University of Wollongong Thesis Collections

University of Wollongong Thesis Collection

University of Wollongong *Year* 1999

Banking deregulation, banking/monetary aggregates and monetary policy

Darsono
University of Wollongong

Darsono, Banking deregulation, banking/monetary aggregates and monetary policy, Doctor of Philosophy thesis, Department of Economics, University of Wollongong, 1999. http://ro.uow.edu.au/theses/1314

This paper is posted at Research Online.

NOTE

This online version of the thesis may have different page formatting and pagination from the paper copy held in the University of Wollongong Library.

UNIVERSITY OF WOLLONGONG

COPYRIGHT WARNING

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site. You are reminded of the following:

Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material. Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.

BANKING DEREGULATION, BANKING/MONETARY AGGREGATES AND MONETARY POLICY

Darsono, SE (Indonesia), MA (USA)

A thesis submitted in total fulfillment

of the requirement for the degree of

Doctor of Philosophy

Department of Economics

Wollongong University

Australia.

March 1999

TABLE OF CONTENS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS

ADRL : Auto Distributive Regression Lag

BPR : Bank Perkreditan Rakyat (Rural Banks)

CAR : Capital Adequacy Ratio

ECM : Error Correction Mechanism

GDP : Gross Domestic Product

GNP : Gross National Product

IFS : International Financial Statistics

KUK : Kredit Usaha Kecil (Small Scale Credit)

LLL : Legal Lending Limits

LLR : Lender of Last Resort

NCG : Net Claims on Central Government

NDC : Net Domestic Credit

NFA : Net Foreign Assets

NOP : Net open Position

OLS : Ordinary Least Square

OMO : Open Market Operation

Pakjan 90 : Paket 29 Januari 1990 (The 29 January Package)

Pakjun 83 : Paket Juni 1983 (The 1 June 1983 Deregulation Package)

PAKTO 88 : Paket Oktober 1988 (The 28 October 1988 Deregulation Package)

PELITA : Pembangunan Lima Tahun (Five Year Development Plan)

SBI : Sertifikat Bank Indonesia (Bank Indonesia Certificates)

SBPU : Surat Berharga Pasar Uang (Money Market Securities)

TABANAS : Tabungan Nasional (Saving deposits)

TASKA : Tabungan Asuransi Berjangka (Time Deposits)

VAR : Vector Auto-regression

SUMMARY

The objective of this study is to evaluate the reliability of banking and monetary aggregates as guide to the conduct of monetary policy. Banking aggregates i.e. savings mobilized through the banking system and credit aggregates are analyzed in accordance with searching alternative variables and providing more information needed to facilitate monetary policy.

This study found that the possible presence of structural breaks for banking and monetary aggregates occurred in response to the second phase of banking deregulation. With regard to the long run relationships, this study confirmed the existence of stable long run equilibrium for all banking and monetary aggregates. However, for interest bearing aggregates i.e. savings, credit, modified narrow money and broad money, the stable equilibrium could only be achieved when applying the test procedures which allow for the presence of possible structural breaks. It implies that banking deregulation had more impact on interest bearing aggregates than on non interest ones. The latter, particularly currency and narrow money, are needed mainly to support transactions, therefore they are less responsive to changes in interest rates which under a deregulated system were allowed to reach their market clearing levels.

The short run relationships particularly with respect to changes in interest rates display an interesting result. Even though interest rates were statistically significant in explaining the short run variations of some interest bearing aggregates, however their magnitudes were considered too low to warrant a policy recommendation. In line with savings mobilization which has received considerable attention in the banking

deregulation, since interest rates were not effective enough as a measure to stimulate savings, the policy should be more focused on building and maintaining public confidence in the domestic banks. With regard to the implementation of monetary policy, it suggests that indirect monetary instruments which work through affecting the price i.e. interest rates were not effective. Clearly, under a deregulated system, banking and monetary aggregates are less controllable.

Banking and monetary aggregates mostly did not perform well in predicting the future course of variables regarded to be the objectives of monetary policy particularly inflation and real income. Nominal currency performs more consistently and statistically significant in explaining the future course of inflation, both in the full sample and sub sample period. Meanwhile none of the banking and monetary aggregates could perform well in explaining real income, particularly in the post banking deregulation sub sample period.

Briefly, in the long run banking and monetary aggregates are mostly still reliable as a guide to undertaking monetary policy in Indonesia, provided that stable long run equilibrium for those aggregates and the specified variables still exist regardless of the impact of banking deregulation. However, in terms of relationship with the variables presumed to be the objectives of monetary policy or predictability and controllability aspects, currency and narrow money and modified narrow money emerge as the most sensible variables to guide for the conduct of monetary policy.

STATEMENT OF AUTHORSHIP

Except where reference is made in the text of this thesis, this thesis contains no material published elsewhere or extracted in whole or part from a thesis presented by me for another degree or diploma.

No other person's work has been used without due to acknowledgement in the main text of the thesis.

This thesis has not been submitted for the award of any degree or diploma in any other tertiary institution.

ACKNOWLEDGEMENTS

To my supervisors, Prof. Robert Castle and Dr. Nelson Perera, I would like to extend my gratitude for their guidance, advice and continuous encouragement throughout the preparation of this thesis.

I would like to thank to Bank Indonesia which gives me an opportunity to undertake this doctoral research.

To my dearest wife Katiti Wulansari and my beloved daughter Nissava Kinjie, I would like to thank for continuing support and deep understanding during the period of this undertaking.

CHAPTER 1

INTRODUCTION

1.1. Introduction

Banking and monetary aggregates are regarded as important variables to guide for the conduct of monetary policy.[1] Prior to banking deregulation, credit was employed as a direct instrument for setting monetary aggregates at the desired level which were presumed to support the achievement of monetary policy objectives such as inflation rates, real income growth, etc.. However, credit ceilings were abolished in 1983 when the first phase of banking deregulation was unveiled. Since credit ceilings were removed, this aggregate could not be employed as a quantitative measure to control monetary aggregates. Instead, the Central Bank had to relay on qualitative measures which affect monetary aggregates through prices i.e. interest rates. In this case, banking deregulation led to banking and monetary aggregates becoming less controllable.

The impact of banking deregulation and innovation on the reliability of banking aggregates and monetary aggregates in particular as guides for monetary policy has received considerable attention. Since the existence of a stable demand for money is a necessary condition for employing monetary aggregates in facilitating monetary policy, many empirical studies have attempted to construct a more appropriate demand for money function in response to banking deregulation. On the basis that the relationship among variables in the system mostly involves nominal aggregates rather than real ones,

[1] Employing bankingand/or monetary aggregates either as intermediate targets or indicators for conducting monetary policy.

Milbourne (1982) introduced a demand for nominal money function. Other studies such as Melnick (1995) introduced a variable which represents the state of financial development to consider the change in demand for money in response to financial deregulation and innovation. However, studies to evaluate the reliability of monetary aggregates in facilitating monetary policy e.g. Huang (1994), Arize (1994), Choudhry (1995), etc. are mostly focused on examining the stability of the demand for money function. With regard to searching for an alternative variable, some studies examined the possibility of banking aggregates particularly credit as a guide to monetary policy.

1.2 Banking/ Monetary Aggregates and Monetary policy in Indonesia

Savings and credit are among the banking aggregates affected by banking deregulation, since that policy was designed to stimulate savings as well as the supply of credit in the banking system. One impact of banking deregulation on banking/monetary aggregates is related to shifts in financial portfolios toward interest bearing aggregates. So far studies evaluating the impact of banking deregulation on banking aggregates particularly savings were more focused on the responsiveness of those aggregates or savings in particular to changes in interest rates which under a deregulated system are freely determined to reach market clearing levels (e.g. Juoro 1993, Athukorala 1996). Along with evaluating the impact of banking deregulation on savings mobilized through the banking system, this study also examines the possibility of using banking aggregates e.g. savings and credit as guide for conducting monetary policy.

A number of studies on estimating a demand for money function in Indonesia have attempted to consider the impact of banking deregulation. In dealing with this issue, however, a dummy variable was simply included in the estimated demand for money

functions (e.g. Boediono 1985, Tseng and Corker 1991). This study undertakes more a comprehensive approach to examining the impact of banking deregulation on the reliability of banking and monetary aggregates as guide for conducting monetary policy. To capture the impact of banking deregulation, the econometric procedures which allow for the presence of a structural break are adopted in evaluating the property of data and testing for cointegration. The advantage of these procedures is to prevent a biased result toward non rejection of the null hypothesis and provide better information for analyzing and deriving policy recommendations. The temporal causality and VAR tests are also conducted to examine the ability of banking and monetary aggregates in predicting the future course of variables presumed to be the objectives of monetary policy.

