quad (1.66)^{+}\quad (1.44)\quad (3.44)^{*}$$

$$- 20.76\,S8 - 23.88\,S10 \qquad (6.51)$$
$$(1.64)\quad (1.90)^{+}$$

$$Adj.\ R^2 = 0.9673,\ h = 0.61$$

$$RC = -253.34 + 0.04\,ELCB - 77.49\,IBR3M + 0.56\,RC_{-1}$$
$$(1.12)\quad (5.48)^{*}\quad (3.11)^{*}\quad (6.82)^{*}$$

$$+ 0.23\,RC_{-3} - 0.16\,RC_{-10} \qquad (6.52)$$
$$(2.88)^{*}\quad (2.57)^{*}$$

$$Adj.\ R^2 = 0.9277,\ h = -1.09$$

Since, the conventional banks are allowed to take part in the inter-bank market, the changes in eligible liabilities is approximately 0.04 which is less than the changes in eligible liabilities in the Islamic banks. Therefore, the changes in eligible liabilities only marginally affect the level of bank reserves in the conventional banks.

d. Liquid Assets

Equations (6.53)-(6.56) indicate that the own return and substitute rates do not have the expected signs and significance, except in equations (6.53) and (6.56). The eligible liabilities is only significant and has the expected signs in equations (6.55) and (6.56). The lagged dependent variables and seasonal factors are also significant.

The own and substitute rates are not significant for the conventional banks, it seems that the amount of liquid assets follows the trend in the previous months, as shown by the significance of lagged dependent variables and the seasonal factors.

An increase in the amount of eligible liabilities in the banks' balance sheet resulted

$$MC = 237.50 - 0.004\ ELCB - 7.05\ MCR + 26.13\ IBR3M$$
$$(0.63)\quad (1.04)\qquad (0.14)\qquad (1.15)$$

$$+ 0.74\ MC_{-1} + 0.22\ MC_{-4} - 0.28\ MC_{-5} + 0.25\ MC_{-6}$$
$$(9.87)^{*}\qquad (2.14)^{*}\qquad (2.19)^{*}\qquad (2.46)^{*}$$

$$+ 0.24\ MC_{-11} - 0.25\ MC_{-12} - 160.53\ S1 - 138.26\ S6$$
$$(2.27)^{*}\qquad (2.19)^{*}\qquad (2.18)^{*}\qquad (1.85)^{+}$$

$$- 193.29\ S11 \qquad (6.53)$$
$$(2.62)^{*}$$

$$Adj.\ R^2 = 0.9321,\ h = -0.29$$

$$TB = 1089.17 - 0.002\ ELCB - 27.08\ TB3 - 44.72\ GS3$$
$$(1.66)^{+}\quad (0.61)\qquad (1.11)\qquad (1.01)$$

$$+ 0.95\ TB_{-1} - 0.40\ TB_{-3} + 0.28\ TB_{-4} + 0.17\ TB_{-9}$$
$$(11.79)^{*}\qquad (3.36)^{*}\qquad (2.62)^{*}\qquad (1.62)$$

$$- 0.22\ TB_{-10} - 248.05\ S1 - 148.39\ S5 - 141.19\ S7$$
$$(2.06)^{*}\qquad (3.36)^{*}\qquad (2.07)^{*}\qquad (1.94)^{+}$$

$$- 139.20\ S8 - 139.05\ S11 \qquad (6.54)$$
$$(1.94)^{+}\qquad (1.94)^{+}$$

$$Adj.\ R^2 = 0.7558,\ h = 1.61$$

$$GSC = 1024.06 + 0.02\ ELCB - 117.40\ GS3 - 46.73\ IBR3M$$
$$(1.47)\quad (2.04)^{*}\qquad (1.27)\qquad (1.88)^{+}$$

$$+ 0.85\ GSC_{-1} - 0.20\ GSC_{-10} + 0.17\ GSC_{-12}$$
$$(15.49)^{*}\qquad (2.65)^{*}\qquad (2.06)^{*}$$

$$+ 386.96\ S1 \qquad (6.55)$$
$$(2.65)^{*}$$

$$Adj.\ R^2 = 0.9607,\ h = -1.34$$

in an increase in the demand for government securities and government investment certificates. At the same time, the banking system is encouraged to increase its use of liability funds (*ELCB* and *ELI*). Bank must raise additional funds via increases in all liability items of eligible liabilities in order to support a given level of liquid

assets.

$$GIC = \underset{(0.72)}{16.01} + \underset{(5.04)^{*}}{0.17\,ELI} - \underset{(5.36)^{*}}{25.68\,TB3} + \underset{(2.52)^{*}}{0.59\,PCPI}$$

$$+ \underset{(12.79)^{*}}{0.72\,GIC_{-1}} + \underset{(1.66)^{+}}{0.17\,GIC_{-9}} - \underset{(1.99)^{*}}{0.20\,GIC_{-10}} \qquad (6.56)$$

$R^2 = 0.9499,\ h = 0.99$

e. Loans.

Equations (6.57)-(6.59) reveal that about 99 percent of the variations in the amount of loans of each bank are explained by the variations in the own rate, substitute rate, seasonal factors and lagged dependent variables. In support of standard empirical findings, all the signs confirmed the theoretical predictions. The sign of the coefficients of the own return and substitute rates are correct, their magnitudes are statistically different from zero, (except, ALRI and ALRL in equations (6.57) and

$$PF = \underset{(0.26)}{-138.76} + \underset{(2.83)^{*}}{0.03\,Y} - \underset{(1.96)^{*}}{131.39\,ALRF} + \underset{(1.41)}{116.09\,ALRI}$$

$$+ \underset{(32.20)^{*}}{0.98\,PF_{-1}} - \underset{(0.84)}{0.02\,PF_{-9}} + \underset{(3.53)^{*}}{732.24\,S3} - \underset{(0.63)}{134.35\,S7}$$

$$- \underset{(0.98)}{202.50\,S11} \qquad (6.57)$$

$Adj.\ R^2 = 0.9983,\ h = 1.13$

$$PL = \underset{(0.54)}{243.40} + \underset{(2.86)^{*}}{0.02\,Y} - \underset{(2.93)^{*}}{238.76\,ALRL} + \underset{(3.01)^{*}}{207.47\,ALRI}$$

$$+ \underset{(16.10)^{*}}{0.85\,PL_{-1}} + \underset{(1.90)^{+}}{0.08\,PL_{-6}} + \underset{(0.60)}{0.27\,PL_{-11}} - \underset{(4.48)^{*}}{552.54\,S3}$$

$$+ \underset{(3.83)^{*}}{467.66\,S6} \qquad (6.58)$$

$Adj.\ R^2 = 0.9972,\ h = -0.92$

(6.59), respectively), at the specified level of significance. The amount of loans is also statistically responsive to changes in income with relatively higher rate of adjustment in the follower and leader banks than in Islamic banks.

$$PI = 34.75 + 0.008\ Y - 5.50\ ALRI + 0.22\ ALRL$$
$$\quad (1.46)\quad (2.66)^{*}\quad (1.82)^{+}\qquad (0.06)$$

$$+ 0.90\ PI_{-1} + 22.94\ S3 + 17.58\ S6 \qquad (6.59)$$
$$(24.92)^{*}\qquad (3.54)^{*}\qquad (2.77)^{*}$$

$$Adj.\ R^2 = 0.9949,\ h = 0.89$$

f. Other assets

Equations (6.49), (6.50), (6.60) and (6.61) complete the equilibrium system in the inter-bank and discounted markets. These four equations are used to adjust the amount of eligible liabilities. Whereas equations (6.48) and (6.62) represent the equilibrium system in the negotiable certificate of deposit market.

$$RAC = -548.87 + 0.04\ EXL - 0.31\ IBR3M + 0.96\ NCD3$$
$$\quad (1.28)\quad (2.94)^{*}\quad (0.03)\qquad (0.01)$$

$$+ 0.99\ RAC_{-1} - 0.17\ RAC_{-9} + 0.23\ RAC_{-10}$$
$$(22.09)^{*}\qquad (1.38)\qquad (1.65)^{+}$$

$$- 0.21\ RAC_{-12} - 941.87\ S4 - 858.29\ S10$$
$$(1.90)^{+}\qquad (2.88)^{*}\qquad (2.49)^{*}$$

$$- 573.10\ S11 \qquad (6.60)$$
$$(1.68)^{+}$$

$$Adj.\ R^2 = 0.9722,\ h = -0.02$$

$$DISA = -2061.72 + 0.05\,EXL - 380.12\,DIR + 276.14\,NCD3$$
$$(4.23)^{*} \quad (3.31)^{*} \quad (1.92)^{+} \quad (2.79)^{*}$$

$$+ 0.78\,DISA_{-1} + 0.16\,DISA_{-4} - 1434.14\,S1$$
$$(11.39)^{*} \quad (2.19)^{*} \quad (3.93)^{*}$$

$$- 619.72\,S2 - 328.11\,S4 \qquad (6.61)$$
$$(1.75)^{+} \quad (0.89)$$

$$Adj.\ R^2 = 0.9575,\ h = -0.47$$

$$NCDA = -1681.88 + 0.03\,EXL - 15.07\,NCD3 + 104.26\,GS3$$
$$(3.46)^{*} \quad (4.09)^{*} \quad (1.00) \quad (2.09)^{*}$$

$$+ 0.82\,NCDA_{-1} - 0.26\,NCDA_{-3} + 0.20\,NCDA_{-4}$$
$$(10.78)^{*} \quad (2.29)^{*} \quad (2.04)^{*}$$

$$- 125.39\,S3 - 108.87\,S8 - 175.80\,S9 \qquad (6.62)$$
$$(1.13) \quad (1.04) \quad (1.68)^{+}$$

$$Adj.\ R^2 = 0.9804,\ h = 1.62$$

In all the above equations, excess liabilities becomes the constraint for banks to invest in other assets. The coefficients of adjusted R^2 show that the variations in these assets are explained by the changes in excess liabilities, the own and substitute rates, lagged dependent variables and seasonal factors. All theoretical signs are correct, however the estimated magnitudes are not statistically different from zero, except for *IBR3M* in equation (6.60) and *NCD3* in equations (6.60) and (6.62). Since banks borrow (lend) in the inter-bank market to reduce (increase) the amount of eligible liabilities, *IBR3M* does not have a significant impact on banks' allocation of assets decision. It seems that the inter-bank rate is more relevant for managing the amount of reserves than to influence in the inter-bank market.

As a result of an increase in the inter-bank rate, the Central Bank also increases the discount rate. The balance-sheet adjustments for an increase in *DIR* would only reduce the amount of discounted instruments.

g. Rate of Return and Cost of Funds.

Some banks may prefer to use the inter-bank market as a more or less permanent source of funds to finance their portfolio. Therefore, short-term disturbances affect the inter-bank rate and only subsequently have an impact on the costs of deposits and cost of lending.

$$FD3F = \underset{(2.08)^*}{-0.29} + \underset{(4.65)^*}{0.17}\, IBR3M + \underset{(27.74)^*}{0.85}\, FD3F_{-1} \qquad (6.63)$$

$$Adj.\ R^2 = 0.9697,\ h = 1.03$$

$$FD3L = \underset{(0.72)}{-0.08} + \underset{(6.21)^*}{0.20}\, IBR3M + \underset{(27.65)^*}{0.81}\, FD3L_{-1} \qquad (6.64)$$

$$Adj.\ R^2 = 0.9753,\ h = 0.26$$

$$ALRF = \underset{(2.81)^*}{0.54} + \underset{(5.05)^*}{0.13}\, FD3F + \underset{(12.06)^*}{0.74}\, ALRF_{-1} + \underset{(2.97)^*}{0.13}\, ALRF_{-9} \qquad (6.65)$$

$$Adj.\ R^2 = 0.9663,\ h = -0.03$$

$$ALRL = \underset{(3.56)^*}{0.70} + \underset{(5.29)^*}{0.11}\, FD3L + \underset{(11.38)^*}{0.70}\, ALRL_{-1} + \underset{(3.48)^*}{0.15}\, ALRL_{-9} \qquad (6.66)$$

$$Adj.\ R^2 = 0.9689,\ h = -0.56$$

$$IA3 = \underset{(0.22)}{0.02} + \underset{(1.63)}{0.01}\, TB3 + \underset{(33.94)^*}{1.04}\, IA3_{-1} - \underset{(1.81)^+}{0.06}\, IA3_{-8} \qquad (6.67)$$

$$Adj.\ R^2 = 0.9882,\ h = 1.13$$

The inter-bank rate becomes the key market clearing rate for monetary policy at the short end of the term structure. The sluggishness of commercial banks in reacting to changes in the costs of funds showed that the changes in monetary policy would have only lagged effects on lending and deposit rates, and thus on the behaviour of lenders and depositors. Therefore, the lending rate is more sticky, especially in the

leader banks, as shown by equation (6.66).

6.5 Model Evaluation

The model developed above is primarily a model of bank behaviour. The credibility of this model can be established through a variety of tests. A common test is to simulate the model over the sample period and to obtain a better understanding of the reaction of the key variables to a range of policy changes. First, the model is simulated using actual values of exogeneous variables at the beginning of the test period, the simulated values of the endogeneous variables are then compared to the actual values. Second, the reaction of the monetary targets to changes in monetary policy will be tested.

6.5.1 Tracking Performance

In evaluating the model's performance, simulation results for the 1985:1-1992:12 sample period will be presented and discussed.

The simulation was carried out using the initial set of lagged values for the months from January to December, 1984 in TSP using the default algorithm, Gauss-Seidel.

It is apparent from the results presented in Table 6.1 that the prediction errors for all endogeneous variables are relatively small. Furthermore, it can be seen that prediction errors for variables like *ELCB*, *ELI*, *LACB*, *LAIB*, *LACS* and *LAIS* are smaller than those of their components, thus indicating a tendency for errors to cancel out.

In the liabilities side, simulation results are satisfactory with a low root mean square error in percentage terms (RMSE%) for eligible liabilities (0.4%), while for the nine disaggregated eligible liabilities components, the RMSE% ranges from 0.5% to 8.9%. In addition, the bias components are low (below 0.54%), implying low errors of central tendency.

Table 6.1
Dynamic Simultaneous Simulation 1985:1-1992:12:
Statistics of Fit.

Var	R^2	RMSE%	MAE%	Theil's inequality coefficient	Square of bias
DDF	0.9591	0.64	0.40	0.06	0.02
DDL	0.9824	0.46	0.21	0.04	0.00
DDI	0.9688	1.16	1.29	0.08	0.16
TDF	0.9190	1.07	1.11	0.11	0.54
TDL	0.8525	0.56	0.30	0.05	0.00
TDI	0.9498	0.81	0.63	0.07	0.03
NCDT	0.8928	1.35	1.76	0.12	0.00
PAC	0.9403	0.96	0.89	0.09	0.05
RAC	0.7700	2.03	3.96	0.20	0.04
DIS	0.9181	1.55	2.29	0.11	0.09
DISA	0.9014	8.97	7.25	0.23	0.13
RI	0.7082	20.53	40.44	0.25	0.01
RC	0.8397	1.44	1.99	0.14	0.01
MC	0.8844	3.06	8.97	0.19	0.01
TB	0.3839	1.29	1.60	0.12	0.01
GSS	0.8845	1.15	1.26	0.10	0.01
GIC	0.8147	2.95	8.35	0.22	0.01
NCDA	0.9563	2.75	7.24	0.12	0.04
PF	0.9917	0.31	0.09	0.03	0.21
PL	0.9931	0.27	0.07	0.03	0.01
PI	0.9874	0.42	0.17	0.04	0.00
FD3F	0.8433	1.98	3.77	0.16	0.00
FD3L	0.9383	0.91	0.79	0.08	0.00
IA3	0.9303	0.63	0.38	0.06	0.21
ALRF	0.8749	0.69	0.47	0.06	0.05
ALRL	0.9493	0.32	0.09	0.03	0.01
ELCB	0.9704	0.43	0.18	0.04	0.07
ELI	0.9480	0.72	0.50	0.06	0.07
LACB	0.8678	0.57	0.31	0.05	0.00
LAIB	0.7912	1.84	3.25	0.18	0.01
LACS	0.9637	0.43	0.18	0.04	0.08
LAIS	0.9605	0.72	0.50	0.06	0.08
AC	0.9944	0.22	0.05	0.02	0.04
LC	0.9921	0.29	0.09	0.03	0.07
AI	0.9632	0.78	0.58	0.05	0.01
LI	0.9762	0.62	0.37	0.05	0.07
L	0.9923	0.29	0.08	0.03	0.08
A	0.9945	0.22	0.05	0.02	0.04
EXA	0.9948	0.35	0.12	0.03	0.53
EXL	0.9925	0.29	0.09	0.03	0.08

Simulation results for two reserves and four liquid assets equations track the data series reasonably well with the RMSE% ranging from 1.1% to 3.1%, except for *RI* where the RMSE% is 20.5%. The magnitudes of the errors are acceptable, given the volatility of reserves and liquid assets during the study periods. Turning point prediction is very good (Theil's inequality test), especially in the study period. Finally, biases are close to zero for all reserves and liquid assets equations.

The simulation statistics for *PF*, *PL* and *PI* show that all equations perform well. These equations track the historical period well and capture the most important turning points, in particular in the recession of 1985:6-1986:12.

The simulation statistics for other assets reveal that the *DISA* and *NCDA* equations performed better than the *RAC* equation. The *DISA* and *NCDA* equations also track the historical period well and capture the most important turning points, in particular in the recession of 1985:6-1986:12.

For the cost of funds equations, the performance is very satisfactory, with RMSE% ranging from 0.3% for *ALRL* to 1.9% for *FD3F*.

Finally, the RMSE% for the main assets and liabilities aggregates are very low and range from 0.2% for *A* to 1.8% for *LAIB*, and 0.3% for *LC* and 0.7% for *ELI*, respectively. The biases are below 0.08.

Figures (E-1)-(E-40) in Appendix E show the actual and simulated behaviours of all endogeneous variables, the cyclical pattern of fluctuations does not change.

6.5.2 Policy Simulations

The aim of this simulation experiment is to obtain a better understanding of the reaction of the model to a range of policy changes and thereby assess the realism of the linkages in the model. The simulation experiments should also provide some insights from a policy perspective as to the reaction of the monetary targets to

changes in monetary policy.

The simulation experiments were conducted over a eight year historical period from the first month of 1985 to the last month of 1992. This represents the period over which most of the model equations were estimated.

Three experiments were undertaken to simulate the reaction of the monetary targets to the following: an increase in required reserve ratio, and an increase in inter-bank rate and discount rate.

a. An increase in required reserve ratio

A restrictive monetary policy is simulated in the model by temporarily increasing the required reserve ratio by 5 percentage point for the whole study period. This temporary restrictive in monetary policy acknowledges that the Central Bank has the ability to reduce inter-bank rate, and hence, to reduce banks' asset holdings and deposits. A summary of the results of this simulation is presented in Table 6.2.