1.3 The Objectives of the Study

The objectives of this study are to undertake more comprehensive investigations regarding the reliability of banking and monetary aggregates as a guide for conducting monetary policy. The analysis of banking aggregates is focused on saving and credit aggregates, while the analysis of monetary aggregates on the other hand is focused on various definitions of money from nominal currency (C) to nominal broad money (M_2).

To evaluate the reliability of those aggregates as intermediate targets or indicators for conducting monetary policy, we focus on examining more appropriate specifications to employ optimal econometric methods, but also emphasize the observability, controllability and predictability of those aggregates. Clearly, this study is not only designed to investigate whether the particular banking or monetary aggregates are econometrically feasible for facilitating monetary policy, but also evaluate whether the proposed aggregates are practically applicable.

1.4 The Sources of the Data and Information

This study mainly employs secondary data collected from official reports published by the Central Bank of Indonesia (Bank Indonesia), Central Bureau of Statistics, and international publications particularly *International Financial Statistics* (IFS), *Bulletin of Indonesian Economic Studies* (BIES). Other qualitative data and information such as banking acts, circular letters, etc. are gathered from reports issued by Indonesian government agencies or other relevant agencies.

1.5 The organization of the Study

Chapter 2 presents the literature review with regard to financial deregulation or banking deregulation in particular to provide better insight for analyzing the impact of banking deregulation particularly when econometric methods are employed. Chapter 3 is devoted to a review the banking deregulation in Indonesia. Chapter 4 describes the development of banking and monetary aggregates before and after banking deregulation. Chapter 5 presents the econometric methods employed in this study. Chapter 6 examines the impact of banking deregulation on banking aggregates particularly saving and credit aggregates. This is not only focused on evaluating banking aggregates in response to the deregulation policy, but more specifically is designed to examine the possibility of using these aggregates as guide for conducting monetary policy. Chapter 7 is devoted to examining the reliability of monetary aggregates in facilitating monetary policy. The demand for the various definitions of monetary aggregates are examined through employing current econometric methods particularly in terms of parameter stability and consistency which is *a sine qua non* for undertaking monetary policy. To shed more light on the reliability of the monetary aggregates, temporal causality tests are conducted. The

purpose of chapter 8 is to test the existence of a significant relationship between banking/monetary aggregates with the variables which are designed as objectives of monetary policy particularly the growth of real income and inflation rates. Chapter 9 is devoted to summarizing the major findings of this study, deriving policy recommendations with regard to using banking/monetary aggregates either as targets or indicators for conducting monetary policy, and suggesting directions for further research.

CHAPTER 2

THEORETICAL FRAMEWORK ON FINANCIAL DEREGULATION

2.1 Introduction

Seminal works by McKinnon (1973) and Shaw (1973) provide the theoretical framework for undertaking financial deregulation particularly in developing countries. The basic idea is to allow interest rates to move freely toward market clearing levels. Financial repression as reflected in setting official interest rates by the government is presumed to discourage mobilization of domestic saving, restricts the availability of supply of credits as well as economic growth. The objective of this chapter is to overview economic literature related to the need of financial deregulation and the importance of prudential regulation. The rest of this chapter is organized as follows. Section 2 overviews the role of financial intermediaries in economic development, Section 3 presents the theoretical ground for financial deregulation, and Section 4 contains some concluding remarks.

2.2 Financial development and Economic Growth

Deregulation in the financial sector which was widely undertaken by many countries in the 1970's and the 1980's, was designed to promote the role of financial institutions in stimulating economic growth. The role of financial intermediaries in enhancing the economic development process has received considerable attention, however, the debate over that issue has not resulted in unanimous conclusions. One view which believes that the development of financial intermediaries does have positive impacts on economic growth, is held among others by by Schumpeter (1911), Goldsmith

(1969), McKinnon(1973), and Shaw (1973), Greenwood and Jovanovic (1990), Bencivenga and Smith (1991), Japelli and Pagano (1994) and King and levine (1993). In contrast, others are still not convinced of the importance of financial development in stimulating economic growth. Robinson (1952) argued that when the economy is growing, it creates more demand for products of financial intermediaries. It suggests that financial development follows rather than leads economic development. He stated: " *Further influences upon the supply of finance may be summed up under two broad headings; first, the state of expectations, and second, legal and institutional arrangements and the habits of lenders. There is a general tendency for the supply of finance to move the demand for it. It is true, of course, that any movement there are many excellent ideas which can not be implemented because those who have conceived them are unable to back them with finance. But, by and large, it seems to be the case that where enterprise leads finance follows".* The argument against financial and economic development relationship was also declared by Lucas who states: " *....the importance of financial matters is very badly over-stressed in popular and even much professional discussion.....*".

Among those who believe in the existence of positive relationships between financial and economic development, however, there are still splits into different opinions regarding the channels through which financial intermediaries affect economic growth and determine the appropriate variables as indicators of financial development.

Joseph Schumpeter (1911) pointed out the existence of a positive correlation between financial and economic development as well as technological innovation. It was reflected in mobilizing savings, evaluating projects, managing risk, monitoring managers, and

facilitating transactions. Eliminating market frictions with regard to the effort to reduce information and transaction costs could facilitate in enhancing the financial functions of financial markets and intermediaries. The role of financial intermediaries in stimulating economic growth is reflected in their ability to promote capital accumulation and technological innovation.

Goldsmith (1969) emphasized the role of financial intermediaries in improving the efficiency of investment which is regarded as the channel of transmission by which financial institutions enhance economic growth. In this case, financial intermediaries could facilitate achievement of the best allocation of capital in the economy.[2]

To justify the important role of financial intermediaries in enhancing economic growth when the economy is characterized by the existence of economic dualism, Galbis (1977) did not emphasize the need to stimulate financial deepening or increase real interest rates. Instead, by using a two sector model which represents the backward and modern sectors, Galbis provides theoretical grounds for how the role of financial intermediaries could promote economic growth even if overall national savings does not increase. In this regard, in the presence of financial intermediaries, the allocation of financial resource will move toward the sector which resulted in higher returns. However, in his subsequent works Galbis (1981, 1982) relied on the importance of interest management in restoring the interest rate equilibrium which previously was not market determined.

[2] This view was supported by Greenwood and Jovanovic (1990) and Bencivenga and Smith (1991)

2.3. Financial Deregulation

Up to the early 1970's, the wisdom of setting low interest rate in promoting economic growth as advocated by Keynes and Neo-structuralists was widely implemented particularly in developing countries. In this context, to enhance economic growth, official interest rates were deliberately set below the prevailing inflation rates which resulted in negative real interest rates. The existence of policies which distorted domestic financial markets the so-called financial repression such as interest rate controls, credit ceilings, high reserve requirements was challenged by McKinnon (1973) and Shaw (1973). It is argued that financial repression in which interest rates were set below normal competitive levels would discourage savings. In his subsequent work, McKinnon (1992) proposed: "*keeping positive and more uniformly high real rates of interest within comparable categories of bank deposits and loans by eliminating enormous reserve requirements, interest ceilings, and mandated allocations of cheap credit on the other hand, while stabilizing the price level through appropriate macroeconomic measures on the other* (pp. 512). Financial liberalization which allowed interest rates to move freely toward their market clearing levels was presumed to promote domestic savings. Accordingly, it would increase the supply of credits and investment as well as economic growth. Removing the market distortions would also facilitate markets to send the right signals for both savers and investors, so that they could identify more accurately the scarcity price of capital and reduce the profitability dispersion among economic sectors in the economy.

Fry (1978,1982,1987,1988,1994) on the other hand strengthened McKinnon and Shaw's hypothesis by arguing that the presence of positive real interest rates resulted from liberalizing the financial sector is believed to be able to promote domestic savings,

hence, the supply of capital which is required for investment. Fry emphasized that positive impacts of deregulation in stimulating growth also depend upon the ability of financial intermediaries to improve efficiency where under a deregulated environment, competition is expected to minimize the spread between deposits and lending rates.

The challenge over the wisdom of high interest rates in respect to the deregulation policy in stimulating economic growth was based on the argument that the increase in interest rates in formal markets led to decreases in the availability of funds in curb markets. Since formal financial institutions are subject to reserve requirements set by the Central Bank, then the availability of overall credit might be reduced (e.g. Wijnbergen 1982, 1983 and 1985, Taylor 1983 and Koshaka 1984). It is also argued that the impact on financial deregulation particularly the rise of real interest rates in stimulating domestic credits could be offset through portfolio shifts from capital goods and/or government bonds toward monetary assets.

2.3.1 The Order of Deregulation

Although deregulation in the financial sector has been widely implemented particularly in developing countries since the 1980's, however, the issue regarding the order of deregulation is not unanimously accepted. The case of the southern cone of Latin America which experienced a series of banking panics and collapses has called into question arguments in favour of liberalization. Many efforts have been developed to provide a theoretical basis on which deregulation should be implemented. The order and speed in implementing liberalization policy become important issues since the economy is subject to the presence of externalities or distortions. In the absence of these externalities or distortions, the economy could be liberalized immediately and

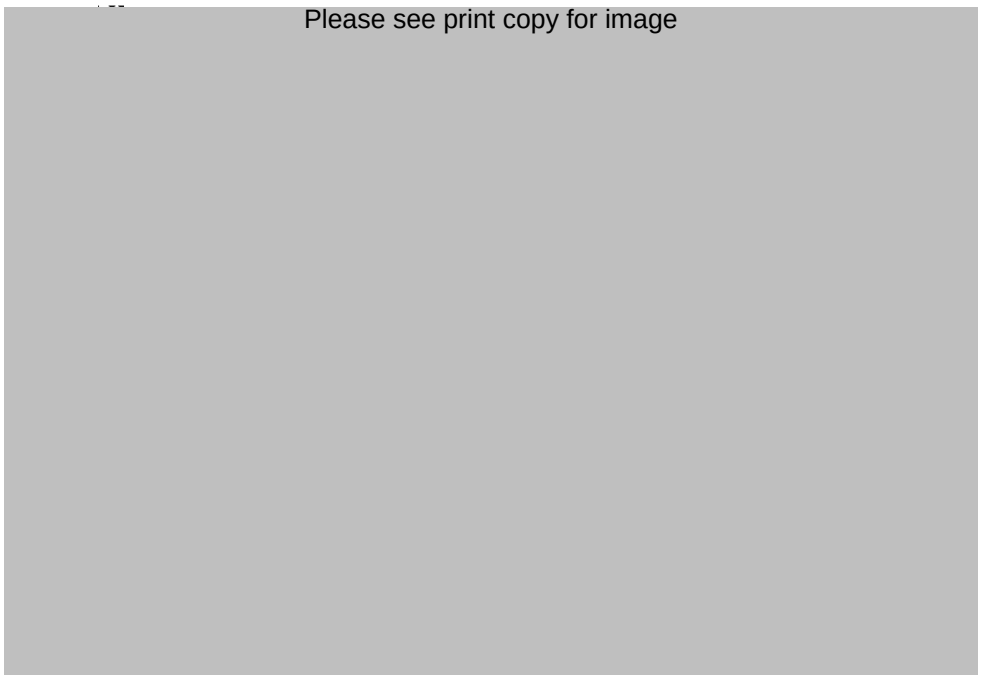
simultaneously (Edwards 1984 p 2). In line with this particular issue, the importance of macroeconomic stability as a necessary precondition for undertaking financial deregulation is widely accepted, while it is sensible to deregulate the foreign sector only after domestic markets have been completely deregulated.

McKinnon (1981, 1992) admitted that the optimal order of liberalization could not be generalized since it varies among the countries depending on their respective initial conditions. However, he indicated two major common elements in phasing deregulation. First, the need to discipline fiscal policy in the sense that government should control its budget prior to undertaking financial liberalization. Second, it should open the domestic capital market so the borrowers pay and the depositors receive significant real interest rates. However, he noted that the restriction imposed on borrowing and lending among decentralized enterprises and households can be removed only when the price level has been successfully stabilized and budget deficits eliminated. To quote: "*without price-level stability, unpredictable volatility in real interest rates or exchange rates makes unrestricted domestic borrowing and lending by deposit-taking banks - which must always be regulated to ensure the safety of payment mechanism - simply too risky*". After liberalizing the domestic trade and finance sector, it is sensible to start imposing deregulation in foreign exchange sectors. In this regard, McKinnon suggested to deregulate current accounts much faster than capital accounts. Clearly, it is sensible that the foreign exchange sector should not be deregulated until domestic financial markets were fully deregulated. When domestic financial markets were still characterized by

financial repression in the sense that an artificial interest rate was set below its competitive market rate, liberalizing capital accounts might easily trigger capital flights.[3]

Edwards (1984) also pointed out that while the economy is characterized with the presence of adjustment costs, market imperfections, and externalities, deregulation is not either feasible or desirable to be implemented immediately and simultaneously. Despite the lack of a strong theorem regarding the order of deregulation, he suggested that the more prudent strategy is to deregulate current accounts first and then open capital accounts. As also noted by McKinnon, deregulating capital accounts might lead to massive capital flows at least in the short run particularly when the domestic financial market has not been completely liberalized. The behaviour of capital flows in response to capital account liberalization is described in Figure 2.1.

Figure 2.1. The behaviour of Capital Flows Following a Capital Account Liberalization



Source: Edward (1984) pp. 6.

[3] See among others McKinnon (1973 and 1991)

Figure 2.1 shows that deregulation in the capital account leads to a sudden increase (overshooting) in capital inflows which result in substantial current account deficits. The behaviour of capital flows is expressed in the following equation.

$$\Delta K = \min [\, \theta (D^* - D_{-1}), \Delta K \,]$$

where K represents capital flows, D* is the desired level of external debt, and D_{-1} stands for the actual stock of external debt in the previous period, while ΔK is the maximum capital inflow which is allowed under a restricted capital account regime. The removal of capital inflow restrictions cause the desired and actual level of external debts to be equal which leads to a sudden jump in capital flows by a fraction of θ and increases the current account deficit. If current accounts and capital accounts are deregulated simultaneously, financial markets will adjust faster than goods markets which results in substantial capital inflows and appreciation of the domestic currency. In this regard, capital account effects will be dominant at least in the short run.

Apart from providing the theoretical basis for ordering economic liberalization, Edwards' important contribution in the implementation of deregulation policy is related to the credibility aspect where the degree of credibility is significantly influenced by the perceived consistency of the proposed policies. It is argued that determining such credible and consistent policies is considered more important than determining the appropriate order and speed of deregulation since the former is directly involved with public confidence and affects public expectations whether the proposed policies would be continuously and consistently imposed or reversed.

Khatkhate (1997) viewed financial deregulation as a process which is continuously evolving. In this regard, stable macroeconomic conditions were regarded as a good basis to start imposing financial deregulation[4]. Clearly financial deregulation should be built on stable macroeconomic conditions, rather than using financial deregulation as an instrument to create macroeconomic stability. Furthermore, the implementation of financial deregulation should consider the state of the financial system when it was initiated. Knowing the state of the financial system, therefore, is an essential step to determine to what extent financial deregulation could be imposed. The appropriate sequencing of the financial deregulation is necessary to prevent the macroeconomic instability.

2.3.2 Prudential Regulation

The need for prudential regulation in the context of financial deregulation or banking deregulation is still controversial. Basically, there are three major views regarding that issue. The first one is the view which supports free banking and challenges the justification for any government intervention or regulation, the second view presumes that to some extent, prudential regulation is needed, and the third one argues that prudential regulation is essentially needed when deregulation is going to be imposed.