The impact of the restrictive monetary policy on the target variables of the model is limited. Monetary base, MB is the only variable most significantly affected, with reserves in the conventional banks rising by the equivalent of percentage of the monetary base over the whole study periods.

The increase in required reserve ratio resulted in a decline in inter-bank rate, which in turn leads to an increase in reserves. Monetary base increases by around 0.03-0.11% in the first three years, but declines below control level after five years as the reserves in the conventional banks declines. Monetary base increases again by 0.19 percentage point above control level in the seventh year.

The time deposit rate offered by the follower banks declines by 0.02 percentage point in the first year as a result of the increase in the required reserve ratio, but thereafter remains at 0.01 percantage point above control for the rest of the years. The same

behaviour can be seen for FD3L and IA3. The increase in required reserve ratio would not change the lending rate offered by the follower banks. The impact of this increase could only contribute to the decline in lending rate offered by the leader banks in the third and fifth years. Since, the increase in *ALRF*, *FD3F*, *FD3L* and *IA3*; and the decline in *ALRL* are relatively small, there are no impact on the money supply and bank credit.

Table 6.2
Experiment I: a 5 percentage increase in the required reserve ratio

	Deviation from control (%)			
	year 1	year 3	year 5	year 7
Monetary base	0.11	0.03	-0.05	0.19
RC	0.11	0.03	-0.05	0.20
RI	0.02	0.02	0.01	0.03
Money supply, M1	0.00	0.00	0.00	0.00
DDF	0.00	0.00	0.00	0.00
DDL	0.00	0.00	0.00	0.00
DDI	0.07	0.06	0.04	0.01
Money supply, M2	0.00	0.00	0.00	0.00
M1	0.00	0.00	0.00	0.00
Quasi-money	0.00	0.00	0.00	0.00
TDF	0.00	0.01	0.01	0.00
TDL	0.00	-0.01	0.00	0.00
TDI	0.01	0.01	0.01	0.01
NCDT	0.00	-0.01	0.00	0.00
Bank credit	0.00	0.00	0.00	0.00
PF	0.00	-0.01	0.00	0.00
PL	0.00	0.00	0.00	0.00
PI	0.00	0.04	0.01	-0.01
Interest rates				
FD3F	-0.02	0.02	0.01	0.01
FD3L	0.00	0.01	0.01	0.01
IA3	0.01	0.01	0.01	0.01
ALRF	0.00	0.00	0.01	0.00
ALRL	0.00	-0.01	-0.07	0.01

Note: The amount of currency in circulation in monetary base and money supply, M1 is assumed as constant.

b. An increase in inter-bank rate

A contractionary monetary policy is simulated in this experiment by increasing the level of 3 months inter-bank rate by 1% above control for the entire simulation. This simulation experiment is expected to increase deposit rates and hence, on the lending rate which will reduce the amount of supply, M1 and bank credit and increase the amount of money supply M2. A summary of the main results is presented in Table 6.3.

The rise in the inter-bank rate has the direct effect of increasing the time deposit rates of follower and leader banks by more than 1 percentage point for the first three years. This explains why the money supply, M2 increases by more than 1 percentage point in the third and fifth years even though the 1 percentage point increase in the inter-bank rate contributes to a decline in the time deposit rates offered by the follower banks.

It shows that the increase in aggregate money supply, M2 also due to; first, the initial rise in time deposit rates is partly met by a rise in time deposits in the follower banks.

Second, the increase in time deposit rates also explains why the money supply, M1 declines over the study period. However, the decline in money supply, M1 is partly offset by the increase in demand deposits in the Islamic banks. Since, the depositors have changed their preferences for earning assets. This can be seen by looking at the deviation of quasi-money is always above control level for most of the simulation.

The impact of the increase in inter-bank rate on the monetary base is ambiguous. The decline in monetary base in the first year is contributed by the substantial decline in reserves in the Islamic banks. However, the increase in reserves in the conventional banks in the third and fifth years is offset by the decline in reserves in the Islamic banks, therefore, the percentage increase in monetary base is less than the former. In the seventh year, the decline in monetary base is mainly contributed by

the decline in reserves in the conventional banks.

Table 6.3
Experiment II: a 1 percentage increase in 3 months inter-bank rate

	Deviation from control (%)			
	year 1	year 3	year 5	year 7
Monetary base	-0.40	1.89	0.80	-1.61
RC	-0.33	2.15	0.88	-1.65
RI	-6.08	-1.37	-0.35	-0.69
Money supply, M1	-0.51	-1.90	-1.41	-0.77
DDF	-0.55	-2.15	-1.44	-0.45
DDL	-0.47	-1.62	-1.43	-1.24
DDI	0.07	0.06	0.04	0.01
Money supply, M2	0.27	1.41	1.89	0.76
M1	-0.51	-1.90	-1.41	-0.77
Quasi-money	0.41	1.96	2.57	1.10
TDF	0.81	3.97	5.31	2.05
TDL	0.07	-0.12	-0.02	0.29
TDI	-1.40	-1.72	-0.31	-0.40
NCDT	-0.10	-0.09	0.22	0.00
Bank credit	-0.23	-1.63	-1.92	-0.88
PF	-0.19	-1.50	-1.80	-0.61
PL	-0.30	-1.94	-2.23	-1.46
PI	0.02	0.08	0.04	0.01
Interest rates				
FD3F	3.32	11.95	-0.45	-0.39
FD3L	2.29	5.05	0.55	1.28
IA3	0.01	0.01	0.01	0.01
ALRF	0.79	2.74	1.93	0.20
ALRL	0.45	1.21	0.69	0.62

Note: The amount of currency in circulation in monetary base and money supply, M1 is assumed as constant.

The rise in time deposit rates has second-round effects on the model through a rise in the lending rates. The rise in lending rates, however, is only small (0.79% and 0.45% for the follower and leader banks, respectively) in the first year and then, much bigger in the third year and decline consecutively in the following years.

The decline in bank credit is largely contributed by the decline of bank credit in the leader banks. However, the impact of this increase on bank credit is offset by the increase in bank credit in the Islamic banks due to the lower cost of funds.

c. An increase in discount rate

A discount rate shock is simulated by exogeneously fixing the discount rate at a level 5% above its control value for the entire period of the experiment. This simulation experiment is expected to discourage the banking firm to rely on the discounted instruments. Therefore, it will increase the inter-bank rate that will be translated into the negative effect on monetary base. A summary of the main results of this simulation is presented in Table 6.4.

The rise in money supply, M2 is initially met from an increase in time deposit rates. This causes an increase in the time deposits by 0.01 percantage point and 0.03 percantage point in the subsequent years in the follower which then increase further money supply, M2 in the third and fifth years.

There is no change in the path of bank credit as a result of the increase in discount rate, other than a few minor changes caused by the slight changes in the lending return. Total bank credit, therefore, does not much deviate from control during the simulation.

The impact of an increase in discount rate could only reduce the monetary base in the first, fifth and seventh years. The initial consequences of the increase in discount rate stimulate higher inter-bank rate which causes the reserves to decline further. This leads to a continuing decline of the monetary base. This cycle does not continue indefinitely, because the deviation of monetary base is above control in the seventh year.

Table 6.4
Experiment III: a 5 percentage increase in discount rate

	Deviation from control (%)			
	year 1	year 3	year 5	year 7
Monetary base	-0.01	-0.01	-0.16	0.05
RC	-0.01	-0.01	-0.18	0.05
RI	0.04	0.02	0.01	0.03
Money supply, M1	0.00	0.00	0.00	0.00
DDF	0.00	0.00	0.00	0.00
DDL	0.00	0.00	0.00	0.00
DDI	0.07	0.06	0.04	0.01
Money supply, M2	0.00	0.01	0.01	0.00
M1	0.00	0.00	0.00	0.00
Quasi-money	0.00	0.01	0.01	0.00
TDF	0.01	0.03	0.03	0.00
TDL	-0.01	-0.01	0.00	0.00
TDI	0.01	0.00	0.00	0.01
NCDT	0.00	0.00	0.00	0.00
Bank credit	0.00	-0.01	0.00	0.00
PF	0.00	-0.01	0.00	0.00
PL	0.00	0.00	0.00	0.00
PI	0.00	0.02	0.01	0.00
Interest rates				
FD3F	-0.02	0.02	0.01	0.01
FD3L	0.00	0.01	0.01	0.01
IA3	0.01	0.01	0.01	0.01
ALRF	0.00	0.00	0.00	0.00
ALRL	0.00	-0.14	-0.07	0.01

Note: The amount of currency in circulation in monetary base and money supply, M1 is assumed as constant.

6.5 Conclusion

This chapter has presented a simultaneous model of 41 equations for the Malaysian banking system. It has attempted to incorporate into the model structure the deregulation environment and the presence of Islamic bank, which have not been adequately treated in previous models. The model also emphasises the integration between assets and liabilities.

The results on the whole conform to theoretical expectations. A comparison of the coefficient estimates and the t-statistics of the model using OLS and 2SLS suggests the coefficient estimates are generally stable. The simulation results indicate that prediction errors for all endogeneous variables are relatively small.

The simulation experiments show that monetary policy instruments have contributed to the behaviour of commercial banks. The fact that the commercial banks in a new environment might be less responsive to a change in the required reserve ratio and the discount rate. However, an increase in the inter-bank rate contributes to an increase in the monetary aggregates. Therefore, in the short-term, changes in the inter-bank rate can produce stabilising effects on the real output. In the long-term, this might be utilised to allocate funds for the process of economic development.

CHAPTER 7

SUMMARY AND CONCLUSION

A stable and efficient banking system is needed at the heart of the process of economic development. In an economy where rapid structural changes is currently underway, it is of crucial importance that funds can be appropriately channelled to enable productive investment to be undertaken. In particular, resources must be properly allocated to sectors having high priority in the industrialisation process. Thus, an effective monetary policy is vital if economic development is to proceed smoothly.

Therefore, the objective of this study is to evaluate the impact of monetary policy on the bank behaviour in a deregulated environment and in the presence of Islamic banks, and hence on the target variables. First, the changing objectives, instruments and targets of monetary policy in a deregulated environment have been analysed. The results show that financial deregulation is brought about by a number of undesirable macroeconomic outcomes. As a result, the magnitude and scope of monetary policy instruments have been changed by deregulation. The results also show empirically that the inter-bank rate is likely the choice for the target variables.

Second, the process of financial deregulation and the establishment of an Islamic bank which have been introduced in the Malaysian banking system have been examined. The analysis has led to the following results: (1) the deregulation process has produced an increase in the degree of competition and a reduction in liquidity, and a better allocation of banks' portfolios; (2) financial fragility and poor assets quality, together with bad management have forced the Central Bank to take further steps to maintain public confidence and speed-up recovery; and (3) interest rates are expected to be able to interact closely with economic activity. This new relationship has to be explored.

A survey of the relationship between monetary policy and commercial banks has led

to overwhelming acceptance of the new transmission of monetary policy. In traditional monetary analysis, monetary policy affects economic activity through changes in the supply of money. At the same time, economists have been increasingly concerned with the composition and behaviour of banks' portfolios. Economists shared a view that credit could be considered as an important transmission mechanism for the effects of monetary policy. This occurs because bank assets mainly consist of loans.

The current surveys, however, showed that credit rationing, and the developments in Islamic banking and deregulation processes have created large changes in the operations and riskness of the banking system. As a result, the role of money supply as an operating target of monetary policy has been undermined. Finally, the deregulation of commercial banks has changed the transmission mechanism of monetary policy from money supply to interest rates and bank credit.

Third, the above surveys give an evidence of the importance of commercial banks as an important link in the monetary transmission process. In addition, the deregulation and the presence of Islamic banks have changed the target variables. Therefore, in order to understand the impact of monetary policy on the target variables, a model of bank behaviour in a deregulated environment and in the presence of Islamic banks had to be constructed.

In Chapter 4, a model of bank behaviour in a deregulated environment under the assumption of a price taker in the reserves and securities markets, and a price setter in loan markets and in certain deposit markets has been developed. In Chapter 5, the effects of profit-sharing in banking and the coexistence of Islamic banks with the conventional banks have been examined. In both chapters, the analysis shows competitive interaction between assets and liabilities which incorporates instruments of monetary policy, and between Islamic banks and conventional banks. So, the impact of monetary policy in a deregulated environment and in the presence of profit-sharing can be evaluated.

In the conventional banks, under a price leadership, changes in interest rates can produce a stabilishing or destabilishing effects. Therefore, it might be argued that the sluggishness of conventional banks to changes in the inter-bank rate shows that the changes in monetary policy would have only slowed effects on lending and deposit rates, and thus on the target variables.

In the Islamic banks, the rate of return on investment is determined by market forces, a rise in this return unambiguously higher the depositor's return, while the most likely effect is an increase in the amount of deposits. This result indicates that the higher return on investment is more prone to an expansion in bank credit.

Fourth, the initial research was mainly concerned with aspects of monetary policy, the structural and regulatory changes, and an overview of the relationship between monetary policy and commercial banks. This research has led to the development of a model of bank behaviour in a deregulated environment and in the presence of Islamic banks. This model provides a useful perspective for evaluating the impact of monetary policy in those environments.

A simultaneous model of 41 equations for the Malaysian banking system has been estimated. The results on the whole conform to theoretical expectations. A comparison of the coefficient estimates and the t-statistics of the model using OLS and 2SLS suggests the coefficient estimates are stable. The simulation results indicate that prediction errors for all endogeneous variables are relatively small.

The simulation experiments show that monetary policy instruments have contributed to the behaviour of commercial banks. The fact that the commercial banks in a new environment might be less responsive to a change in the required reserve ratio and the discount rate. However, an increase in the inter-bank rate contributes to an increase in the monetary aggregates. Therefore, given the findings in Appendix-A, in the short-term changes in the inter-bank rate are likely to produce stabilising effect on real output.

The inter-bank rate is likely to contribute significantly to the efficient use of funds. Hence, this would improve the effectiveness of monetary policy. Therefore, in the long-term, the changes in inter-bank rate might be utilised to allocate funds for the process of economic development. It is believed that incorporating price leadership, price takers, profit-sharing and assets-liabilities integration are essential if the portfolio approach is to provide characterization of bank behaviour in Malaysia, and that this research strategy has a reasonable probability of success.

APPENDIX-A

MONETARY AND REAL VARIABLES

1. Alternative Measures of Monetary Policy

As already mentioned in Section 2.3, the Central Bank has several different instruments at its disposal for influencing monetary variables. The instruments issues of monetary policy arise because of the need to specify how the Central Bank will conduct its monetary policy. In particular, the instrument issues as mentioned by Davis (1990) and Friedman (1990) are the choice of monetary variables to be set and the values of these variables which are to serve as the principal guide in carrying out those policies. In addition, the choice of monetary variables may change from time to time, in response to such factors as financial deregulation (see section 2). This section reviews the effects of these changes in monetary policy on monetary variables before and after deregulation.

1.1 Monetary aggregates

Table A-1 gives in detail the behaviour of four monetary aggregates: monetary base, MB (column 1), M1 (column 2), M2 (column 3) and bank credit (column 4). In comparing these indicators, it is important to recognise their different secular trends by assessing the changes in monetary aggregates relative to changes in real GDP. Thus, for example, a "contractionary" monetary stance could be defined as occurring when monetary growth is below the growth rate of real GDP.

The four variables give somewhat different impressions for the subsequent course of financial deregulation. After deregulation, the contractionary of monetary policy can be seen by looking at the growth rate of MB in 1983 and 1985-1988, M1 in 1984, and M2 and bank credit in 1987-1988.

Before deregulation, the contractionary of monetary policy can only be seen in 1971

and 1975 by looking at the growth rate of MB and M1. This comparison shows that monetary policy has been regarded as actually contractionary in 1971, 1975 and 1984-1988.

Table A-1
Alternative Measures of Malaysian Monetary Policy

Year	Growth rate of monetary base (1)	Growth rate of M1 (2)	Growth rate of M2 (3)	Growth rate of bank credit (4)	Inter-bank rate (5)
1970	13.6	8.3	10.9	18.9	3.505
1971	[5.3]	[4.9]	13.1	13.0	3.718
1972	91.7	25.0	23.6	19.2	3.150
1973	30.4	37.6	31.0	53.1	3.025
1974	14.4	8.8	15.4	14.6	4.150
1975	[-14.8]	7.3	14.8	16.0	4.125
1976	18.9	20.9	27.7	24.6	4.125
1977	7.9	16.6	16.4	18.6	3.650
1978	11.8	18.2	17.9	28.6	3.868
1979	18.8	17.2	24.1	25.2	3.646
1980	27.4	15.0	26.2	36.7	4.856
1981	15.6	12.9	17.9	21.4	5.885
1982	26.7	13.3	16.3	16.2	9.196
1983	[5.5]	7.7	9.4	24.0	8.055
1984	14.9	[-0.6]	11.4	18.3	9.415
1985	[-9.4]	5.8	6.7	12.6	8.289
1986	[-4.4]	2.8	11.0	6.8	8.239
1987	[1.3]	12.8	[3.8]	[-0.3]	3.216
1988	[5.1]	14.4	[6.7]	[8.2]	4.009
1989	61.8	17.3	15.2	19.0	5.431
1990	21.6	14.1	22.4	20.3	6.855
1991	15.9	10.9	14.5	20.4	7.582
1992	9.3	12.9	19.1	8.8	8.071

Restrictive monetary policy can also be indentified by looking at the high volatility of monetary aggregates. This can be seen in Figure (A-1)-(A-4). The volatility of monetary aggregates growth averaged 2.8 units for monetary base, 2.3 units for M1,

1.8 units for M2 and 1.5 units for bank credit over the period 1970-1992.[1] The volatility of monetary base fell from its peak of 7.4 units in 1972 to 3.2 units in 1974 and then fell continously until reaching the lowest level of 1.2 units in 1978. Since then, the level has stayed near the average level.

The same trend was reported for the volatility of M1 in the early period. However, after 1978 the level increases alternately, where in 1981, 1986, 1988 and 1992 recorded the peak levels.

An enormous contrast has been identified for the volatility of M2 and bank credit. The volatility of M2 and bank credit growth averaged 1.8 units and 1.5 units respectively. The volatility of M2 reached its peak of 4.8 units in 1990, whereas before 1978 it had been below the average level. However, the volatility of bank credit fell from its peak of 4.2 unit in 1973 to 1.7 unit in 1977 and then, it fell again in 1979 and stayed near that level until 1989.

Accounting for this similarity in the behaviour of the different monetary aggregates during 1970-1978 and 1979-1992 was one of the key insights of Blundell-Wignall, Browne and Manasse (1990). They argued that during financial deregulation, the four variables reported in columns (1)-(4) of Table A-1 should give broadly similar measures of the course of monetary policy. As a consequence of the rapid growth of bank liabilities (for example, inter-bank funds, short-term bills, etc.) existing

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[1] The following formula is used to calculate monetary aggregates volatility:

$$VM = [\frac{1}{4}\sum_{t=1}^{4} m_{it}^2 - m_t^2]^{\frac{1}{2}}$$

where VM is the standard deviation of m_{it}, the quarterly change in the monetary aggregates in quarter i of year t, and $m_t = 1/4\ \Sigma\ m_{ti}$. Evans (1984) produced a number of these measures in an investigation that involved US data. Since, the volatility given is for deviations of each monetary aggregate from its average, these figures are comparable measures of the volatility of monetary aggregates.

Figure A_1: Volatility of Monetary Base

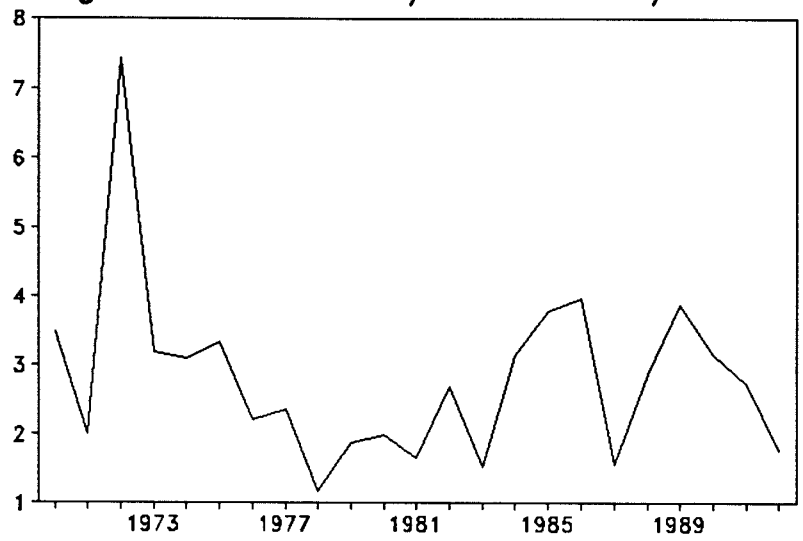


Figure A_2: Volatility of M1.

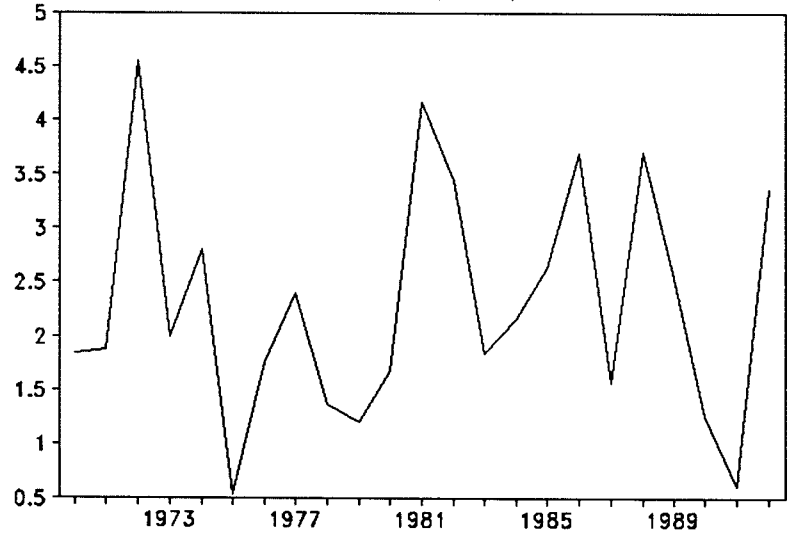


Figure A_3: Volatility of M2.

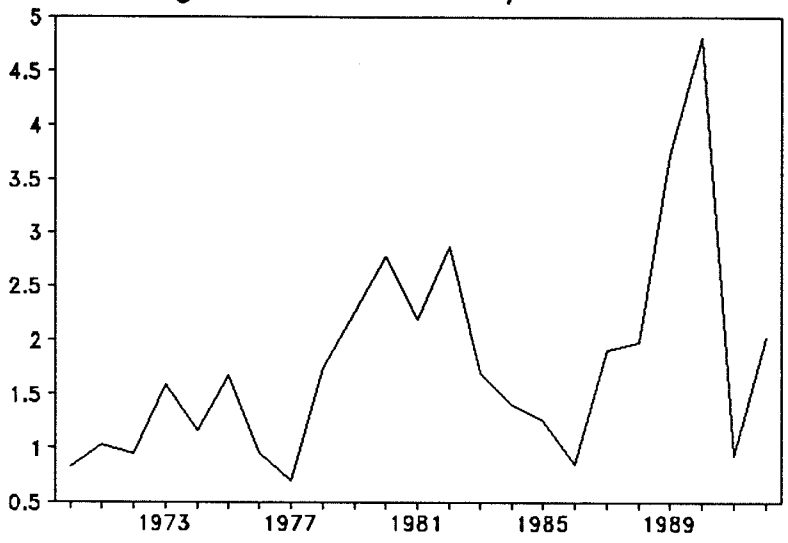
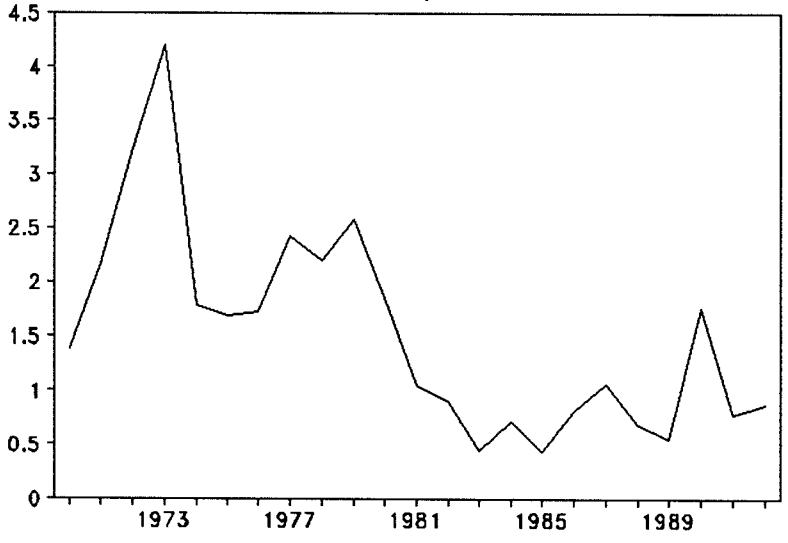


Figure A_4: Volatility of Bank Credit.



definitions of money are rendered meaningless. In addition, if banks no longer expand their lending aggressively in line with the growth of deposits (money), there is also reason for the latter to maintain its relationship with real output.[2]

1.2 Interest rates

Interest rates also constituted an important indicator of the course of monetary policy. Column 5 of Table A-2 records the behaviour of the short-term inter-bank rate from 1970 to 1992. The inter-bank rate was raised from a low of 3.025 percent in 1973 to a high of 9.415 percent in 1984.

Between 1970 (when the interest rates were still subject to the Central Bank ceilings) and 1978, interest rate volatility was initially stable, but then rose as plotted in Figure A-5.[3] Since the Central Bank adopted its new monetary policy in October 1978, VR increased until 1981. Then, it oscillated around the average of 0.81 unit with two peaks in 1986 and 1989.

A major shift in interest rate behaviour can be identified in the after-deregulation period, when large deviations of the interest rate from its average appeared. Comparison with the full period and the subperiods 1970-1978 shows the effect of financial deregulation on interest rate behaviour and points to the need for redefinitions of the monetary variables for use as targets.

2. Monetary and Real Variables

With the growing sophistication of the financial system and increasing monetisation

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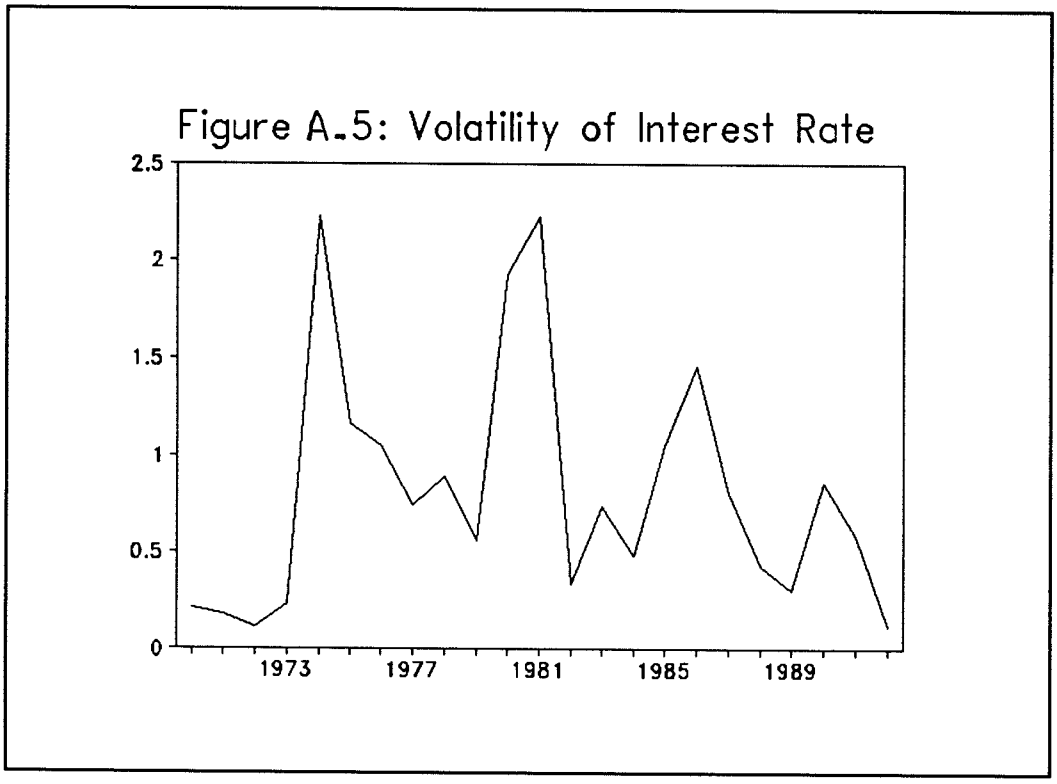
2 The removal of rate/quantity regulations on banks, as has been shown in Chapter 3 (section 3.4.3) will further enhance the reliance of banks on liabilities management.

3 The same formula as footnote (1) can be used to calculate the volatility of interest rate by substituting m_{it} and m_t with the quarterly growth rate and quarterly average growth rate of these variables, respectively.

of the economy, the public becomes more sophisticated and increasingly more sensitive to interest rate changes. In this regard, the broader definition of money, M2 has assumed increasingly greater significance in terms of a stable and predictable relationship with underlying economic activity.



However, in the current monetary literature (for example OECD (1989) and Blundell-Wignall, Browne and Manasse (1990)) it is argued that bank credit and interest rates may also act as the transmission mechanism in a deregulated environment. Therefore, if financial deregulation causes a breakdown in the relationship between money and real output, then this could be linked with the undermining of the old transmission mechanism of monetary policy through money supply or the monetary base. This has brought into doubt the validity of the money supply or monetary base as channel of the transmission mechanism of monetary policy.

The purpose of this section is to show evidence for selecting the choice of monetary variables as targets in the face of such an environment.

2.1 Unit Root Test

To illustrate the choice of monetary variables, consider a four-variable VAR, that includes real output, inflation, nominal monetary aggregate (monetary base, M1, M2 and bank credit), and a short-term nominal interest rate (3 months inter-bank rate).[4] Real output is chosen, as mentioned by Rasche (1993), in recognition of the recent discussion suggesting that the role of money and monetary policy is not to be seen in terms of the response of nominal output.[5]

Before the model is specified and estimated, it is important to test the order of integration by testing level-form and first differences of the series under consideration for unit roots.

The analysis of vector autoregression, as mentioned by Engel and Granger (1987), requires the use of stationary time-series data. Under current practice, estimating such data requires that observed data series be tested for unit roots.

In order to test for the presence of unit roots, the following augmented Dickey-Fuller (ADF) regressions were run:

$$\Delta x_t = \beta_0 + \beta_1 T + \beta_2 x_{t-1} + \sum_{t=1}^{4} \gamma_i \Delta x_{t-i} + e_t \qquad (1)$$

The null hypothesis of a unit root corresponds to $\beta_2 = 0$, and the test statistic is the usual t-statistic of this coefficient which must be compared with the appropriate critical value, (Fuller (1976)). For stationarity, this entails a significantly negative t-statistic, as this is a one-sided test concentrating on $\beta_2 < 0$ as the alternative hypothesis.

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4 A good survey on VAR can be found in Clements and Mizon (1991).

5 Several authors, like Sims (1980), and Litterman and Weiss (1985) also argue on the same basis.

Accordingly, augmented Dickey-Fuller test statistics, which test for the presence of unit roots under the alternative hypothesis that the series in question is stationary around a fixed time trend, were computed for real GNP, consumer price index, money supply and the interest rate. From the results presented in Table A-2, the null hypothesis that, in level-form, each series contains unit roots (i.e. is non-stationary) can be rejected (except for CPI and IBR3M). The series were first-differenced and the unit-root tests re-run; in this form, the ADF-statistics accept the hypothesis of a unit root (except for BC). By comparing the significance of the ADF-statistics in both cases, the estimation of the monetary-real relationship was carried out in first differences of the data.

Table A-2
Unit-root Test Results

	Level-form	First differences
Real GNP	-0.4299	-5.9747*
Monetary base, MB	1.4151	-6.5502*
Money supply, M1	1.9188	-6.3267*
Money supply, M2	2.0737	-6.2403*
Bank credit, BC	0.0054	-3.1916
Inflation, CPI	-6.8052*	-7.2572*
Inter-bank rate, IBR3M	-3.6000*	-11.1936*

Note: The asterisk sign, * indicates that the variable is significant at the 5% level.

2.2 Results

The conventional structural equation used in this study is:

$$y_t = \alpha_0 + \alpha_1 \sum_{i}^{4} y_{t-i} + \alpha_2 \sum_{t-i}^{4} P_{t-i} + \alpha_3 \sum_{t-i}^{4} M_{t-i} + \alpha_4 \sum_{t-i}^{4} r_{t-i} + u_{1t} \qquad (2)$$

where y is real output, P is consumer price index, M is monetary aggregates, r is interest rate (3 months inter-bank rate) and u is error term. All variables are defined

in first-difference form.

The estimation results of equation (2) are presented in Tables A-3-A-6, for three sample periods: first, from first quarter 1970 to fourth quarter 1992; second, from first quarter 1970 to fourth quarter 1978; and third, from first quarter 1979 to fourth quarter 1992. The first sample period is chosen to show the alternative transmission of monetary policy for the whole period. The second and third samples are chosen in an attempt to answer the question of whether the interest rates or monetary aggregates acted as the transmission mechanism of monetary policy, before and after financial deregulation.

The result of each sample period is reported with the t-statistics (adjacent to the estimated coefficients, where * and + signs indicate that the variable is significant at the 5% and 10% level, respectively), adjusted R^2, and Breush-Godfrey (1978) test (*LM* statistics). The overall fit of each equation is reasonable, as shown by adjusted R^2. The *LM*-statistics are also reported to test for the presence of any serious autocorrelation problem in the residuals. These statistics do not reveal any significant autocorrelation in the residuals.

The significance of each coefficient is tested at least at the 10% level. It is noteworthy that the deregulation effect is ambiguous. The result in Table A-3 shows that the monetary base is not siginificant in transmitting the monetary policy to real output before and after dregulation. On the other hand, the inter-bank rate is only significant in transmitting the monetary policy for the whole period and after deregulation.

In Table A-4 shows that the money supply M1 is only significant in transmitting the monetary policy for the whole period and after deregulation, whereas the inter-bank rate is only significant in transmitting the monetary policy after deregulation.

Table A-3
VAR Evidence on Monetary Targets: Monetary Base

Dep. var.	1970:I-1992:IV		1970:I-1978:IV		1979:I-1992:IV	
	ln y	t	ln y	t	ln y	t
Inpt	0.03	2.36*	0.06	2.67*	0.01	0.31
ln Δy_{-1}	-0.11	0.87	0.04	0.15	-0.09	0.49
ln Δy_{-2}	0.15	1.34	0.28	0.90	0.14	0.84
ln Δy_{-3}	-0.32	2.84*	-0.31	1.62	-0.38	2.25*
ln Δy_{-4}	0.06	0.49	-0.07	0.38	0.13	0.72
ln ΔCPI_{-1}	0.07	0.16	0.12	0.21	0.69	0.68
ln ΔCPI_{-2}	0.37	0.87	1.03	1.57	0.26	0.24
ln ΔCPI_{-3}	0.51	1.23	0.59	0.87	0.29	0.27
ln ΔCPI_{-4}	-1.26	3.13*	-1.76	2.69*	-0.70	0.72
ln ΔMB_{-1}	0.03	0.13	-0.03	0.10	-0.11	0.33
ln ΔMB_{-2}	0.22	1.09	-0.22	0.69	0.51	1.65
ln ΔMB_{-3}	0.19	0.94	-0.17	0.48	0.42	1.32
ln ΔMB_{-4}	-0.08	0.42	-0.10	0.36	-0.09	0.29
ln $\Delta IBR3M_{-1}$	-0.01	0.51	-0.04	0.70	-0.02	0.73
ln $\Delta IBR3M_{-2}$	-0.06	0.26	-0.01	0.12	-0.03	0.93
ln $\Delta IBR3M_{-3}$	-0.05	1.92+	-0.04	0.55	-0.07	2.12*
ln $\Delta IBR3M_{-4}$	-0.02	1.04	-0.05	0.93	-0.02	0.65
Adj. R^2	0.2770		0.3436		0.2136	
LM(4)	22.7422		8.2111		11.3707	

The results in Table A-5 and A-6 show that the money supply, M2 and bank credit are not significant in transmitting the monetary policy to real output, except for bank credit before deregulation. While, the inter-bank rate shows the same behaviour as monetary base.

Table A-4
VAR Evidence on Monetary Targets: Money Supply, M1.