Dowd (1993, 1996) stated that the argument for financial *laissez-faire* or free banking is very simple in the sense that given free trade is mostly preferable, then there is no reason the same principle does not apply in the financial sector. With regard to the stability of a free banking system, he argued that in the absence of lender of last resort or state-run deposit insurance system, both depositors and bank managers would be acutely

[4] See Cho and Khakate (1989), Cole and Slade (1995).

aware of their own interest. Depositors, on the one hand, would search for a sound bank to ensure that their funds were safe, and withdraw their deposits if they felt that the bank was unsound. The managers of the banks, on the other hand, have to promote the soundness of their banks to maintain public confidence which is regarded as the most important factor in determining the survival of the banks in the long run. Under these circumstances, bank managers would tend to undertake conservative policies for lending their funds to borrowers, promote transparency to public scrutiny, and disclose audited financial reports. In addition, a free banking system also stimulates bank managers to maintain adequate capital for absorbing any potential losses which might be experienced by the banks. Briefly, financial *laissez-faire* or a free banking system in particular provides a mechanism for promoting a sound banking system. Furthermore, he also justified his argument by citing some empirical evidence that under a free banking system, banks maintain a high level of capital (Benston and Kaufman 1995) and face low probabilities of failure (Dowd 1992). In line with arguments which support the need for a lender of last resort to prevent contagion problems, he argued: "....*this argument ignores the earlier point that good banks have a strong incentive to distance themselves from bad ones. If the good banks felt there was any danger of contagion, they would take appropriate action- they would strengthen themselves and curtail credit to weak banks- to help ensure that contagion did not occur*". Clearly, under this scenario contagion problems could be solved simply by shifting the funds from the bad banks to the good ones. Meanwhile, in response to the argument which supported the existence of a central bank acting as lender of last resort (LLR), he argued: " *The establishment of an LLR is meant to provide liquidity to banks that cannot otherwise obtain it. Since good banks can*

always obtain loans to maintain their liquidity, an LLR therefore protects bad banks from the consequences of their own actions. It therefore directly encourages the very behaviour-greater risk taking and the maintenance of weaker capital positions-that a sound banking regime should avoid. It also undermine the decipline of the market in another, less obvious way". The existence of a state sponsored deposit insurance was claimed to have comparable impacts to a LLR. Since depositors felt that their deposits were insured than there is no need to monitor bank management or bank performance. In this case, maintaining public confidence was no longer the central issue in the context of bank survival in the long run. The banks which maintained their capital ratio could even be forced to follow the others that reduced their capital level in order to reduce costs. Therefore, government regulation was obviously not necessary and counterproductive.

Kaufman (1991) argued that a central bank acting as lender of last resort is needed to support liquidity to prevent banks from selling their assets at substantial losses. Meanwhile, the existence of state sponsored deposit insurance was needed on the ground that the private insurance would not have enough capacity and credibility to insure all deposits, therefore, the government sponsored insurance would prevent any externalities.

Benston and Kaufman (1995) identified two main reasons why banking industries in most countries are still subject to regulation, namely to limit competition and to provide revenue and power for government officials. However, it is argued that the only economic justification for imposing regulation is to deal with reducing the impact of negative externalities from moral hazard and agency costs related to deposit insurance. More specifically, prudential regulation is needed to reduce the possible presence of bank failures.

The arguments which support the need for prudential regulation basically represent public concerns about the safety of the banking system. In this regard, prudential regulation is devoted to promoting bank soundness and preventing economic concentration (Gart 1994). Financial institutions and banking industries in particular are conducted on the basis of public trust since the main financial sources come from deposits mobilized from society[5]. With regard to building and maintaining public confidence in the banking system, such regulations are required as a guide for the banks to undertake sound banking practices.

Dow (1996) argued that prudential regulation is required mainly to ensure the banks maintain sufficient liquidity in their asset portfolios. Clearly, regulation would discipline the banks to adopt prudent portfolios. It is also needed on the basis that "*the moneyness which is necessary to the working of the monetary system is a public good*". In this regard, the banks should not be completely deregulated (free banking).

Cited by Khatkhate (1997), Sundararajan and Balino pointed out that in a deregulated system when entry barriers are relaxed, interest rates are freely determined and new instruments are encouraged to mobilize savings, there could be excessive risk taking. Under these circumstances, interest rate deregulation can boost the growth of some financial institutions and open the opportunity for unsuitable persons and institutions to engage in financial business.

Khatkhate (1997) also noted that financial deregulation could change the institutional structure toward concentration of power in banking, interlocking ownership

[5] It is reflected in the banks' liabilities which mostly consist of deposits (checking accounts, saving accounts and long term deposits).

and lending patterns. These conditions would increase market failures. Even though financial deregulation was designed to eliminate market distortions, however, it could not create perfect financial markets or a prefect credit market in particular. Therefore, it is argued that the existence of prudential rules will be even more urgently required when broader deregulation is going to be imposed. He summarized: *"Financial reform should be interpreted only as a withdrawal of government intervention for economic reasons; but it is essential for prevention of breach of prudential rules for protection of investors' interests. Thus, greater the degree of financial liberalization greater is the need for strengthening regulatory framework"* (pp. 1533).

Coggins (1998) cast doubt over the work of deregulation in enhancing soundness and stability of financial institutions. It is argued that the assumptions on which the success of deregulation policy relies, are only implicitly stated and do not mirror the real world. " *Most of these assumptions are implicit, within their reasoning, and are rarely explicitly stated. Nonetheless, the assumptions the deregulationists employ are discernible. At one level, the deregulationists' arguments that the market discipline generated by deregulation will promote financial system soundness and stability are very powerful and convincing. This persuasive power, however, only remains intact as long as the foundational assumptions remain unquestioned. When the assumptions are made explicit, the deregulationists' proposal lose credibility.* This view suggested that to promote a sound and stable financial system, the financial sector and the banking sector in particular, should be strictly regulated.

2.4 Concluding Remarks

The role of financial intermediaries in stimulating economic development has been widely discussed in the economic literature with mixed conclusions. Those who argued that financial development contributed to economic growth varied in identifying the channels of transmission by which financial intermediaries stimulated economic growth. Basically, there are two major channels of transmission in which financial intermediaries stimulate growth, namely through improving the quality of investment (Goldsmith 1969) and increasing the quantity of savings as well as investment (McKinnon 1973, and Shaw 1973).

The Keynesian and Neo-structuralist wisdom presumed that setting a low interest rate was required to promote investment. In accordance with those views, up to 1970' setting low interest rates below the market rate in order to stimulate investment and economic growth became a common practice in developing countries. McKinnon (1973) and Shaw (1973), argued that under repressed financial environments when interest rates were mostly set below market rates, mobilization of domestic saving through financial institutions was obviously discouraged. Since investment conducted by private sector in most developing countries was still subject to the presence of liquidity constraints, then setting artificial interest rates below the market rate is not justified. In this regard, interest rates which become the central issue of financial liberalization proposed by McKinnon and Shaw, should be allowed to be freely determined to find their market clearing levels. Meanwhile, in coping with problems arising from the presence of imperfect information in credit markets and banking moral hazard, McKinnon suggested the government

intervene on lending and deposit rates, which is regarded as modification of his previous position.

Although financial deregulation has been widely implemented particularly in developing countries, the theoretical approach to implementing that policy yet has not been unanimously agreed. The standard approach to financial deregulation introduced by McKinnon (1982,1992) emphasizes the need for macroeconomic stability as a necessary condition for liberalizing interest rates. Along with the presence of macroeconomic stability, financial deregulation should be imposed based on the state of the financial system when it originated (Khakhate 1997). Edward (1984) argued that even though ordering economic liberalization is considered to be a prudent policy but the credibility aspect is regarded more important since the latter directly involves public confidence and affects public expectations about whether the proposed policies are consistently implemented or reversed.

The issue regarding the need for prudential regulation is also debatable. The supporters of a free banking system presume that any regulation in the banking sector is not only unnecessary but also counterproductive. The arguments in favour of prudential regulation are based on the need to protect public interest and prevent bank failures associated with banking moral hazards and externalities.

CHAPTER 3

OVERVIEW OF BANKING DEREGULATION IN INDONESIA

3.1.Introduction

The theoretical grounds for conducting financial deregulation or banking deregulation in particular as presented in the previous chapter basically presumed that financial repression would discourage savings, constrain the supply of credit, limit investment levels, and hence economic growth. In this chapter, the implementation of banking deregulation in Indonesia will be overviewed.

The objectives of this chapter are to understand the features of banking deregulation in Indonesia which is essential for better analysis and more appropriate policy.

The organization of this chapter is as follows: section 2 highlights the background to deregulation policy, section 3 presents deregulation in foreign exchange/capital accounts, and section 4 presents the banking system in the banking sector. Section 5 describes banking deregulation and section 6 evaluates the strategy and sequence of banking deregulation. Section 7 analyzes the availability of prudential regulations, while section 8 contains some concluding remarks.

3.2. Background to the Banking Deregulation in Indonesia

Following its success in stabilizing both the political and economic scene, the new order government started to introduce policies to restore the confidence of foreign investors undertaking investment in Indonesia. In 1967, the new order regime issued a new foreign investment law which guaranteed investors against expropriation. However,

most foreign investments were in the mining sector including the oil and gas sector which contributed significantly to export revenue. Meanwhile, a wide area of the economy was still closed for foreign investors and reserved for government or domestic private enterprises. The windfall gains which resulted from the oil boom caused the government to introduce an inward looking strategy by imposing trade barriers to protect infant industries which produced import substituting goods. At the same time the government became more restrictive in approving foreign investment (Hill 1988). Nasution (1994) claimed that this strategy coincided with the rise of some conglomerates which enjoyed economic privileges such as monopoly, excessive protection, etc.