Dep. var.	1970:I-1992:IV		1970:I-1978:IV		1979:I-1992:IV	
	ln y	t	ln y	t	ln y	t
Inpt	0.01	1.09	0.04	1.66^{+}	0.00	0.20
ln Δy_{-1}	-0.15	1.28	0.07	0.25	-0.23	1.43
ln Δy_{-2}	0.01	0.05	0.05	0.02	-0.04	0.25
ln Δy_{-3}	-0.19	1.89^{+}	-0.18	0.88	-0.21	1.29
ln Δy_{-4}	-0.09	0.93	-0.22	1.07	-0.05	0.34
ln ΔCPI_{-1}	-0.04	0.12	0.10	0.19	0.47	0.52
ln ΔCPI_{-2}	0.16	0.44	0.70	1.17	0.22	0.22
ln ΔCPI_{-3}	0.64	1.66^{+}	0.66	1.10	0.40	0.39
ln ΔCPI_{-4}	-1.23	3.42*	-1.52	2.82*	-1.35	1.47
ln $\Delta M1_{-1}$	0.65	3.05*	0.58	1.30	0.70	2.14*
ln $\Delta M1_{-2}$	-0.22	0.93	-0.55	1.04	-0.06	0.19
ln $\Delta M1_{-3}$	0.71	3.14*	0.36	0.83	0.92	2.80*
ln $\Delta M1_{-4}$	-0.03	0.14	-0.25	0.61	0.14	0.43
ln $\Delta IBR3M_{-1}$	0.01	0.33	-0.00	0.03	-0.00	0.04
ln $\Delta IBR3M_{-2}$	0.01	0.08	0.01	0.21	-0.02	0.58
ln $\Delta IBR3M_{-3}$	-0.03	1.49	-0.01	0.20	-0.05	1.68^{+}
ln $\Delta IBR3M_{-4}$	-0.01	0.38	0.00	0.06	-0.01	0.49
Adj. R^2	0.4140		0.3995		0.3307	
LM(4)	20.1121		9.5137		13.5075	

The results suggest that money supply and the monetary base are not the predictors of real output at least before 1978. This does not occur after the introduction of financial deregulation and the establishment of the Islamic bank. The result also reveals the significant effect of interest rate in transmitting the monetary policy to real output after deregulation.

Table A-5
VAR Evidence on Monetary Targets: Money Supply, M2.

Dep. var.	1970:I-1992:IV		1970:I-1978:IV		1979:I-1992:IV	
	ln y	t	ln y	t	ln y	t
Inpt	0.02	1.08	0.02	0.59	0.01	0.58
ln Δy_{-1}	-0.14	1.17	-0.18	0.74	-0.17	1.01
ln Δy_{-2}	0.15	1.34	0.05	0.17	0.18	1.06
ln Δy_{-3}	-0.26	2.33*	-0.35	1.99+	-0.18	1.01
ln Δy_{-4}	0.01	0.11	-0.09	0.49	0.11	0.66
ln ΔCPI_{-1}	0.15	0.38	0.16	0.36	0.69	0.64
ln ΔCPI_{-2}	0.40	0.98	0.65	1.27	0.72	0.65
ln ΔCPI_{-3}	0.61	1.49	0.44	0.84	0.30	0.27
ln ΔCPI_{-4}	-1.45	3.88*	-1.51	3.53*	-1.21	1.20
ln $\Delta M2_{-1}$	0.33	1.11	0.42	0.65	0.25	0.61
ln $\Delta M2_{-2}$	-0.12	0.39	0.55	0.72	-0.33	0.82
ln $\Delta M2_{-3}$	0.32	1.09	0.43	0.53	0.27	0.68
ln $\Delta M2_{-4}$	0.05	0.20	-0.66	0.94	0.12	0.32
ln $\Delta IBR3M_{-1}$	-0.00	0.13	0.00	0.03	-0.01	0.14
ln $\Delta IBR3M_{-2}$	-0.01	0.44	0.07	0.95	-0.04	1.20
ln $\Delta IBR3M_{-3}$	-0.04	1.74+	0.03	0.48	-0.07	1.85+
ln $\Delta IBR3M_{-4}$	-0.03	1.17	-0.01	0.28	-0.03	0.80
Adj. R^2	0.2801		0.4271		0.1411	
LM(4)	19.7516		10.3134		22.7879	

3. Conclusion

The instruments of monetary policy act as effective tools in relation to influence the economic objectives. The achievement of ultimate policy objectives depends on the application of policy being consistent with those objectives. However, there are deficiencies in potential target variables for guiding the Central Bank in conducting the monetary policy instruments, especially in the changing structural and regulatory frameworks. In the Malaysian context, such frameworks must allow for assessing the changing objectives, instruments and targets of monetary policy.

Table A-6
VAR Evidence on Monetary Targets: Bank Credit, BC.

Dep. var.	1970:I-1992:IV		1970:I-1978:IV		1979:I-1992:IV	
	ln y	t	ln y	t	ln y	t
Inpt	0.01	0.58	0.01	0.35	0.01	0.25
ln Δy_{-1}	-0.15	1.27	0.02	0.08	-0.15	0.96
ln Δy_{-2}	0.16	1.54	0.11	0.39	0.18	1.19
ln Δy_{-3}	-0.28	2.65*	-0.17	0.96	-0.23	1.46
ln Δy_{-4}	0.03	0.35	-0.25	1.65	0.14	0.85
ln ΔCPI_{-1}	-0.20	0.47	-0.82	1.70+	0.46	0.43
ln ΔCPI_{-2}	0.39	0.88	0.86	1.22	0.53	0.45
ln ΔCPI_{-3}	0.42	0.96	0.28	0.42	0.20	0.16
ln ΔCPI_{-4}	-1.31	3.41*	-0.99	2.35*	1.35	1.28
ln ΔBC_{-1}	0.37	1.43	0.58	2.11*	0.18	0.26
ln ΔBC_{-2}	0.36	1.20	0.58	1.31	0.19	0.24
ln ΔBC_{-3}	-0.05	0.15	-0.58	1.15	0.46	0.56
ln ΔBC_{-4}	0.12	0.39	0.31	0.67	-0.22	0.36
ln $\Delta IBR3M_{-1}$	-0.01	0.65	-0.01	0.24	-0.01	0.50
ln $\Delta IBR3M_{-2}$	-0.02	0.96	-0.02	0.42	-0.03	0.92
ln $\Delta IBR3M_{-3}$	-0.06	2.33*	-0.04	0.81	-0.08	2.13*
ln $\Delta IBR3M_{-4}$	-0.03	1.41	-0.03	0.82	-0.03	0.86
Adj. R^2	0.3063		0.6098		0.1440	
LM(4)	20.0581		18.8999		21.1401	

Our result shows that financial deregulation is brought about by a number of undesirable macroeconomic outcomes. The magnitude and scope of monetary policy instruments have been changed by deregulation. This has changed the target variables. The empirical evidence has confirmed this proposition.

APPENDIX-B

MONETARY POLICY INSTRUMENTS

Table B-1
Reserve Requirement of the Commercial Banks, 1959-1992.

Date	Required reserve ratio (%)
January, 1959	2.5
December, 1959	4.0
February, 1965	3.5
July, 1969	5.0
October, 1972	8.5
January, 1974	10.0
December, 1978	4.0
October, 1983	5.0
April, 1985	4.0
October, 1986	3.5
May, 1989	4.5
October, 1989	5.5
January, 1990	6.5
August, 1991	7.5
May, 1992	8.5

Source: *Bank Negara Malaysia, Annual Report (various issues).*

Table B-2
Minimum Liquidity Requirement of the Commercial Banks, 1959-1992

Date	Minimum liquidity requirement (%)		
	Total	Primary	Secondary
November, 1959	20	-	-
January, 1962	25	-	-
February, 1965	20	-	-
October, 1973	25	-	-
March, 1979	20	10	10
February, 1986	18.5	10	8.5
February, 1987	17	8	9

Source: *Bank Negara Malaysia, Annual Report (various issues).*

Table B-3
Base Lending Rate of the Commercial Banks, 1982-1992

Date	Base lending rate (%)
1982	12.0
1983	10.75
1984	12.25
1985	10.75
1986	10.0
1987	7.5
1988	7.0
1989	6.75
1990	7.0
1991	8.0
1992	9.0

Source: *Bank Negara Malaysia, Annual Report (various issues).*

Table B-4
Annual Open Market Transactions, 1971-1992
(RM million).

Year	Gross purchases	Gross sales	Net
1971	2.8	364.8	-362.0
1972	32.8	283.7	-250.9
1973	265.0	118.1	146.9
1974	855.4	873.0	-17.6
1975	1004.0	1053.8	-49.8
1976	1314.2	1357.5	-43.3
1977	1495.7	1116.0	379.7
1978	4104.9	3340.8	764.1
1979	2475.3	2516.1	-40.8
1980	4462.2	4025.9	436.3
1981	5790.5	7416.1	-1625.6
1982	28377.3	27960.1	417.2
1983	10359.7	9011.5	1348.2
1984	9896.6	7860.1	2036.5
1985	7550.1	7249.7	300.4
1986	6358.6	5401.6	957.0
1987	65499.7	67272.4	-1772.7
1988	36995.1	37391.2	-396.1
1989	3135.7	3741.5	-605.8
1990	2620.4	2868.2	-247.8
1991	1767.9	2953.0	-1185.1
1992	3384.7	4057.6	-672.9

Source: *Bank Negara Malaysia, Annual Report (various issues).*

Table B-5
Guidelines of Lending Effective from 31 March 1981 until 31 March 1992.

Lending to	Minimum requirement (as percentage of total loans oustanding at the end of the year)				
	1981	1982	1983	1984	1985
Indigenous community	17	18	18	20	20
Agricultural food production	8	10	6	6	6
Indivudual housing	10	10	-	-	-
Total (unit)			20000	20000	20000
Indigenous			6000	6000	6000
Low cost housing					
Small scale industries	12	12	-	-	-
Special loans scheme	5	5	5	5	5
Indigenous	-	2.5	2.5	2.5	2.5

Table B-5
(Continued).

Lending to	Minimum requirement (as percentage of total loans oustanding at the end of the year)				
	1986	1987	1988	1989	1990
Indigenous community	20	20	20	20	20
Agricultural food production	6	6	6	-	-
Indivudual housing					
Total (unit)	80000	80000	75000	75000	-
Indigenous	24000	24000	27500	11500	-
Low cost housing	48000	48000	45000	45000	-
Small scale industries				RM600m	
Special loans scheme	RM150m	RM150m	RM300m	RM200m	RM200m
Indigenous	RM75m	RM75m	RM150m	RM100m	RM100m

Table B-5
(Continued).

Lending to	Minimum requirement (as percentage of total loans oustanding at the end of the year)	
	1991	1992
Indigenous community	20	20
Agricultural food production	-	-
Indivudual housing		
Total (unit)	-	-
Indigenous	-	-
Low cost housing	-	-
Small scale industries		
Special loans scheme	RM200m	RM150m
Indigenous	RM100m	RM75m

Source: *Bank Negara Malaysia, Annual Report (1981-1992).*

APPENDIX-C

DATA SOURCES AND DEFINITIONS

1. Data Sources

This study was carried out with data on the Malaysian banking system. The monthly data set for this research was mainly compiled from the Monthly Statistical Bulletin (published by Bank Negara Malaysia) and the Monthly Financial Statement of Bank Islam (M) Berhad for the years 1984-1992. There were also unpublished data collected for individual follower and leader banks.

2. List of Variables.

a. Endogenous Variables.

Variable	Definition
A	total assets in the banking firm, RM million
AC	total assets in the conventional banks, RM million
AI	total assets in the Islamic banks, RM million
ALR	lending rate, defined as ALRF or ALRL or ALRI, %
ALRF	lending rate offered by the follower banks, defined as the average lending rate offered by the whole banking firm, %
ALRI	lending rate charged by the Islamic banks, defined as the average rate of return on deposits plus 70% mark-up rate, %
ALRL	lending rate offered by the leader banks, defined as the average of lending rate offered by the leader banks, %
DDF	demand deposits in the follower banks, RM million
DDL	demand deposits in the leader banks, RM million
DDI	demand deposits in the Islamic banks, RM million
DISA	total discounted instruments (net assets), defined as total

	eligible liabilities minus total deposits, total net payable amount and total discounted instruments, RM million
DIS	total discounted instruments (liabilities), defined as the total amount of banker acceptances, RM million
ELCB	total eligible liabilities in the conventional banks, RM million
ELI	total eligible liabilities in the Islamic banks, RM million
EXA	total excess assets, defined as total assets minus total reserves and total liquid assets, RM million
EXL	total excess liabilities, defined as total liabilities minus total capital, and total liabilities allocated to required reserves and liquid assets, RM million
FD3F	three months fixed deposit rates offered by the follower banks, defined as the time deposit rates offered by the Hong Kong and Shanghai Bank Corporation, %
FD3L	three months fixed deposit rates offered by the leader banks, defined as the average time deposit rates offered by the leader banks, %
GIC	total government investment certificates held by the Islamic banks, RM million
GSC	total government securities held by the conventional banks, RM million
IA3	three months investment account rates offered by the Islamic banks, %
L	total liabilities in the banking firm, RM million
LACB	total liquid assets in the conventional banks, RM million
LACS	total eligible liabilities allocated to liquid assets in the conventional banks, RM million
LAIB	total liquid assets in the Islamic banks, RM million
LAIS	total eligible liabilities allocated to liquid assets in the Islamic banks, RM million
LC	total liabilities in the conventional banks, RM million
LI	total liabilities in the Islamic banks, RM million

MC	total money at call held by the conventional banks, RM million
NCDA	total negotiable certificate of deposits held by the conventional banks, RM million
NCDT	total negotiable certificate of deposits issued by the conventional banks, RM million
PAC	total payable amount in the conventional banks, RM million
PF	total loans in the follower banks, RM million
PI	total financing in the Islamic banks, RM million
PL	total loans in the leader banks, RM million
RAC	total receivable amount in the conventional banks, RM million
RC	total reserves in the conventional banks, defined as total required reserves plus the difference between the actual and the required amount of liquid assets, RM million
RI	total reserves in the Islamic banks, defined as total required reserves plus the difference between the actual and the required amount of liquid assets, RM million
TB	total treasury bills held by the conventional banks, RM million
TDF	total time deposits in the follower banks, RM million
TDI	total time deposits in the Islamic banks, RM million
TDL	total time deposits in the leader banks, RM million

b. Exogenous Variables.

Variable	Definition
DIR	discount rates, %
ERC	total excess reserves in the conventional banks, RM million
ERI	total excess reserves in the Islamic banks, RM million
GS3	three years interest rates on government securities, %
IBR3M	three months inter-bank rate, %
KC	total capital in the conventional banks, RM million
KI	total capital in the Islamic banks, RM million

MCR	interest rates on money at call, %
NCD3	three months negotiable certificates of deposit rate, %
OACB	other assets in the conventional banks, RM million
OAIB	other assets in the Islamic banks, RM million
OIIB	other liquid assets in the Islamic banks, RM million
OLCB	other liabilities in the conventional banks, RM million
OLIB	other liabilities in the Islamic banks, RM million
OSCB	other liquid assets in the conventional banks, RM million
PAI	total payable amount in the Islamic banks, RM million
PCPI	palm oil price index (1985=100)
RAI	total receivable amount in the Islamic banks, RM million
S_i	seasonal dummies varaibles (i = 1,2, ...,11)
SCI	stock of commodities in the Islamic banks, RM million
TB3	treasury bills rate. This variable is also used as a proxy for the rate of return on government certificates, %
Y	the income is interpolated as follows: $Y_{i,t} = (GNP_t * IPI_{i,t})/IPI_t$, where i is the ith month and *IPI* is the industrial production index, RM million
ρ	required reserve ratio, %
τ	liquid assets ratio, %

APPENDIX-D

ESTIMATION RESULTS USING OLS TECHNIQUE

1. Deposit markets

a. $$DDF = -41.14 + 0.006\,Y - 22.47\,FD3F + 0.89\,DDF_{-1}$$
$$(0.36) \quad (1.39) \quad (1.96)^{*} \quad (16.50)^{*}$$
$$+ 0.07\,DDF_{-7}$$
$$(0.96)$$

$$Adj.\ R^2 = 0.9877,\ F(4,91) = 1901.3,\ h = -0.69$$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 17.323$ (0.138)

Functional form, $\chi_{ff(1)}^2 = 2.178$ (0.140)

Normality $\chi_{n(2)}^2 = 2.453$ (0.293)

Heteroscedasticity, $\chi_{h(2)}^2 = 3.141$ (0.208)

b. $$DDL = -76.74 + 0.005\,Y - 24.96\,FD3L + 0.73\,DDL_{-1}$$
$$(0.89) \quad (1.35) \quad (2.69)^{*} \quad (10.51)^{*}$$
$$+ 0.27\,DDL_{-9} - 168.80\,S3 - 153.05\,S10$$
$$(2.92)^{*} \quad (2.62)^{*} \quad (2.33)^{*}$$

$$Adj.\ R^2 = 0.9870,\ F(6,89) = 1202.4,\ h = -1.63$$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 17.169$ (0.143)

Functional form, $\chi_{ff(1)}^2 = 0.843$ (0.359)

Normality $\chi_{n(2)}^2 = 0.495$ (0.781)

Heteroscedasticity, $\chi_{h(1)}^2 = 1.291$ (0.256)

c. $$DDI = \underset{(1.44)}{18.66} - \underset{(0.29)}{0.001\ Y} - \underset{(0.29)}{0.70\ IA3} + \underset{(1.70)^{+}}{0.17\ DDI_{-1}}$$

$$+ \underset{(2.87)^{*}}{0.26\ DDI_{-2}} + \underset{(3.29)^{*}}{0.31\ DDI_{-8}} + \underset{(3.41)^{*}}{0.33\ DDI_{-9}}$$

$$- \underset{(3.26)^{*}}{18.17\ S10} - \underset{(3.43)^{*}}{19.95\ S11}$$

$Adj.\ R^2 = 0.9634,\ F(8,87) = 313.91,\ h = 0.81$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 10.755\ (0.555)$

Functional form, $\chi_{ff(1)}^2 = 0.103\ (0.748)$

Normality $\chi_{n(2)}^2 = 127.06\ (0.000)$

Heteroscedasticity, $\chi_{h(1)}^2 = 1.752\ (0.186)$

d. $$TDF = \underset{(1.02)}{-863.76} + \underset{(1.40)}{0.01\ Y} + \underset{(2.02)^{*}}{286.47\ FD3F} - \underset{(1.48)}{213.67\ FD3L}$$

$$+ \underset{(18.45)^{*}}{1.03\ TDF_{-1}} - \underset{(1.17)}{0.08\ TDF_{-4}} - \underset{(1.64)}{0.22\ TDF_{-10}}$$

$$+ \underset{(1.91)^{+}}{0.26\ TDF_{-11}} + \underset{(0.60)}{192.23\ S2} + \underset{(1.34)}{401.89\ S3}$$

$Adj.\ R^2 = 0.9881,\ F(9,86) = 874.15,\ h = 0.07$

Diagnostic Tests

Serial correlation, $\chi_{sc(11)}^2 = 13.407\ (0.268)$

Functional form, $\chi_{ff(1)}^2 = 0.001\ (0.972)$

Normality $\chi_{n(2)}^2 = 72.531\ (0.000)$

Heteroscedasticity, $\chi_{h(1)}^2 = 0.070\ (0.791)$

e. $TDL = 1400.40 + 0.02\ Y + 94.75\ FD3L - 52.16\ FD3F$
$(1.44) \quad (2.50)^{*} \quad (0.70) \quad (0.43)$

$+ 0.81\ TDL_{-1} - 0.16\ TDF_{-8} + 0.17\ TDF_{-10}$
$(18.04)^{*} \quad (2.09)^{*} \quad (2.14)^{*}$

$+ 458.02\ S2 - 590.32\ S3$
$(1.66)^{+} \quad (2.17)^{*}$

$Adj.\ R^2 = 0.9316,\ F(8,87) = 162.69,\ h = -0.02$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 6.826$ (0.869)

Functional form, $\chi_{ff(1)}^2 = 3.173$ (0.075)

Normality $\chi_{n(2)}^2 = 101.89$ (0.000)

Heteroscedasticity, $\chi_{h(1)}^2 = 0.302$ (0.582)

f. $TDI = 134.07 + 0.006\ Y - 8.23\ IA3 - 6.75\ FD3L$
$(1.71)^{+} \quad (1.79)^{+} \quad (0.62) \quad (2.05)^{*}$

$+ 0.88\ TDI_{-1}$
$(18.76)^{*}$

$Adj.\ R^2 = 0.9849,\ F(4,91) = 1550.0,\ h = -0.07$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 4.121$ (0.981)

Functional form, $\chi_{ff(1)}^2 = 0.030$ (0.862)

Normality $\chi_{n(2)}^2 = 66.781$ (0.000)

Heteroscedasticity, $\chi_{h(1)}^2 = 1.755$ (0.185)

g. $NCDT = -491.56 + 0.03\ Y - 3.91\ NCD3 - 32.09\ FD3F$
$(1.66)^{+}\ \ (3.43)^{*}\ \ (0.02)\ \ \ \ (0.17)$

$+ 1.25\ NCDT_{-1} - 0.43\ NCDT_{-2} + 0.11\ NCDT_{-7}$
$(13.00)^{*}\ \ \ \ (4.25)^{*}\ \ \ \ (0.98)$

$- 0.13\ NCDT_{-8} - 308.24\ S1 - 428.83\ S7$
$(1.16)\ \ \ \ (1.54)\ \ \ \ (2.14)^{*}$

$Adj.\ R^2 = 0.9736,\ F(9,86) = 390.77,\ h = -0.94$

Diagnostic Tests

Serial correlation, $\chi_{sc(2)}^2 = 1.955$ (0.376)

Functional form, $\chi_{ff(1)}^2 = 0.228$ (0.633)

Normality $\chi_{n(2)}^2 = 8.884$ (0.012)

Heteroscedasticity, $\chi_{h(1)}^2 = 1.903$ (0.168)

2. Other liabilities

a. $PAC = -3736.50 + 0.07\ EXA + 48.55\ IBR3M + 241.18\ ALRF$
$(2.63)^{*}\ \ (4.16)^{*}\ \ \ \ (0.87)\ \ \ \ (2.05)^{*}$

$+ 0.66\ PAC_{-1} - 419.09\ S1 - 797.53\ S2 - 349.87\ S7$
$(8.08)^{*}\ \ \ \ (1.47)\ \ \ \ (2.84)^{*}\ \ \ \ (1.25)$

$- 563.87\ S11$
$(2.00)^{*}$

$Adj.\ R^2 = 0.9664,\ F(8,87) = 342.30,\ h = 0.77$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 7.470$ (0.825)

Functional form, $\chi_{ff(1)}^2 = 2.289$ (0.130)

Normality $\chi_{n(2)}^2 = 13.302$ (0.001)

Heteroscedasticity, $\chi_{h(1)}^2 = 1.263$ (0.261)

b. $DIS = -989.87 + 0.03\ EXA + 14.09\ DIR + 53.25\ IBR3M$
$(2.54)^{*}\ (2.63)^{*}\ (0.29)\ (0.65)$

$+ 0.40\ DIS_{-1} - 0.12\ DIS_{-5} + 0.29\ DIS_{-7}$
$(4.41)^{*}\ (1.09)\ (3.20)^{*}$

$Adj.\ R^2 = 0.8790,\ F(6,89) = 116.05,\ h = -0.89$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 10.058$ (0.611)

Functional form, $\chi_{ff(1)}^2 = 1.7187$ (0.190)

Normality $\chi_{n(2)}^2 = 5390.0$ (0.000)

Heteroscedasticity, $\chi_{h(1)}^2 = 0.041$ (0.840)

3. Reserves

a. $RI = 70.31 + 0.12\ ELI - 19.64\ TB3 + 0.77\ RI_{-1}$
$(4.57)^{*}\ (4.47)^{*}\ (4.82)^{*}\ (13.83)^{*}$

$- 0.07\ RI_{-10} - 23.04\ S3 - 16.55\ S4 - 43.32\ S7$
$(1.75)^{+}\ (1.84)^{+}\ (1.33)\ (3.48)^{*}$

$- 19.34\ S8 - 23.58\ S10$
$(1.55)\ (1.90)^{+}$

$Adj.\ R^2 = 0.9375,\ F(9,86) = 159.25,\ h = 0.78$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 6.799$ (0.871)

Functional form, $\chi_{ff(1)}^2 = 8.546$ (0.003)

Normality $\chi_{n(2)}^2 = 6.490$ (0.039)

Heteroscedasticity, $\chi_{h(1)}^2 = 0.987$ (0.320)

b. $RC = -250.79 + 0.04\ ELCB - 77.23\ IBR3M + 0.57\ RC_{-1}$
$(1.11)\ \ (5.46)^{*}\qquad (3.10)^{*}\qquad (6.83)^{*}$

$+ 0.23\ RC_{-3} - 0.16\ RC_{-10}$
$(2.88)^{*}\qquad (2.56)^{*}$

$Adj.\ R^2 = 0.9278,\ F(5,90) = 244.97,\ h = -1.09$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 13.2370\ (0.352)$

Functional form, $\chi_{ff(1)}^2 = 2.128\ (0.145)$

Normality $\chi_{n(2)}^2 = 0.018\ (0.991)$

Heteroscedasticity, $\chi_{h(1)}^2 = 0.413\ (0.520)$

4. Liquid assets

a. $MC = -235.93 - 0.004\ ELCB - 6.55\ MCR + 26.01\ IBR3M$
$(0.63)\ \ (1.04)\qquad (0.13)\qquad (1.14)$

$+ 0.74\ MC_{-1} + 0.22\ MC_{-4} - 0.27\ MC_{-5} + 0.25\ MC_{-6}$
$(9.87)^{*}\qquad (2.11)^{*}\qquad (2.17)^{*}\qquad (2.44)^{*}$

$+ 0.24\ MC_{-11} - 0.25\ MC_{-12} - 160.51\ S1 - 136.99\ S6$
$(2.27)^{*}\qquad (2.19)^{*}\qquad (2.18)^{*}\qquad (1.84)^{+}$

$- 192.66\ S11$
$(2.61)^{*}$

$Adj.\ R^2 = 0.9322,\ F(12.83) = 109.81,\ h = -0.26$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 9.853\ (0.629)$

Functional form, $\chi_{ff(1)}^2 = 0.799\ (0.371)$

Normality $\chi_{n(2)}^2 = 2.392\ (0.302)$

Heteroscedasticity, $\chi_{h(1)}^2 = 1.914\ (0.166)$

b. $TB = 1095.30 - 0.002\ ELCB - 26.89\ TB3 - 45.11\ GS3$
$(1.67)^{+}\ (0.62)\qquad (1.10)\qquad (1.02)$

$+ 0.95\ TB_{-1} - 0.40\ TB_{-3} + 0.28\ TB_{-4} + 0.17\ TB_{-9}$
$(11.79)^{*}\qquad (3.36)^{*}\qquad (2.62)^{*}\qquad (1.62)$

$- 0.22\ TB_{-10} - 248.01\ S1 - 148.49\ S5 - 141.23\ S7$
$(2.07)^{*}\qquad (3.36)^{*}\qquad (2.07)^{*}\qquad (1.94)^{+}$

$- 139.21\ S8 - 139.04\ S11$
$(1.94)^{+}\qquad (1.94)^{+}$

$Adj.\ R^2 = 0.7558,\ F(13,82) = 23.62,\ h = 1.63$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 17.330\ (0.138)$

Functional form, $\chi_{ff(1)}^2 = 0.261\ (0.610)$

Normality $\chi_{n(2)}^2 = 7.520\ (0.023)$

Heteroscedasticity, $\chi_{h(1)}^2 = 2.033\ (0.154)$

c. $GSC = 1030.80 + 0.02\ ELCB - 119.24\ GS3 - 47.01\ IBR3M$
$(1.48)\quad (2.10)^{*}\qquad (1.29)\qquad (1.89)^{+}$

$+ 0.85\ GSC_{-1} - 0.20\ GSC_{-10} + 0.16\ GSC_{-12}$
$(15.47)^{*}\qquad (2.66)^{*}\qquad (2.03)^{*}$

$+ 386.95\ S1$
$(2.65)^{*}$

$Adj.\ R^2 = 0.9607,\ F(7,88) = 332.57,\ h = -1.31$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 9.030\ (0.700)$

Functional form, $\chi_{ff(1)}^2 = 1.186\ (0.276)$

Normality $\chi_{n(2)}^2 = 11.406\ (0.003)$

Heteroscedasticity, $\chi_{h(1)}^2 = 2.935\ (0.087)$

d. $GIC = 17.45 + 0.17\ ELI - 26.53\ TB3 + 0.60\ PCPI$
$(0.79)\quad (5.24)^{*}\quad (5.54)^{*}\quad (2.57)^{*}$

$+ 0.72\ GIC_{-1} + 0.18\ GIC_{-9} - 0.20\ GIC_{-10}$
$(12.97)^{*}\quad (1.73)^{+}\quad (2.07)^{*}$

$Adj.\ R^2 = 0.9506,\ F(6,89) = 305.43,\ h = 1.19$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 6.499$ (0.889)

Functional form, $\chi_{ff(1)}^2 = 11.775$ (0.001)

Normality $\chi_{n(2)}^2 = 1.979$ (0.372)

Heteroscedasticity, $\chi_{h(1)}^2 = 1.571$ (0.210)

5. Loans

a. $PF = 689.24 + 0.03\ Y - 240.22\ ALRF + 179.91\ ALRI$
$(0.92)\quad (3.00)^{*}\quad (1.97)^{+}\quad (1.63)$

$+ 0.98\ PF_{-1} - 0.03\ PF_{-9} + 738.34\ S3 - 151.80\ S7$
$(32.28)^{*}\quad (1.13)\quad (3.56)^{*}\quad (0.71)$

$- 233.20\ S11$
(1.13)

$Adj.\ R^2 = 0.9983,\ F(8,87) = 6837.40,\ h = 1.13$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 14.371$ (0.278)

Functional form, $\chi_{ff(1)}^2 = 4.539$ (0.033)

Normality $\chi_{n(2)}^2 = 445.43$ (0.000)

Heteroscedasticity, $\chi_{h(1)}^2 = 0.056$ (0.812)

b. $$PL = \underset{(0.57)}{256.06} + \underset{(2.86)^*}{0.02\ Y} - \underset{(3.03)^*}{242.46\ ALRL} + \underset{(3.09)^*}{210.22\ ALRI}$$

$$+ \underset{(16.17)^*}{0.85\ PL_{-1}} + \underset{(1.91)^+}{0.08\ PL_{-6}} + \underset{(0.63)}{0.03\ PL_{-11}} - \underset{(4.48)^*}{551.87\ S3}$$

$$+ \underset{(3.83)^*}{466.92\ S6}$$

$Adj.\ R^2 = 0.9972,\ F(8,87) = 4263.30,\ h = -0.90$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 12.059\ (0.441)$

Functional form, $\chi_{ff(1)}^2 = 4.906\ (0.027)$

Normality $\chi_{n(2)}^2 = 35.289\ (0.000)$

Heteroscedasticity, $\chi_{h(1)}^2 = 3.076\ (0.079)$

c. $$PI = \underset{(1.50)}{35.40} + \underset{(2.67)^*}{0.008\ Y} - \underset{(1.80)^+}{5.41\ ALRI} + \underset{(0.03)}{0.09\ ALRL}$$

$$+ \underset{(24.94)^*}{0.90\ PI_{-1}} + \underset{(3.54)^*}{22.92\ S3} + \underset{(2.77)^*}{17.58\ S6}$$

$Adj.\ R^2 = 0.9950,\ F(6,89) = 3118.7,\ h = 0.90$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 7.583\ (0.750)$

Functional form, $\chi_{ff(1)}^2 = 0.608\ (0.436)$

Normality $\chi_{n(2)}^2 = 16.240\ (0.000)$

Heteroscedasticity, $\chi_{h(1)}^2 = 0.004\ (0.998)$

6. Other assets

a. $RAC = -486.69 + 0.03\ EXL + 16.31\ IBR3M - 24.92\ NCD3$
$(1.13)\quad (2.63)^{*}\quad (0.16)\quad (0.27)$

$+ 0.99\ RAC_{-1} - 0.20\ RAC_{-9} + 0.19\ RAC_{-10}$
$(22.11)^{*}\quad (1.57)\quad (1.24)$

$- 0.13\ RAC_{-11} - 926.07\ S4 - 755.74\ S10$
$(1.00)\quad (2.78)^{*}\quad (2.16)^{*}$

$- 378.55\ S11$
(1.15)

$Adj.\ R^2 = 0.9714,\ F(10,85) = 323.70,\ h\ -0.01$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 6.921$ (0.863)

Functional form, $\chi_{ff(1)}^2 = 0.538$ (0.463)

Normality $\chi_{n(2)}^2 = 3.902$ (0.142)

Heteroscedasticity, $\chi_{h(10)}^2 = 15.488$ (0.115)

b. $DISA = -2490.90 + 0.06\ EXL - 403.23\ DIR + 311.23\ NCD3$
$(4.37)^{*}\quad (3.31)^{*}\quad (1.77)^{+}\quad (2.72)^{*}$

$+ 0.66\ DISA_{-1} + 0.26\ DISA_{-4} - 1284.50\ S1$
$(8.69)^{*}\quad (3.37)^{*}\quad (3.06)^{*}$

$- 833.98\ S2 - 785.94\ S4$
$(2.05)^{*}\quad (1.90)^{+}$

$Adj.\ R^2 = 0.9487,\ F(8,87) = 220.61,\ h = -1.52$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 5.638$ (0.933)

Functional form, $\chi_{ff(1)}^2 = 0.564$ (0.453)

Normality $\chi_{n(2)}^2 = 37.166$ (0.000)

Heteroscedasticity, $\chi_{h(1)}^2 = 0.899$ (0.343)

c. $NCDA = -1709.40 + 0.03\ EXL - 15.51\ NCD3 + 106.12\ GS3$
$(3.52)^{*}\quad (4.17)^{*}\qquad (1.02)\qquad\qquad (2.13)^{*}$

$+ 0.82\ NCDA_{-1} - 0.26\ NCDA_{-3} + 0.20\ NCDA_{-4}$
$(10.74)^{*}\qquad\quad (2.29)^{*}\qquad\quad (2.03)^{*}$

$- 124.84\ S3 - 108.56\ S8 - 175.84\ S9$
$(1.12)\qquad (1.04)\qquad (1.68)^{+}$

$Adj.\ R^2 = 0.9804,\ F(9,86) = 530.02,\ h = 1.66$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 17.102\ (0.146)$

Functional form, $\chi_{ff(1)}^2 = 0.022\ (0.881)$

Normality $\chi_{n(2)}^2 = 1.387\ (0.500)$

Heteroscedasticity, $\chi_{h(1)}^2 = 0.428\ (0.513)$

7. Rate of return and cost of funds

a. $FD3F = -0.29 + 0.16\ IBR3M + 0.85\ FD3F_{-1}$
$(2.04)^{*}\quad (4.56)^{*}\qquad\quad (28.30)^{*}$

$Adj.\ R^2 = 0.9697,\ F(2,93) = 1520.50,\ h = 1.06$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 11.068\ (0.523)$

Functional form, $\chi_{ff(1)}^2 = 2.029\ (0.154)$

Normality $\chi_{n(2)}^2 = 174.50\ (0.000)$

Heteroscedasticity, $\chi_{h(1)}^2 = 0.004\ (0.947)$

b. $FD3L = -0.08 + 0.20\ IBR3M + 0.81\ FD3L_{-1}$
$(0.72)\quad (6.21)^{*}\qquad (27.65)^{*}$

$Adj.\ R^2 = 0.9753,\ F(2,93) = 1878.30,\ h = 0.25$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 10.533$ (0.569)

Functional form, $\chi_{ff(1)}^2 = 3.246$ (0.072)

Normality $\chi_{n(2)}^2 = 65.821$ (0.000)

Heteroscedasticity, $\chi_{h(1)}^2 = 0.513$ (0.474)

c. $ALRF = 0.64 + 0.08\ FD3F + 0.77\ ALRF_{-1} + 0.12\ ALRF_{-9}$
$(3.81)^{*}\ (4.76)^{*}\qquad (14.24)^{*}\qquad (2.92)^{*}$

$Adj.\ R^2 = 0.9784,\ F(3,92) = 1437.50,\ h = -0.77$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 9.339$ (0.674)

Functional form, $\chi_{ff(1)}^2 = 1.969$ (0.161)

Normality $\chi_{n(2)}^2 = 256.51$ (0.000)

Heteroscedasticity, $\chi_{h(1)}^2 = 2.848$ (0.092)

d. $ALRL = \underset{(3.56)^*}{0.70} + \underset{(5.29)^*}{0.11\ FD3L} + \underset{(11.38)^*}{0.70\ ALRL_{-1}} + \underset{(3.49)^*}{0.16\ ALRL_{-9}}$

$Adj.\ R^2 = 0.9689,\ F(3,92) = 987.55,\ h = -0.54$

Diagnostic Tests

Serial correlation, $\chi_{sc(11)}^2 = 13.012\ (0.293)$

Functional form, $\chi_{ff(1)}^2 = 0.800\ (0.371)$

Normality $\chi_{n(2)}^2 = 63.501\ (0.000)$

Heteroscedasticity, $\chi_{h(1)}^2 = 0.058\ (0.809)$

e. $IA3 = \underset{(0.22)}{0.02} + \underset{(1.63)}{0.01\ TB3} + \underset{(33.94)^*}{1.04\ IA3_{-1}} - \underset{(1.80)^+}{0.06\ IA3_{-8}}$