In response to declining oil and gas revenue which was regarded as the main source to engineer economic growth, the government started to promote policies which encouraged conducive investment for foreign investors. In 1983, a wider area of the economy was opened to foreign investors and this was accompanied by various incentives such as imposing tax holidays for certain investments, relaxing procedures for licensing, etc. As a follow up to the agreement reached in the Uruguay round and ratification of new GATT (General Agreement on Tariff and Trade) in 1994, the government issued further a deregulation package which covered reductions in import duties, restricted import trading schemes, bonded zones and export oriented production zones, credit for taxes on inputs, and facilities for investment expansion.

In line with promoting foreign investment to participate in developing the Indonesian economy, the government widely liberalized its capital accounts, long before the financial sector and banking sector in particular were deregulated. Both the capital account measures and banking deregulation are discussed below.

3.3. Foreign Exchange/Capital Account Deregulation

The orthodox view suggested that when a country adopts a broad set of deregulation measures, it requires appropriate sequencing in the implementation of those deregulation policies. In this regard, deregulation of the capital account or the financial sector should not be conducted in inflationary circumstances. Meanwhile, control over capital accounts could be removed if other regulations have been relaxed to enhance exports.

In the early 1960s, despite the economy experiencing high inflation rates, the government depreciated the domestic currency very slowly. This led to a substantial overvaluation of the rupiah against foreign currencies and increased excess demand for foreign currencies. The prevailing official exchange rate was much lower than that in black markets. Cited by Fane (1994) Arndt argued that the new order regime moved to liberalize the exchange control system from February 1966 by introducing new export revenue retention schemes known as export bonus schemes or BE[6]. In October 1966, the government set three exchange rates in the market (1) the official rate: Rp 10 per dollar in this case of the U.S. $ (2) the BE rate: Rp 120 per dollar and (3) Free market rates: Rp 135 per dollar. The last exchange rate was set for importing luxury goods.

In April 1970 the government issued policy No.16/1970 which removed most exchange controls. The exchange rates were unified and determined at a market price commencing in December 1970. In 1978, the government released the fixed exchange rate system and started imposing the new flexible exchange rates. The so called "managed

[6] Literally, BE stands for Bonus Ekspor

floating rate system " where the government determined exchange rates based on a basket of currencies.

In the capital account, however, the government still imposed ceilings on bank borrowing offshore. During the oil boom period, restrictions on capital inflows were designed as part of efforts to control the growth of the money supply. In April 1974, the government required the private sector to deposit 30% of foreign borrowings in non interest bearing deposits at the Central Bank. A new ceiling system for foreign borrowing was imposed in November 1991 which applied to state owned banks and other government entities.

3.4 Banking System in Indonesia

The banking system in Indonesia consists of a central bank and operational banks. The later were classified into commercial banks, development banks, saving banks and the secondary banks (rural banks).

Banking deregulation stimulated the operational banks to introduce banking products which virtually blurred distinctions among those types of banks (commercial, development or savings banks). However, the banking system and particularly operational banks was formally redefined when the government released the Bank Act no.7, 1992 to replace the Bank Act no.14, 1967. A brief description of the banking system in Indonesia is presented below.

3.4.1 Central Bank

The Central Bank of Indonesia is Bank Indonesia which was established under Act no.13, 1968. The main functions of the Central Bank are related to conducting bank supervisory, monetary policy and providing services for operational banks such as

clearing house, credit information etc. However, prior to banking deregulation (June 1983) the Central Bank not only operated as a central bank but also as operational bank as well which was reflected in extending direct credits to the private sector.

3.4.2 Operational Banks

Under the Bank Act no. 14, 1967, operational banks were categorized on the basis of their specific functions. Commercial banks were designed to provide short term financing for the private sector and the sources of funds were mainly in the form of demand deposits, time deposits and saving deposits. Development banks were appointed to provide mid term and long term financing where these types of bank were permitted to mobilize funds in the form of time and saving deposits. Demand deposits were restricted and only considered as complements to any services associated with extending credit for their customers. Saving banks were mainly directed to extend credit for the housing sector and they were allowed to mobilize funds in the form of saving deposits and issuing bonds. Meanwhile the secondary banks were only permitted to operate in restricted areas and designed to provide banking services for low income groups particularly in rural areas. The secondary banks were only permitted to mobilize funds in the form of saving and time deposits.

The banking system in Indonesia formally remained unchanged even when broader deregulation was imposed in 1988, in the sense that there was no new banking act to replace the existing banking act (the Bank Act no.14, 1967). However, in practice the banking system particularly the operational banks had changed significantly. The distinction between commercial banks, development banks and savings banks was blurred, since all types of banks were practically allowed to offer the same products to

obtain funds namely demand deposits (checking accounts), savings deposits (saving accounts) and time deposits (term deposits). With regard to credit extension, these types of banks were not rigidly bound to types of credits according to their respective types of bank. For instance commercial banks were not necessarily restricted to extending short term credits, and development banks were not fully associated with long term credits. Clearly, the allocation of assets or credits in particular was no longer strictly tied to the types of bank as described in the Bank Act no. 14, 1967.

The Indonesian banking system was formally changed when the government replaced the Banking Act no. 14, 1967 with the Banking Act no. 7, 1992. Under the Banking Act no. 7, 1992, the banking system was simplified particularly where operational banks were classified into only two categories namely commercial banks and secondary banks or rural banks.

3.5 Banking Deregulation

The role of government as a major participant in economic development process has been continuously decreasing since the substantial drop in oil prices in 1982 which reduced revenue from the oil and gas sector, which was at that time, the major source of government revenue. The government then started to encourage the participation of the private sector more intensively. In accordance with government policy to promote private investment, it wished to build a national banking system which would be able to provide banking services competitively.

This study will focus on two major banking deregulation packages, namely the 1 June 1983 deregulation package or Pakjun 83 and the 28 October 1988 deregulation

package or Pakto 88. In addition, the 29 January 1990 Package or Pakjan 90 which eliminated most of the subsidized credits for small borrowers is also analyzed.

3.5.1 Deregulation Package of 1 June 1983

Prior to the 1983 banking deregulation, the banks were subject to some limitations both in operational as well as institutional aspects. With regard to operational aspects, the Central Bank imposed interest rate controls on deposits and loans, as well as credit ceilings. Meanwhile, in line with the institutional aspects, a barrier was established for preventing new entrants into the banking industry.

Interest Rate Control

State owned banks exhibited interest rate control both in deposits and lending rates. In the period of stabilization (1968-72), deposit rates were set very high and above the prevailing inflation rates except in 1968 due to extremely high inflation rates which still reached 125% p.a. This policy had a significant effect on increasing the growth of fund mobilization through banking system which accelerated from negative growth in the early 1960's to approximately 23% on average p.a. in the period 1968 - 1972. During the oil boom period (1973-1982), the Central Bank set deposit rates at low levels and mostly less than the prevailing inflation rates. Lending rates in state owned banks were also set by the Central Bank at very low levels despite the economy experiencing relatively high inflation rates. It was mainly because credits were mostly financed by liquidity credits from the Central Bank. Empirically, the issue related to interest rates and banking aggregates will be discussed in more detail in the next chapter.

Credit Ceilings

As an instrument to control the money supply, domestic credit was strictly controlled by the monetary authority through imposing credit ceilings on each of the operational banks.[7] Although private banks were not subject to interest controls, their efforts to mobilize funds were also discouraged since the allocation of those funds was constrained by credit ceilings.

Entry Barriers

From the early 1970's the government did not allow the establishment of new banks. The existing banks were even encouraged to undertake mergers especially those which exhibited internal problems. Mergers and consolidations among operational banks were related to facilities provided by the Central Bank such as access to the higher levels of liquidity credits and upgrades in the bank's status, for instance from a non foreign exchange to a foreign exchange bank etc. The expansion of banking networks through the establishment of new bank offices were strictly limited. Meanwhile, the existing foreign banks and joint venture banks were only permitted to have one branch office and limited to operating in Jakarta.

The first phase of banking deregulation in Indonesia was revealed on 1 June 1983, known as *Pakjun 83*. This deregulation package mainly contained two major forms. First, the abolition of interest rate controls on deposits and lending rates.[8] Second, the removal of credit ceilings. At the same time Bank Indonesia gradually

[7] The secondary banks were not subject to credit ceilings since their share of domestic credit was considered insignificant.