$Adj.\ R^2 = 0.9882,\ F(3,92) = 2656.0,\ h = 1.15$

Diagnostic Tests

Serial correlation, $\chi_{sc(12)}^2 = 15.733\ (0.204)$

Functional form, $\chi_{ff(1)}^2 = 5.793\ (0.016)$

Normality $\chi_{n(2)}^2 = 59.404\ (0.000)$

Heteroscedasticity, $\chi_{h(1)}^2 = 1.010\ (0.315)$

APPENDIX-E

THE ACTUAL AND SIMULATED BEHAVIOURS OF ALL ENDOGENEOUS VARIABLES

Fig. E-1: FD3F: Actual and Simulated

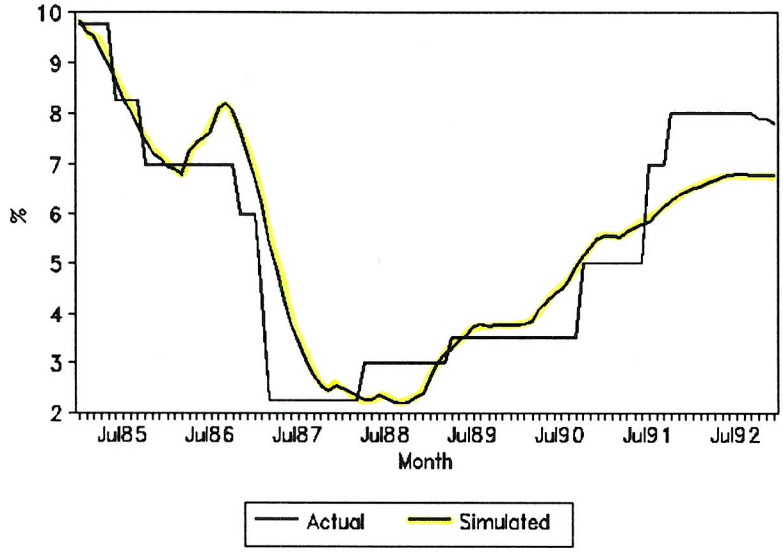


Fig. E-2: FD3L: Actual and Simulated

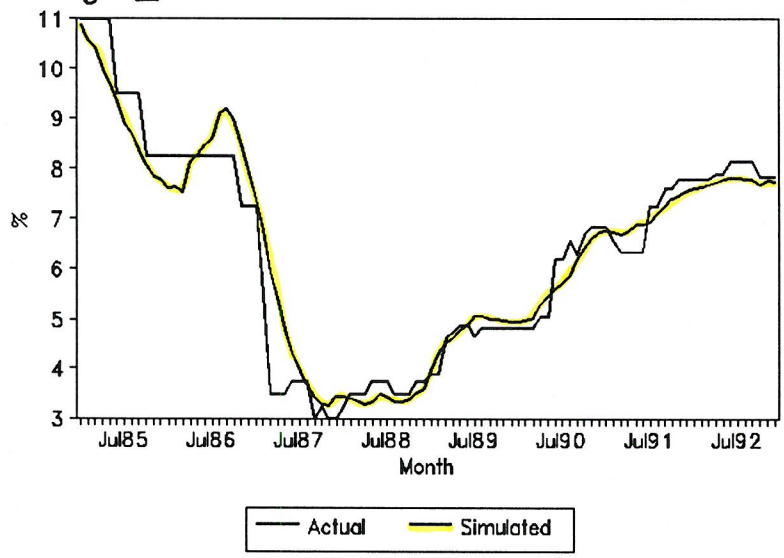


Fig. E-3: IA3: Actual and Simulated

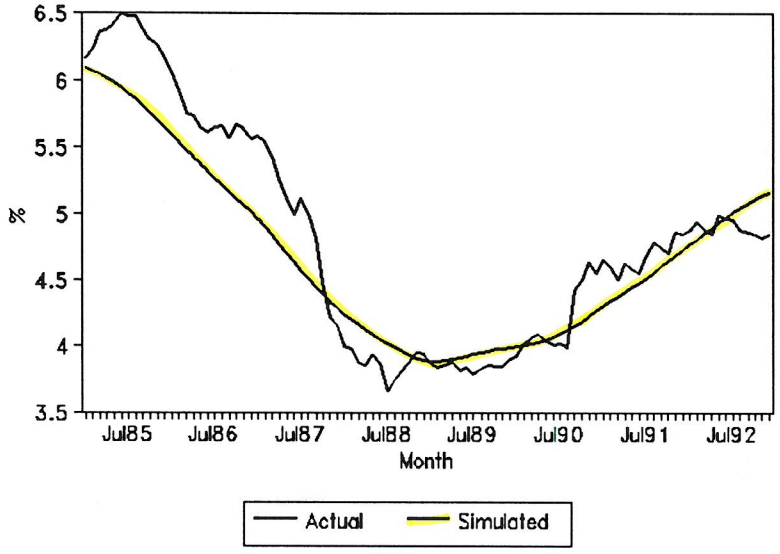


Fig. E-4: ALRF: Actual and Simulated

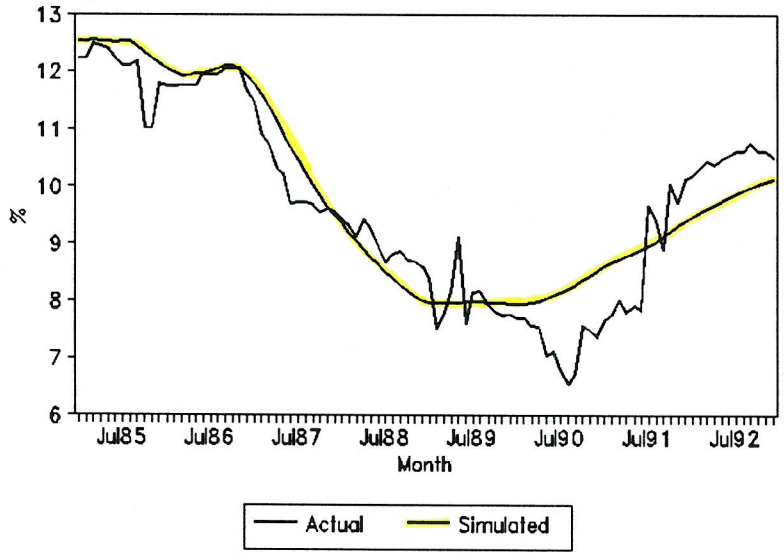


Fig. E-5: ALRL: Actual and Simulated

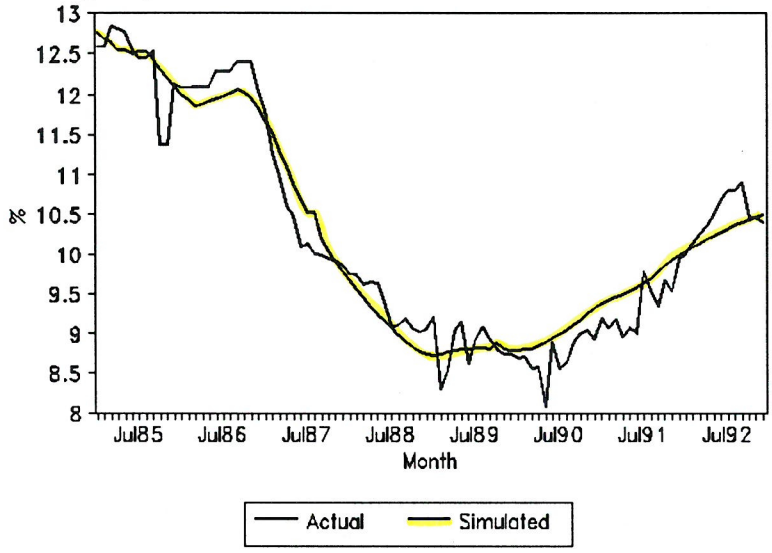


Fig. E-6: DDF: Actual and Simulated

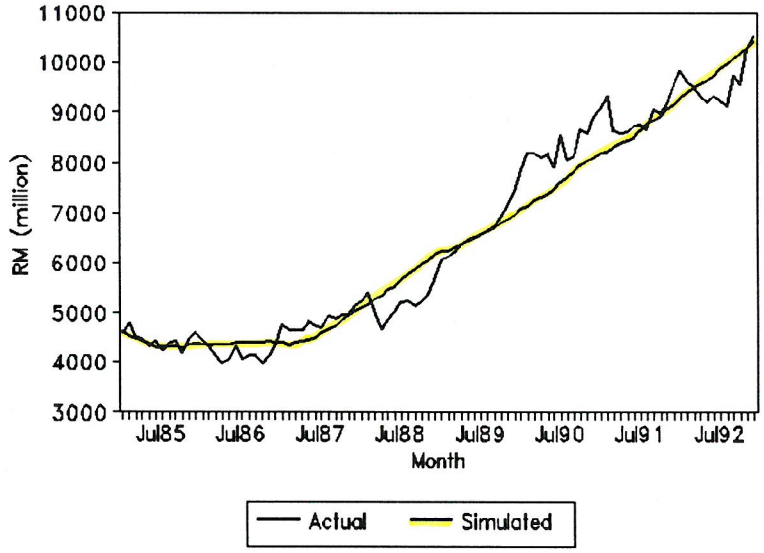


Fig. E-7: DDL: Actual and Simulated

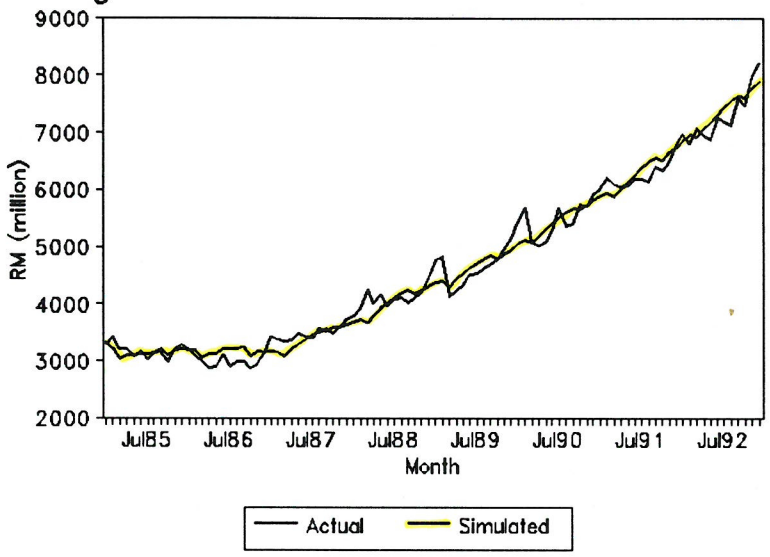


Fig. E-8: DDI: Actual and Simulated

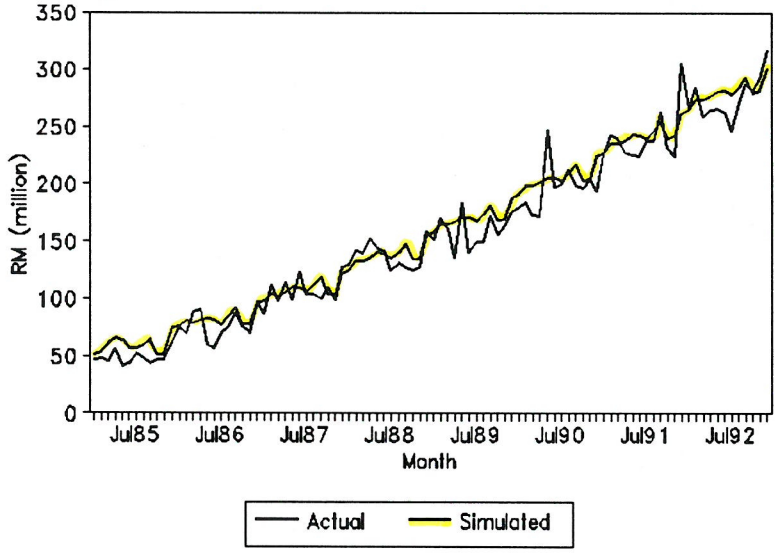


Fig. E-9: TDF: Actual and Simulated

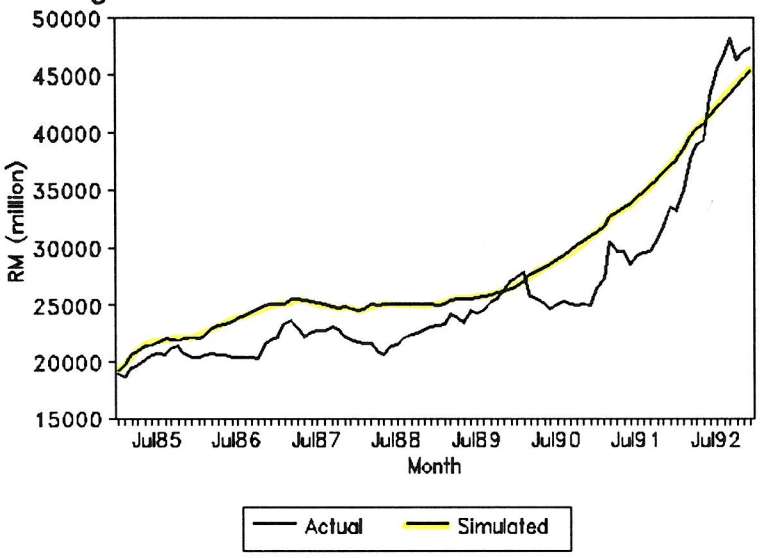


Fig. E-10: TDL: Actual and Simulated

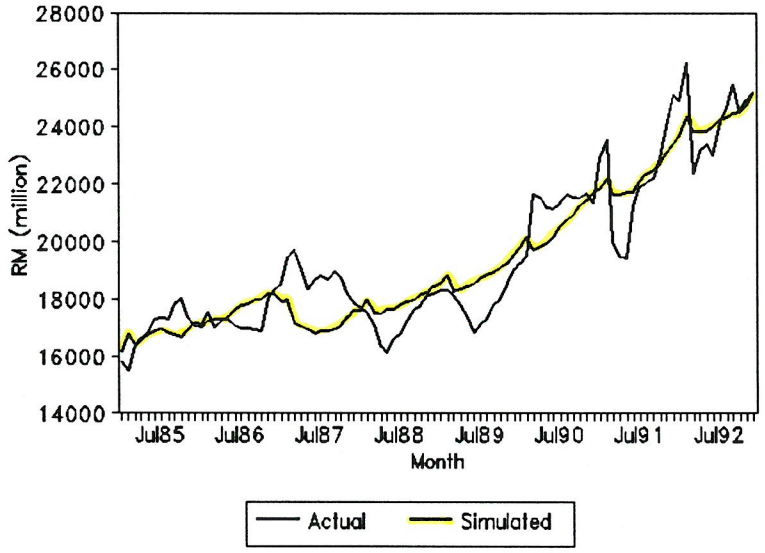


Fig. E-11: TDI: Actual and Simulated

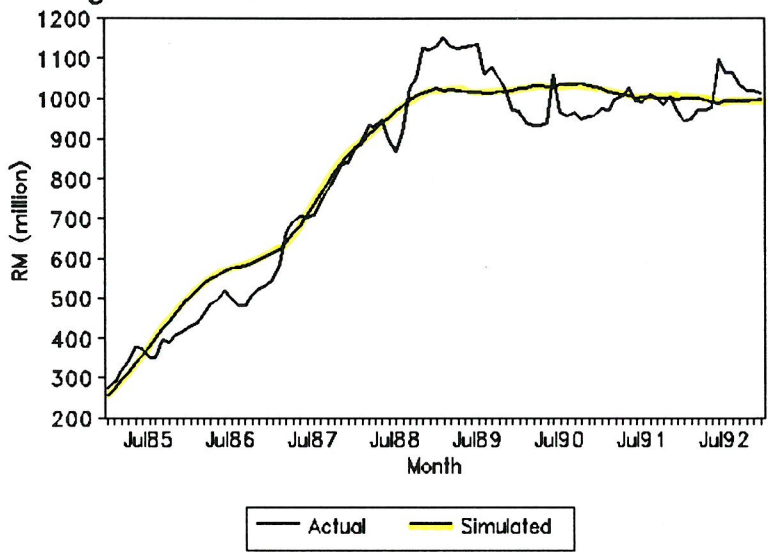


Fig. E-12: NCDT: Actual and Simulated

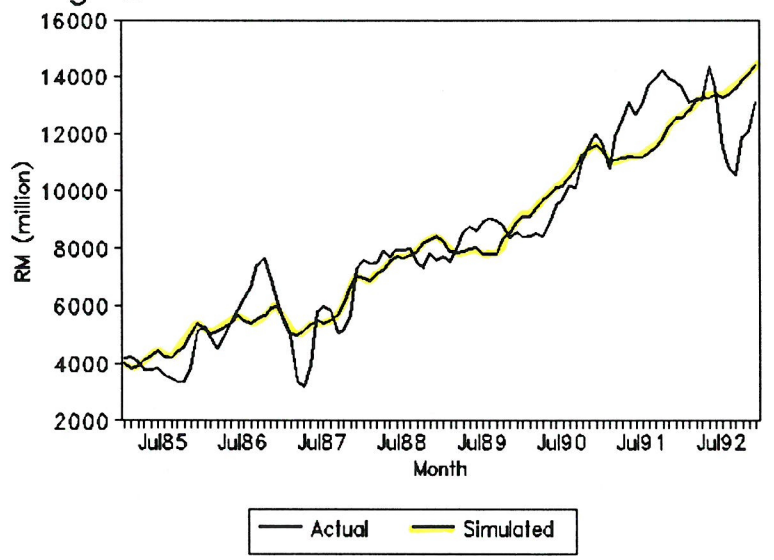


Fig. E-13: PF: Actual and Simulated

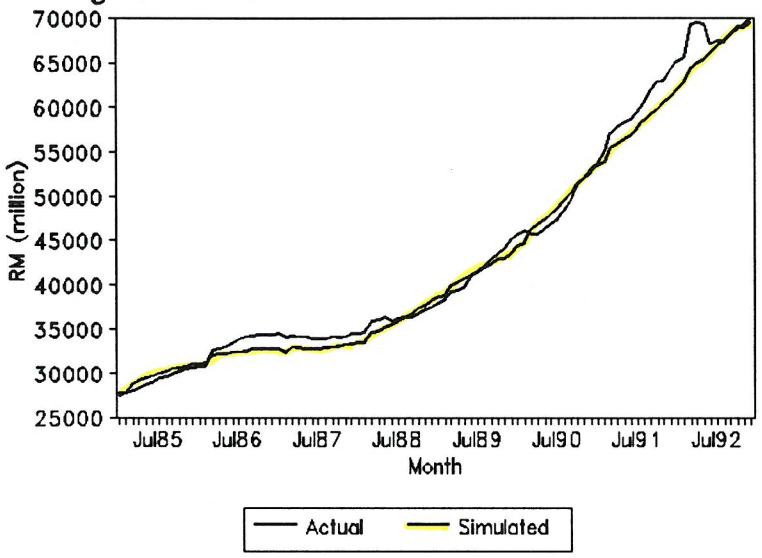


Fig. E-14: PL: Actual and Simulated

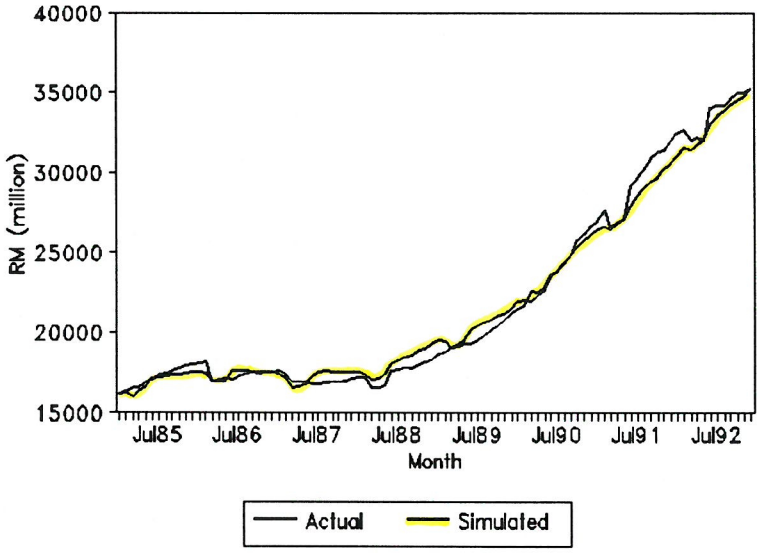


Fig. E-15: PI: Actual and Simulated

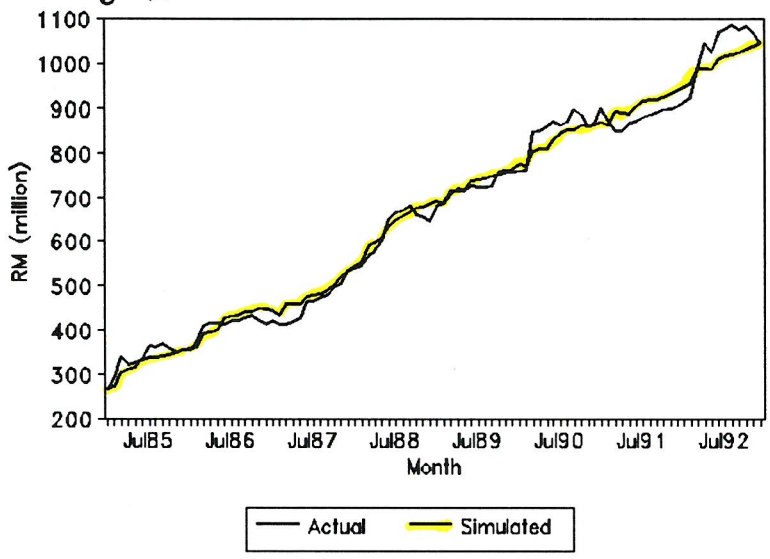


Fig. E-16: ELI: Actual and Simulated

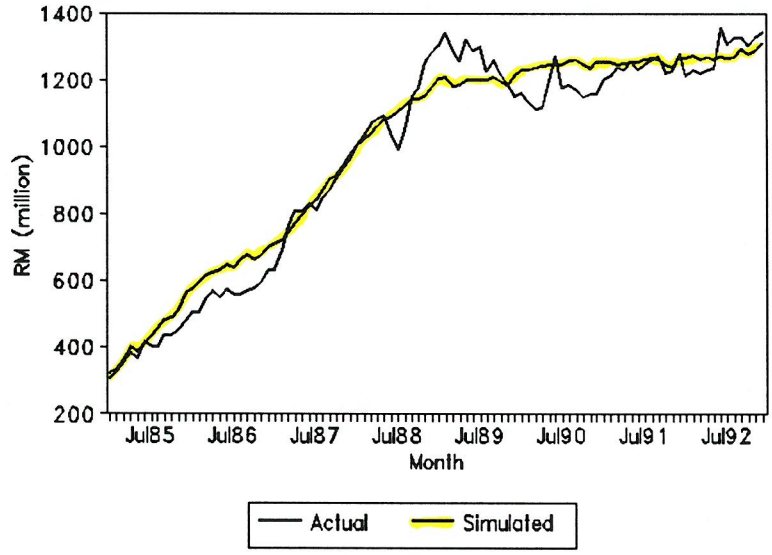


Fig. E-17: LAIS: Actual and Simulated

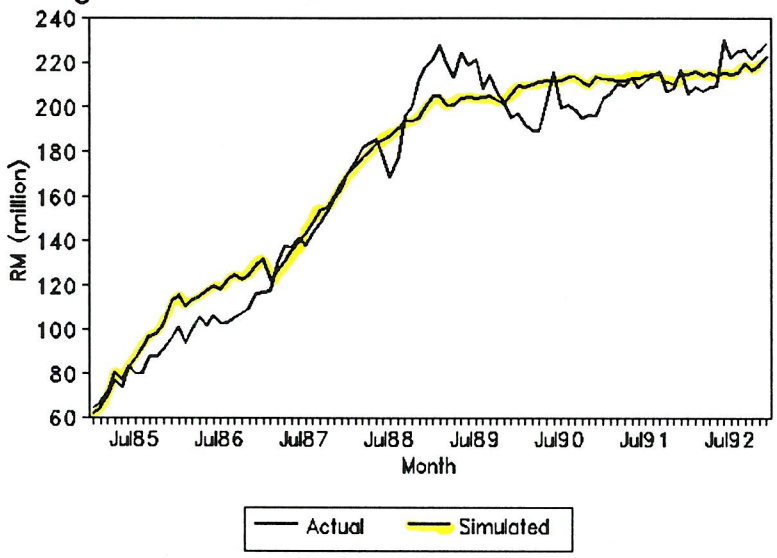


Fig. E-18: LI: Actual and Simulated

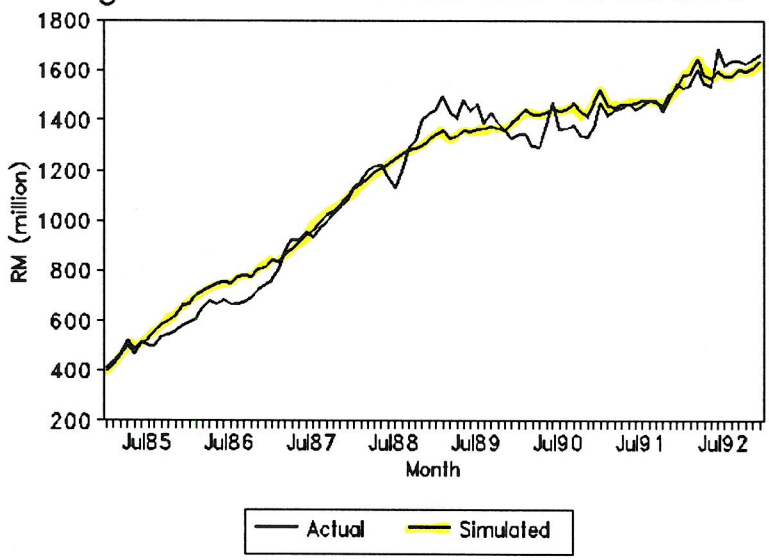


Fig. E-19: PAC: Actual and Simulated

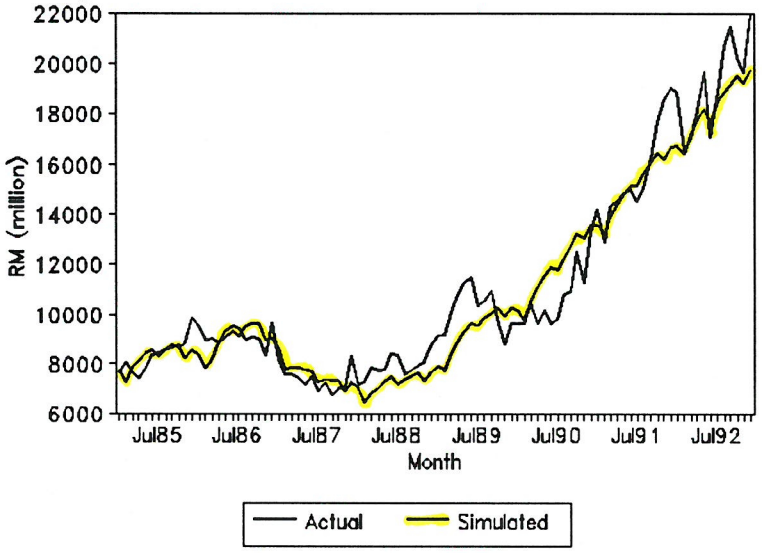


Fig. E-20: RAC: Actual and Simulated

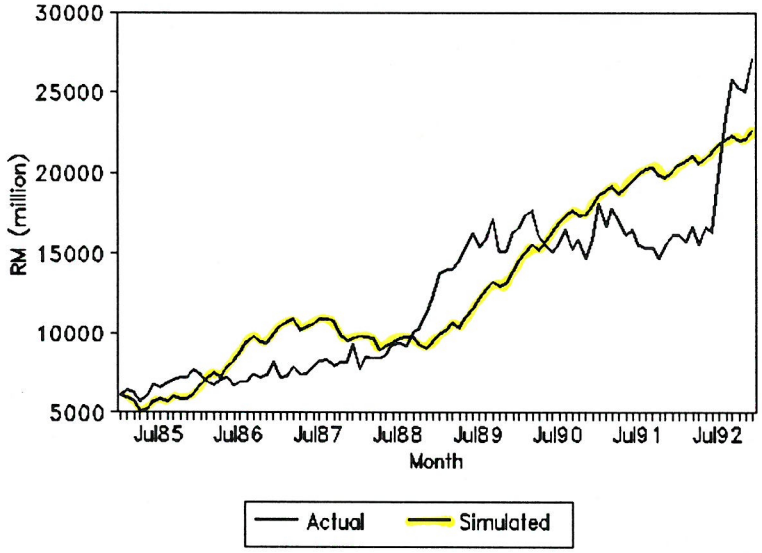


Fig. E-21: DIS: Actual and Simulated

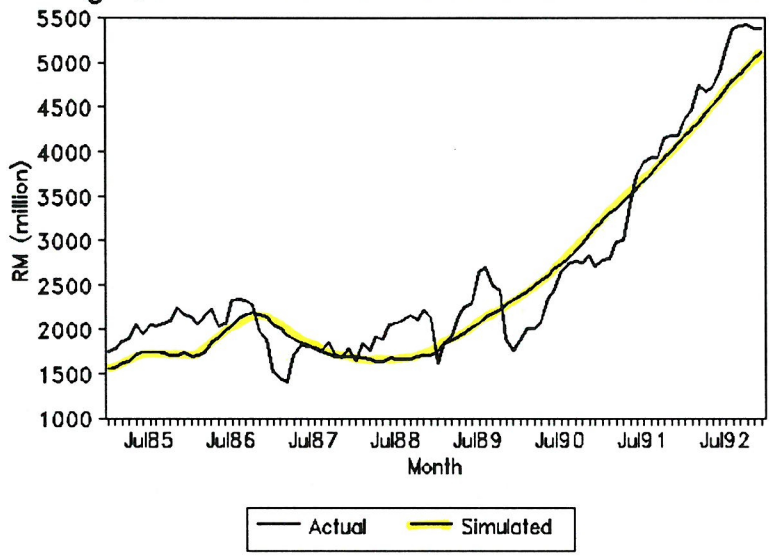


Fig. E-22: DISA: Actual and Simulated

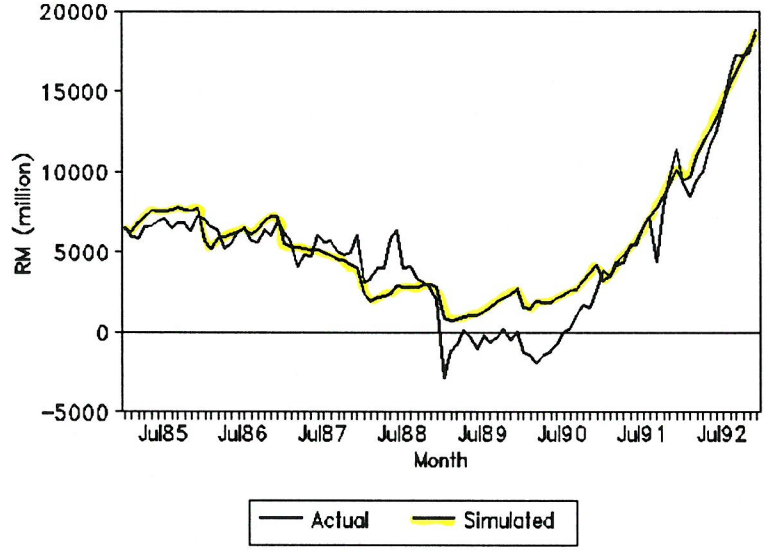


Fig. E-23: RC: Actual and Simulated

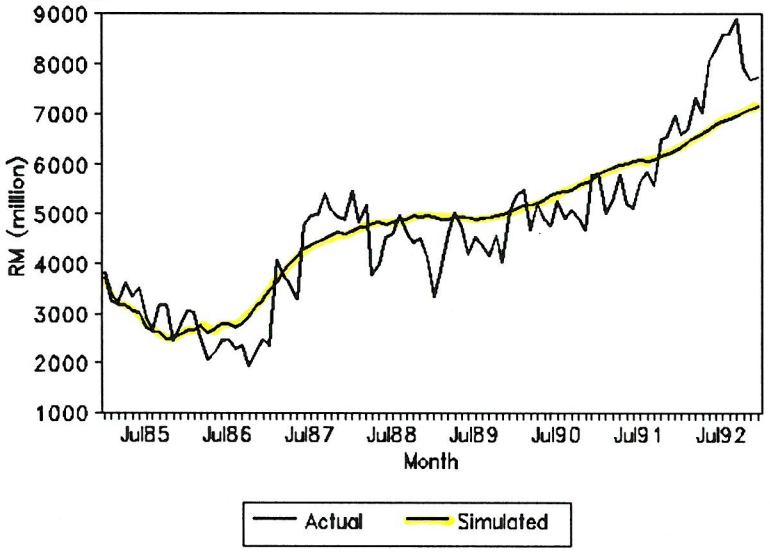


Fig. E-24: MC: Actual and Simulated

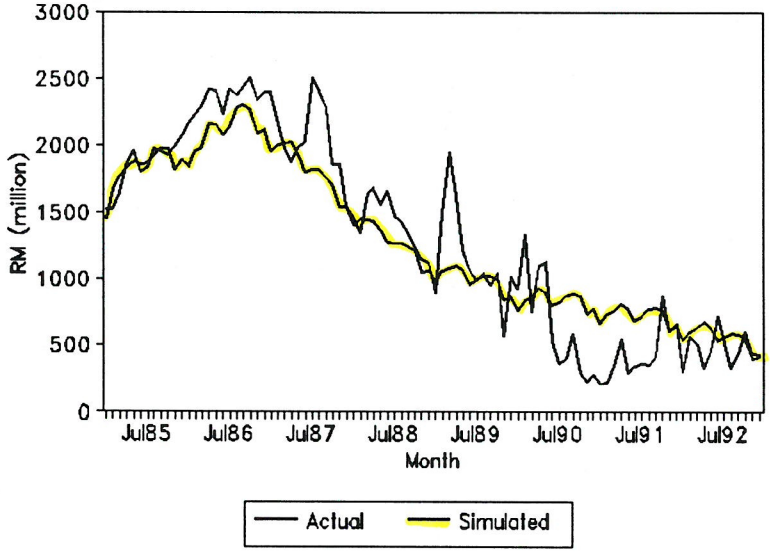


Fig. E-25: TB: Actual and Simulated

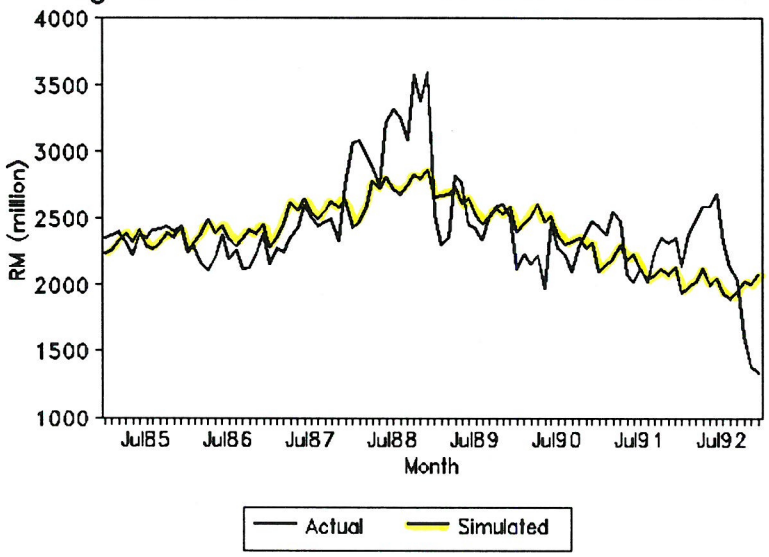


Fig. E-26: GSC: Actual and Simulated