[8] Prior to 1983, interest rate control was only imposed on state owned banks, however private banks were subject to credit ceilings.

reduced its direct credits to the private sector and eliminated liquidity credits as a major source of financing of commercial banks in extending credits. The Central Bank only provided liquidity credits to finance certain schemes of credit which were still classified as "high priority credits". In other words, the operational banks might expand their credit without limit provided those credits were financed with their own funds.[9] However, Pakjun 83 still did not give much room for operational banks particularly with regard to mobilization of savings, since product innovation such as creating or modifying savings accounts was still not allowed. Pakjun 83 neither removed the entry barriers for establishment of new banks nor relaxed the requirements to enable existing banks to widen their branch office network. Briefly, the first banking deregulation was limited to removing interest rates as well as credit ceilings, and more focused on efforts to enhance saving mobilization through the banking system. In this regard, Pakjun 83 didn't lay the ground for the implementation of prudential regulation in the deregulated environment.

The basic idea behind the first banking deregulation (Pakjun 83) was to make market mechanism work efficiently in determining the price and the volume of banking services. State owned banks were directed to be able to compete efficiently with other private banks, particularly in mobilizing funds. Unless credits were still classified as high priority credits, all banks were required to finance their credit expansion by using their own funds. It implies that Pakjun 83 formally had reduced dualism in treating the operational banks, where previously state owned banks enjoyed some privileges and were treated simply just as the extension of the bureaucratic policy (Nasution, 1991).

---

[9] The major source of banking funds is deposits mobilized form society.

3.5.2 Deregulation Package of 28 October 1988 (Pakto 88).

In 1988, the government issued a broader set of financial reform measures which were not limited to operational aspects of the banking system, but also dealt with institutional aspects.

With regard to banking operations, the efforts towards promoting competitiveness and efficiency of the banking system as well as establishing more equal treatment particularly between state owned banks and private banks were strengthened. Government entities were allowed to deal with private banks i.e. they were permitted to put up to 50% of their deposits in non state owned banks. Meanwhile, reserve requirements were reduced substantially from 15% to 2%. Pakto 88 also encouraged the banks to create banking products which were supposed to be appropriate to customer preferences and tastes. Prior to Pakto 88, although the banks were no longer subject to interest rate controls which were lifted by the first banking deregulation in 1983 (Pakjun 83), but they still could not promote their own banking products particularly saving accounts. Instead, the banks had to adopt saving accounts introduced by the Central Bank so called "Tabanas and Taska"[10]. In this regard, Pakto 88 provided wider room for improvising banking products especially saving accounts by allowing the banks to design their own specific saving accounts including the ability to determine the requirements to be applied to that particular account such as setting interest rates and conditions for withdrawals both in terms of amounts and frequency.

[10] Literally, Tabanas stands for Tabungan Nasional, and Taska is Tabungan Asuransi Berjangka.

In the institutional aspects, Pakto 88 allowed new entrants into banking industries, and relaxed the requirements for establishing new branches as well as improving bank status.

The removal of entry barriers

Pakto 88 also removed barriers to entry and started to reopen the opportunity for establishing new banks which had been closed since 1970s. The establishment of new banks was permitted either in the form of national private banks or joint-venture banks with minimum capital required of 10 billions and 50 billion rupiahs respectively. The establishment of new secondary banks or rural banks was only allowed in areas outside the main cities and municipalities. The minimum capital required for establishing a new rural bank amounted to 50 million rupiahs. Secondary banks are designed to provide banking services for people in rural areas which mostly remain untouched by the other types of banks.

Relaxing the Requirements for Opening new Branch Offices as well as Improving Bank Status

Under the regulated banking system, the establishment of new bank offices or upgrading banks' status were not directly linked to the soundness of the bank. Instead, it was associated with the number of mergers or consolidations undertaken by the banks. Under the deregulated banking environment, on the other hand, the requirements for establishing new branch offices were significantly relaxed and only related directly to the soundness of the bank. To open branch offices which have status lower than main branch offices or full branch offices such as: sub branch offices, payment points, etc., the banks were not even required to get approval from the government and just simply need to

report to the Central Bank. Meanwhile, the existing foreign banks which previously were only permitted to have a single office in Jakarta, they allowed under Pakto 88 to open new branches in seven major cities, Bandung, Semarang, Surabaya, Denpasar, Ujung Pandang, Medan and Batam. Meanwhile, the secondary banks which were already established prior to Pakto 88 and located in the main cities they were not allowed to open new branches in the same area.

Pakto 88 also stimulated the banks to upgrade their bank's status for instance from a non foreign exchange bank to a foreign exchange bank, from sub branch office to a main or full branch office, from a secondary bank to a commercial bank, etc. The requirements to increase bank status are just related to minimum required capital, total assets and the soundness of the bank. Prior to Pakto 88, the requirements for extending banking networks (opening new branches) and improving bank status were not directly associated with soundness of those particular banks such as mergers with other banks etc.

3.5.3 The 29 January 1990 Package (Pakjan 90)

The Central Bank further reduced the subsidized credit schemes which provided credits for small borrowers. Instead, all domestic banks were required to extend credit to small borrowers to a minimum 20% of their credit portfolio. Foreign and joint-venture banks on the other hand, were required to extend credit to minimum 50% of their loan portfolio to support export oriented activities or to extend credits for small borrowers to a minimum 20% of their loan portfolio. Liquidity credits from Bank Indonesia were only provided to support activities towards maintaining self sufficiency on rice, promoting cooperatives, and stimulating investment in the eastern area of Indonesia. The spirit of

Pakjan 90 was to guarantee the availability of credit for small borrowers at the prevailing market lending rate, rather than to provide subsidized credits with limited supply which normally forced the banks to impose credit rationing. This system improved the capability of small borrowers to access credit financing from the banking system (Goultom 1995).

The operational banks have three options in extending credit for small borrowers. Firstly, the operational banks may extend credits directly to small borrowers. Secondly, they extend indirectly through secondary banks. Thirdly, instead of extending credit directly to small borrowers, the operational banks have another option by purchasing marketable securities issued by other banks which have already extended credits for small borrowers to more than 20% of their loan portfolio.

3.6 The Strategy and the Sequencing of Banking Deregulation in Indonesia

The implementation of banking deregulation in Indonesia could be regarded as adopting a gradual strategy, in the sense that the abolition of operational and institutional restrictions was not undertaken simultaneously. The first banking deregulation in 1983 was limited to removing interest rate controls, credit ceilings, and phasing out liquidity credits. The deregulation which removed the barriers to entry as well as relaxed the requirements for opening new branches was introduced in 1988.

However, compared to some Asian countries, the implementation of banking deregulation in Indonesia is considered to be fairly rapid. South Korea, for instance, started liberalizing its financial sector by deregulating interest rates on commercial papers in June 1981 and one year later (June 1982) new corporate debentures were allowed to fluctuate 100 basis points. Following the removal of controls over the upper limit of call rates in 1984, decontrolling yields on convertible bonds and debentures with bank

payment guarantees in 1985, and liberalizing interest rates on certificates of deposits in 1986, ultimately lending rates were liberalized in 1988. With regard to the institutional aspects, in 1981 the Korean government started to privatize the nationwide commercial banks and to charter joint-venture commercial banks with Korean and foreign partners to promote competition in the banking sector and to establish linkages with international financial markets. In 1986, requirements for opening new branches were relaxed.

Meanwhile, the liberalization of interest rates in Taiwan has a similar pattern to the implementation in South Korea. In 1976, Taiwan started to liberalize interest rates by relaxing its control over interest in money markets. Following the implementation of the Bank Act 1989, the banks were allowed to set their own deposits as well as lending rates. In line with institutional aspects, since 1984 the existing banks are allowed to set up three full-service branches and three limited-service agencies per year, compared only two for each types of bank office before. Meanwhile, the Bank Act 1989 allows the establishment of new private banks.

In term of sequencing, the conventional approach suggests deregulation in the financial sector should be imposed after distortions in the real sector were removed. With regard to the deregulation of the financial sector and the banking sector in particular, it is suggested that financial deregulation should precede the policy designed to promote international financial integration. It implies that capital accounts should be liberalized only after distortions in domestic financial markets were removed. Indonesia, in contrast, imposed banking deregulation after capital accounts were widely liberalized, as mentioned before, that Indonesia had started to liberalize its capital account in the 1970's. The Indonesian experience was not similar to South Korea, where capital

accounts were not liberalized until 1991. It suggests that financial deregulation preceded capital account deregulation. Meanwhile, Taiwan phased out most of its controls over foreign exchange in 1987 when the financial sector was about to be completely liberalized.