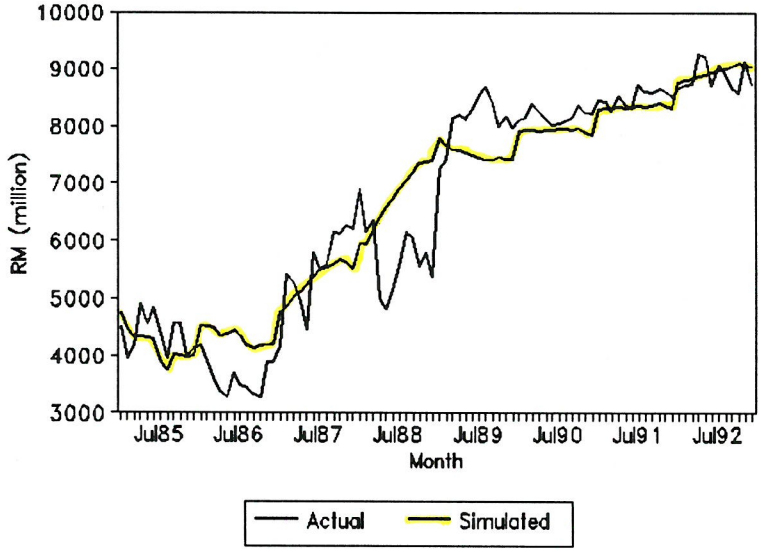


Fig. E-27: NCDA: Actual and Simulated

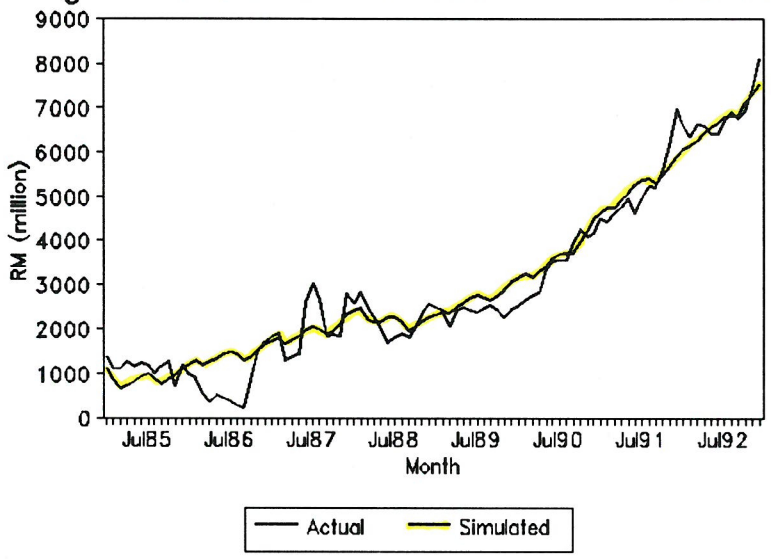


Fig. E-28: ELCB: Actual and Simulated

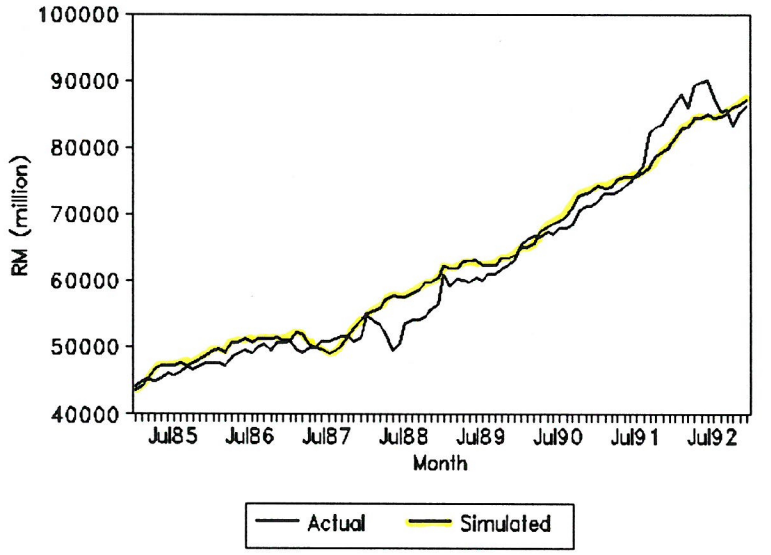


Fig. E-29: LACB: Actual and Simulated

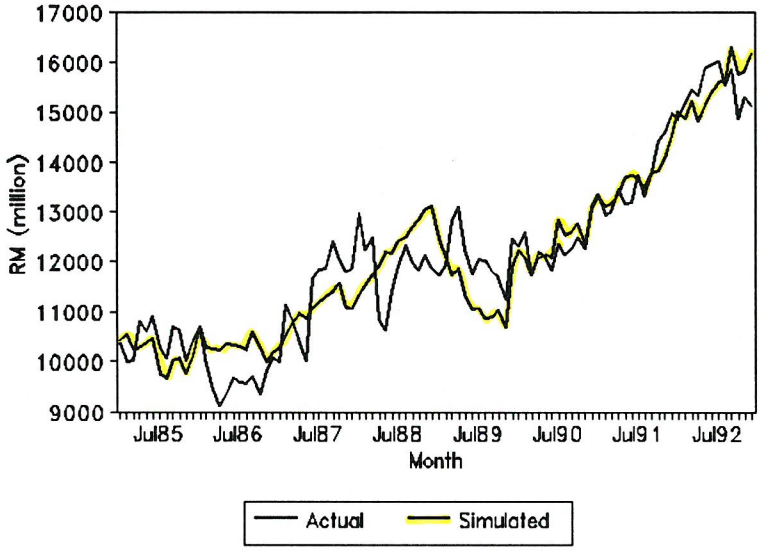


Fig. E-30: LACS: Actual and Simulated

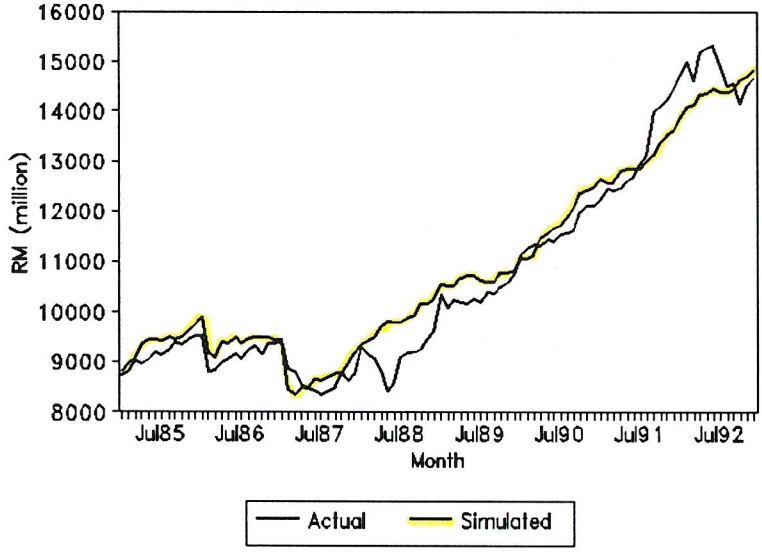


Fig. E-31: AC: Actual and Simulated

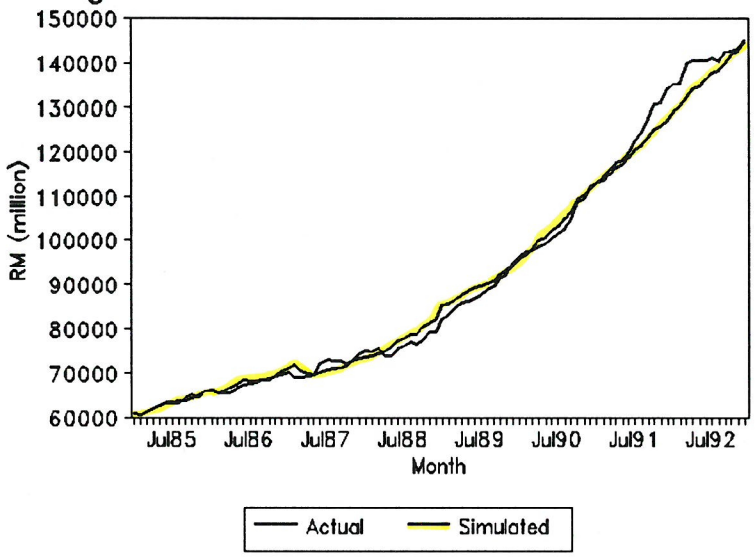


Fig. E-32: LC: Actual and Simulated

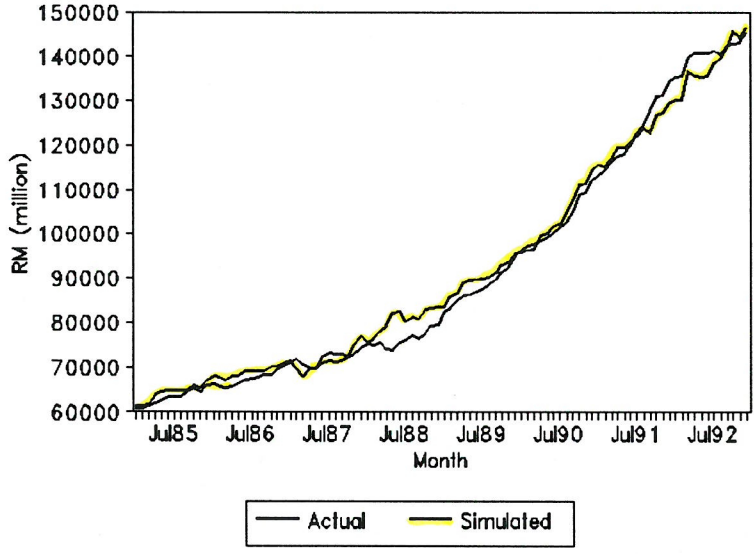


Fig. E-33: EXA: Actual and Simulated

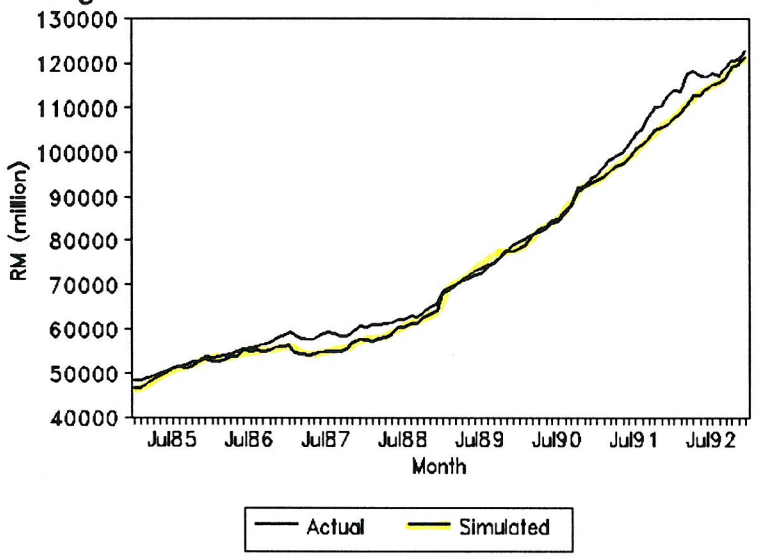


Fig. E-34: EXL: Actual and Simulated

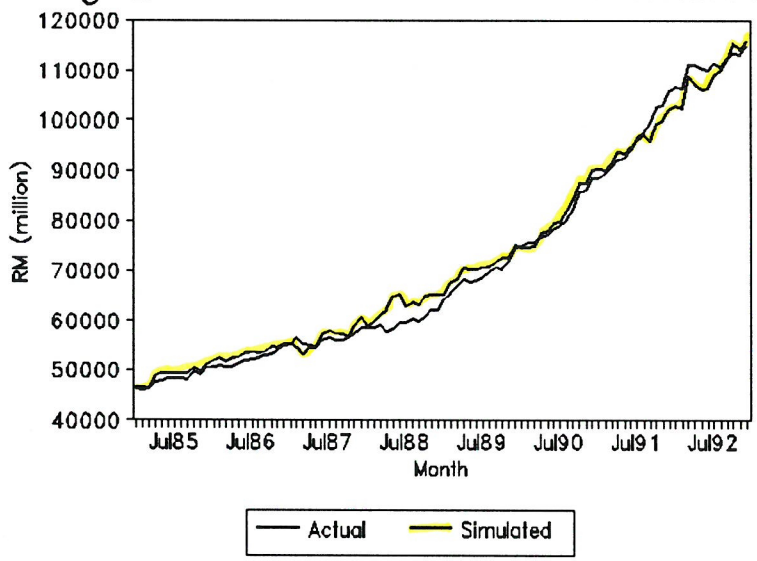


Fig. E-35: RI: Actual and Simulated

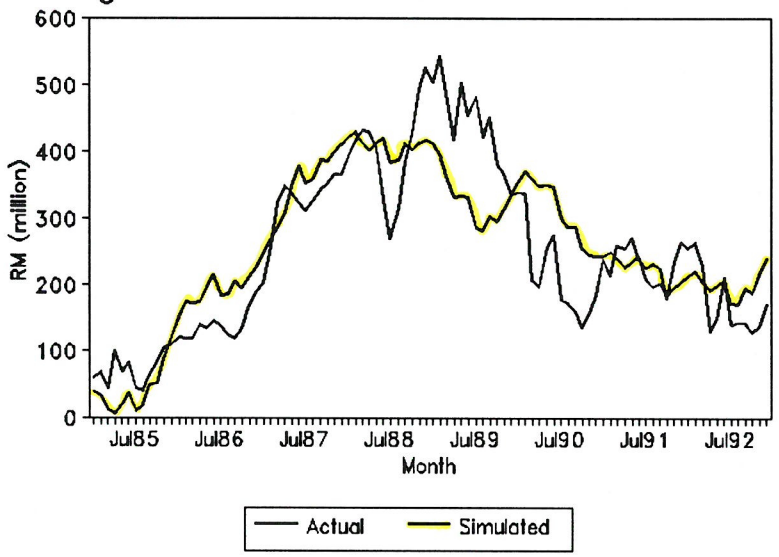


Fig. E-36: GIC: Actual and Simulated

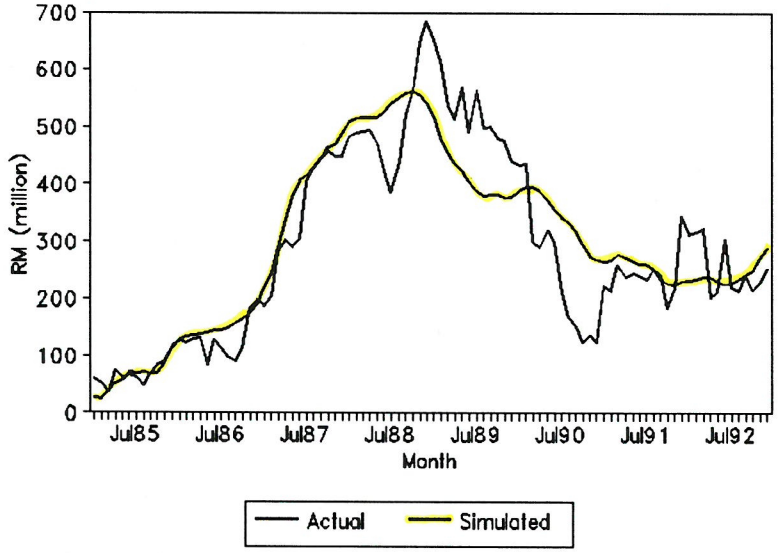


Fig. E-37: LAIB: Actual and Simulated

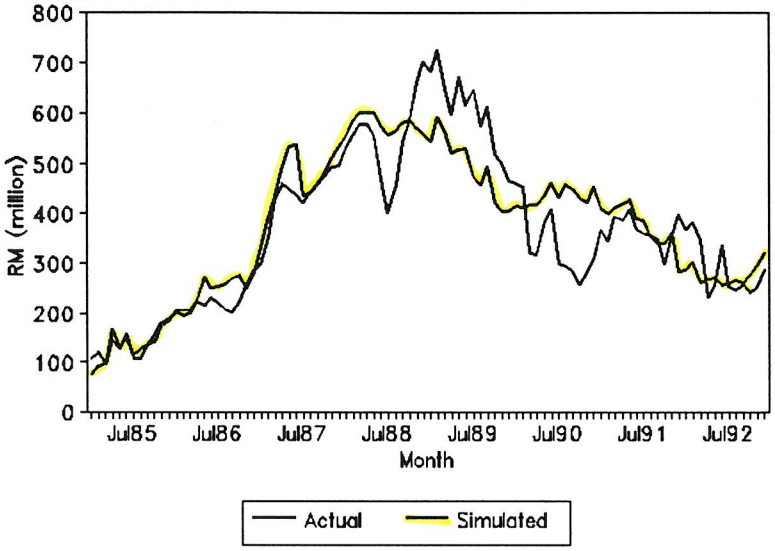


Fig. E-38: AI: Actual and Simulated

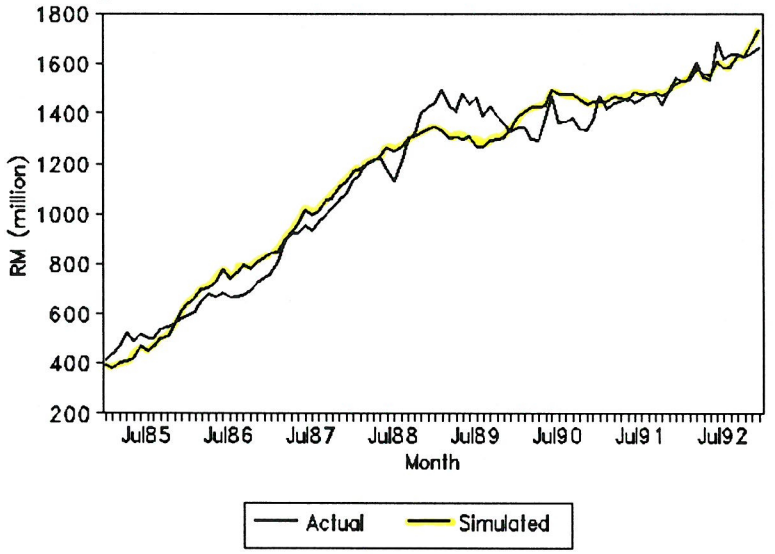


Fig. E-39: L: Actual and Simulated

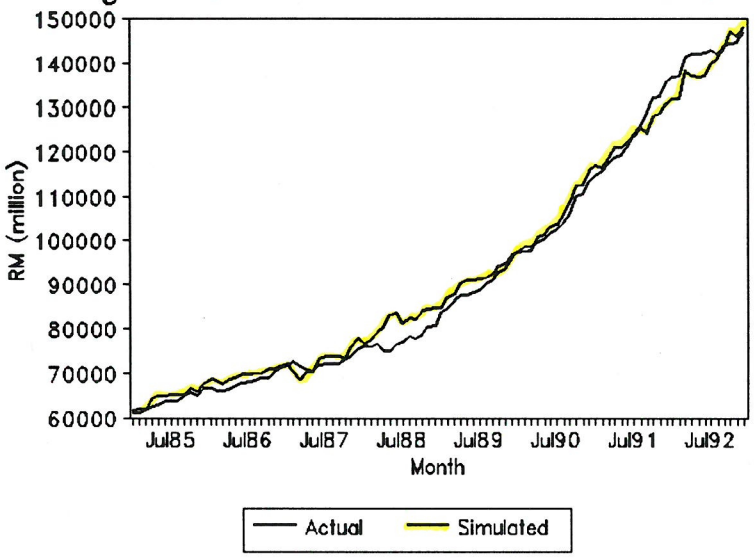
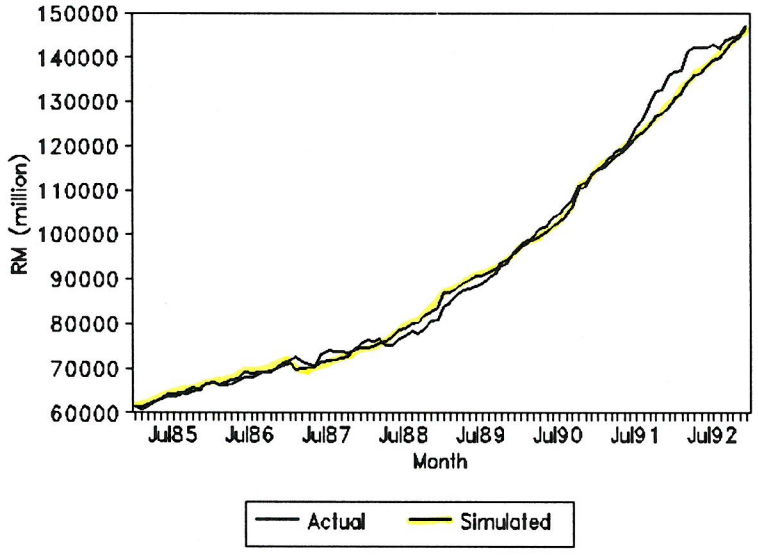


Fig. E-40: A: Actual and Simulated



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