Grenville (1994) argued that in practice, the issue of sequencing deregulation policies is less essential, and the most essential thing is to balance deregulation with adequate prudential regulation. The latter is urgently needed to ensure that the banks keep undertaking sound banking practices, with regulation designed to set the rules of the game and not deal with the run of the play. In the case of Indonesia, the need for adequate prudential deregulation for balancing the widely deregulated banking system is important, but it is more important to ensure that prudential regulation is strictly and consistently implemented. This issue will be discussed further in the next section.

3.7 Prudential Regulation

As mentioned earlier, the implementation of deregulation policy, particularly in the banking sector, should be accompanied by the existence of adequate prudential regulation to ensure the banks undertake sound banking practices. In spite of the Indonesian banking system being widely deregulated both in the operational aspects as well as the institutional ones, prudential regulation was not intensively introduced. More specifically, when the banking system was already widely deregulated in October 1988, prudential regulation such as setting a minimum CAR requirement, legal lending limits, etc. which was needed to strengthen the soundness and the competitiveness of the existing banks (the banks established prior to banking deregulation) was not well developed for banks entering the deregulated environment. In general, there is something

in common between the implementation of banking deregulation and prudential regulation. The former was introduced as a response of the substantial decrease in the oil price, while the latter was imposed as a response to difficulties faced by the banks.

Capital Adequacy Ratio (CAR)

The capital adequacy ratio represents the proportion of the amount of capital to total assets which is designed to cover any potential loses suffered by the banks. The first banking deregulation in 1983 did not introduce prudential regulation for the existing banks, including imposing a minimum CAR in particular. The minimum CAR was still not applied to the existing banks[11] when the second banking deregulation was introduced. The October 1988 package which allowed new entrants into the banking industry, was only concerned with setting the minimum amount of capital required for establishing a new bank, and did not impose the minimum CAR applied for the existing banks (the banks established prior to October 1988).

To promote the soundness of the banks as well as to minimize the various risks assumed by the banks, the Central Bank introduced a minimum standard of capital requirements in 1989. Further prudential regulation was issued in February 1991 which consisted mainly of three aspects. First, the banks are required to strengthen their capital base in accordance with the requirements set by the Bank for International Settlement (BIS). The banks are required to keep the capital adequacy ratio (CAR) at minimum 8%

[11] The banks which have already been established prior to banking deregulation 1983.

which is calculated based on risk-weighted assets of the bank. Second, the banks are also required to keep reserves to cover any potential losses resulting from non performing loans. The amount of these reserves depends upon the classification of loan collectibility

Legal Lending Limits (LLL)

The legal lending limit (LLL) is defined as the maximum credit allowed to be extended to an individual borrower or an individual group was introduced for the first time in 1988 when the second banking deregulation was unveiled. Similar to CAR, the implementation of LLL was practically subject to some adjustments, particularly with regard to the legal limit requirements and setting the time table for adjustment processes for loans which previously exceeded the maximum amount allowed by the LLL. Since being introduced in 1988, the LLL has been adjusted through the subsequent policies unveiled on March 1989, January 1990, and May 1993.

With regard to the implementation of prudential regulation, the adjustments were taken to enable the banks to meet the prudential requirements. "The improved compliance with the CAR was facilitated by the relaxation of regulations .....". In another aspect, it was reported: " In relation to the fulfillment of KUK[12] ratio, it was stated .....The success was partly due to the relaxation of the regulation relating to small scale enterprise lending ....." (Bank Indonesia, Report for the Financial Year 1993/94 pp. 71-73). Clearly, to some extent the implementation of that prudential requirements were relaxed rather than strictly imposed.

[12] Literally, KUK stands for Kredit Usaha Kecil or credits extended to small borrowers.

Banking Supervision

As noted by Villanueva and Mirakhor (1990) Indonesia started to impose banking reform when it did not have adequate bank supervision. Prudential banking supervision is more related to institutions with the main objective to protect bank solvency and viability. Bank Indonesia which is appointed to conduct day to day monitoring and supervising the banks is still subject to some weaknesses particularly due to inadequate bank supervisors. It is argued that the Central Bank had not been successful in forcing the banks to obey prudential regulations such as legal lending limits, net open position, etc. Subsequent bank failures such as Bank Duta (1990), Bank Summa (1992) and Bapindo (1994), were associated with the excessive risk due to violation of those prudential regulations (Nasution 1994).

To anticipate rapid growth of the number of banks and branch offices , and to overcome shortcomings in banking supervision, Hendrobudiyanto (1994) stated that the Central Bank systematically improved some of the measures. First, the Central Bank conducted organizational restructuring which is designed to put more resources to support the achievement of its *core functions*, especially in promoting bank solvency and viability. Human resources are being continuously developed along with organizational changes to provide more qualified bank examiners and bank supervisors. Second, Electronic Data Processing (EDP) auditing was designed to equip bank supervisors to deal with sophisticated EDP which is intensively adopted by operational banks. Third, it is also developed *early warning systems* on a monthly basis. The system consisted mainly of 45 financial ratios which can be analyzed intensively to detect current problems faced by the banks. Fourth, the Central Bank continuously enhanced provision of more

transparent credit information to avoid the violation of prudential regulation especially regarding monitoring maximum credit limits for individual firms, groups and insider borrowers, the so called legal lending limits. Fifth, it developed accounting standards which supported improved legal, accounting and disclosure standards. The Central Bank and The Indonesian Accountant Association have developed special standards for application of bank accounting known as SKAPI. The implementation of SKAPI will reduce the disputes in dealing with accounting treatment between the operational banks and the supervisors.

3.8 Concluding Remarks

This chapter is devoted to providing better understanding of banking deregulation in Indonesia along with prudential regulation which is considered to be an important element for promoting a sound and efficient banking system.

Banking deregulation in Indonesia was basically undertaken as a response to the substantial decrease in oil price and significantly reduced the oil and gas exports which were the most an important financial sources for supporting the achievement of economic growth targets. More specifically, banking deregulation was initially directed to enhance domestic savings mobilization through financial institutions particularly the banking system to compensate for decreasing financial sources from the oil and gas sector. In this regard, banking deregulation has provided many measures for promoting savings, ranging from allowing the banks to determine their own interest rates, introducing product innovations, granting licenses for establishment of new banks as well as relaxing the requirements for opening new branches and upgrading a bank's status.

Despite the considerable deregulated banking system, however, prudential regulation was not intensively imposed until the introduction of the February 1991 policy package or Pakfeb 91. The introduction of prudential regulation was mostly in response to specific problems experienced by the banks. Apart from the existing prudential regulations which were adjusted frequently, the Central Bank seemed not to have enough power to force the banks to comply with those prudential regulations. Briefly, the banking system in Indonesia was characterized by the existence of a broader deregulated environment particularly in terms of establishing new banks, however, the implementation of deregulation policy was neither supported by adequate bank supervisors nor equipped with adequate prudential regulations.

The efforts to promote sound and efficient banks and to enhance savings in particular largely depend on the ability to maintain public confidence. In this regard, prudential regulation should be designed solely for the sake of preserving the soundness of the banking sector. Any adjustments regarding the existing prudential regulation if urgently required, should be based upon the same spirit, in the sense that the adjustments are purely devoted to searching a better measure for facilitating bank soundness, and should not be directed to facilitate the banks to meet the prudential requirements which might result in misleading information.

Empirically, the impact of banking deregulation on banking and monetary aggregates will be discussed in the following chapter.

CHAPTER 4

BANKING AND MONETARY AGGREGATES IN INDONESIA

4.1 Introduction

The main purpose of this chapter is to analyze the behaviour of the major banking and monetary aggregates in Indonesia particularly in response to banking deregulation. This will allows us to better understand the impact of changes in the banking sector and derive more appropriate policy recommendations.

The rest of this chapter is organized as follows. Section 2 presents the behaviour of major banking aggregates, section 3 analyzes the impact of banking deregulation on monetary aggregates. Section 4 contains some concluding remarks.

4.2 Banking Aggregates

The major banking and monetary aggregates presented here are selected to provide better understanding regarding the evaluation of the reliability of those aggregates as a guide of monetary policy.

4.2.1 Interest Rates

As mentioned in the previous chapter, prior to 1983 state banks were subject to interest rate controls, both on deposit rates and lending rates.[13] In the early period of the stabilization policy (1966 - 1968), the Central Bank set deposit rates very high in terms of nominal rates to encourage fund mobilization through the banking system. However,

[13] Loans which all or part of financing supported by liquidity credits provided by the Central Bank.

the prevailing inflation rates were even higher which resulted in negative real interest rates. In the period 1969 to 1971, the remarkable success in controlling inflation led to positive real deposit rates despite the decrease in deposit rates set by the Central Bank. Inflation rates were successfully pushed down from 85% in 1968 to 10 %, 9% and 2 % in 1969, 1970 and 1971 respectively. However, in 1972 the economy experienced internal and external problems which accelerated the inflation rates. Internally, the drought in 1972 caused large shortages in the supply of rice which is still considered to be the main staple of the Indonesian diet. The shortage of rice led to increased inflation rates which reached 26 % in 1972 when the price of rice rose more than 80 %. Externally, inflation rates in 1972-74 were boosted through world-wide inflation which started in 1972. Despite the substantial increase in inflation rates from 2% in 1971 to 33 % in 1974, the Central Bank did not intend to increase nominal deposit rates. In the same period, the Central Bank reduced nominal deposit rates consistently from 18 % to 12 % in 1972 and 9 % in 1974,[14] which resulted in negative real deposit rates. The Central Bank still maintained a low level for deposit rates until the first banking deregulation policy emerged in 1 June 1983, which abolished any direct control on interest rates and started to give more room for market mechanisms in determining interest rates. Consequently, nominal deposit rates in state banks increased significantly and were close to deposit rates in private banks and foreign banks. Since one of the spirits of the first deregulation policy is to promote banking competitiveness and efficiency in mobilizing public funds, then it is sensible that deposit rates offered by individual banks would be closer to each other.

[14] Nominal interest rate of 3 month time deposit on state banks.

Table 4.1 Time Deposit Interest Rates

(Percent per Annum)

Effective as from	1 months	3 Months	6 Months	12 Months
April 1, 1964	--	--	6	24
April 16, 1967	--	36	--	--
July 1, 1967	--	24	--	--
Oct 1, 1968	18	48	60	72
March 17, 1969	18	36	48	60
May 1 , 1969	12	24	36	48
July 10, 1969	12	18	30	36
Sept 15, 1969	12	18	24	30
Jan 1, 1970	12	18	21	24
May 31, 1972	9	12	15	18
April 12, 1973	6	9	12	15
April 9, 1974	6	9	12	18
Des 28, 1974	6	9	12	15
Jan 13, 1977	3	6	9	12
Jan 1, 1978	b)	b)	6	9
May 1, 1983	b)	b)	b)	9
June 1, 1983	r)	r)	r)	r)

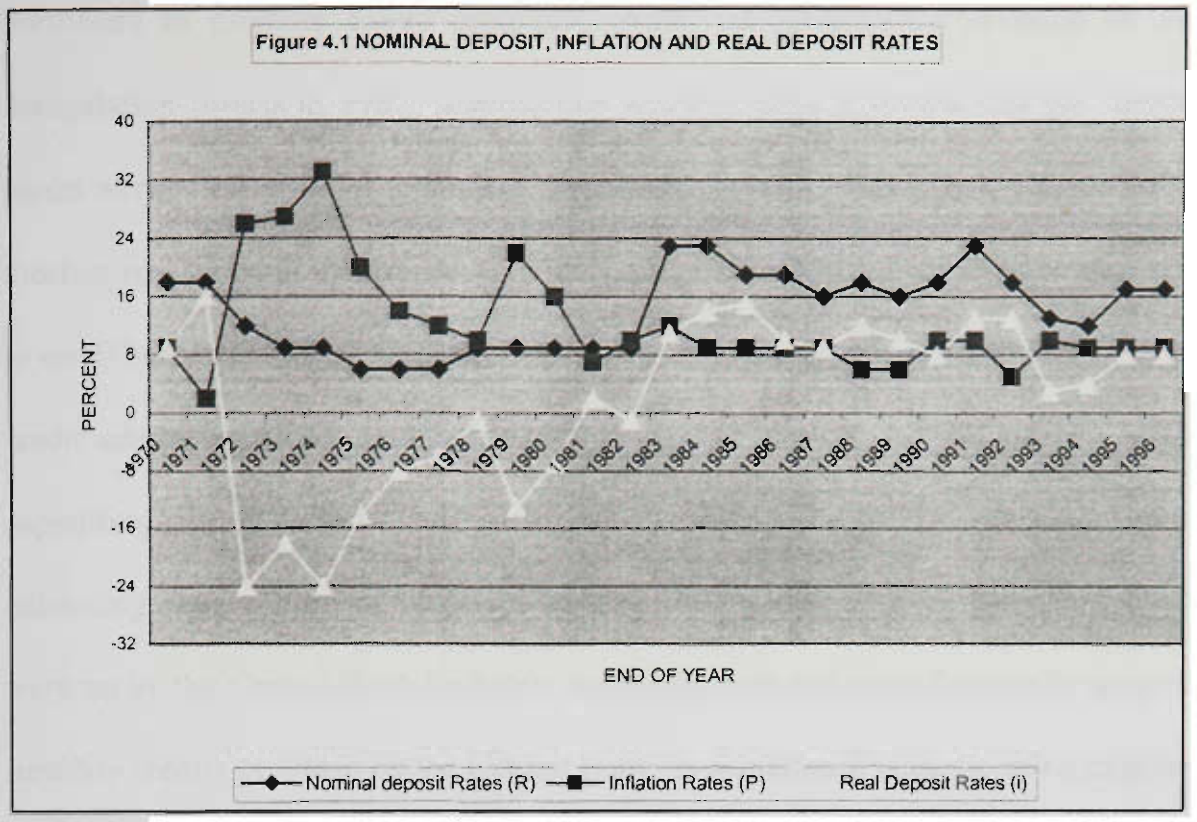
Note: b) : Left to the handling of banks discretion
r) : Interest rate controls were removed.

Source: Bank Indonesia, Weekly Report and Monthly Reports, various issues.

Table 4.1 (Contd) Time Deposit Interest Rates
(Percent per Annum)

Periods	Maturities				
	1 Month	3 Months	6 Months	12 Months	24 Months
1983	21.23	23.17	25.86	26.19	24.12
1984	20.88	23.08	24.18	24.89	23.72
1985	19.11	22.14	24.42	24.23	23.22
1986	19.09	21.84	23.35	23.52	22.45
1987	16.17	17.54	18.42	17.50	17.64
1988	18.37	17.75	18.99	18.49	16.99
1989	16.03	17.06	17.70	18.58	18.82
1990	18.23	17.61	17.32	17.75	18.30
1991	22.66	23.40	23.38	21.18	19.90
1992	18.31	19.51	20.18	21.13	20.55
1993	13.37	14.53	15.06	16.25	18.27
1994	12.42	12.64	12.39	12.99	15.03
1995	16.88	17.15	16.95	16.28	15.45
1996	17.03	17.20	16.90	16.52	15.63

Note : Excluding certificate of deposits
Source : Bank Indonesia, Monthly Reports, various issues.



It is worth noting that since the removal of deposit rate controls, positive real deposit rates were generated mainly due to the continuing success in controlling inflation rates (Figure 4.1).

Prior to banking deregulation, lending rates were complexly determined based on classification of credits, economic sectors, borrowers, etc. In the early periods of the stabilization policy (1966 - 1969), the Central Bank set low interest rates on investment credits to enhance production and investment which were previously nearly stagnant due to hyperinflation and political instability. In the early two periods of the implementation of the five year development plans introduced in 1969, the economy had been expected to accumulate substantial growth boosted mainly by oil booms. It inspired the government to impose more intensively policies which stimulated the achievement of equity programs. In 1978 the Central Bank introduced schemes of credit designed for small

borrowers to promote equity programs. When the government revealed its banking deregulation policy in 1983, interest rate controls were removed and the commercial banks were allowed to set interest on deposits and credits freely based upon the market mechanism to obtain market-clearing levels. However, lending rates on credits extended to small borrowers were exempted from that policy, along with maintaining some priority credit schemes such as: credits designed to support non oil and gas exports, credits for supporting efforts to reach and maintain self sufficiency in rice products, credits for enhancing development of cooperatives, etc. The interest rates for those priority credits were set by the Central Bank far below the market rate and were financially supported by liquidity credits provided by the Central Bank. In accordance with the spirit of promoting further banking deregulation as well as enhancing the soundness and efficiency of the banking system, in 1988 the subsidy for interest rates over priority credits was abolished including credit schemes for small borrowers and the banks were allowed to determine interest rates on their own discretion based on the market. Lending rates post banking deregulation are reported in Table 4.2 below.

Table 4.2 Bank Lending Rates
(Percent per Annum)

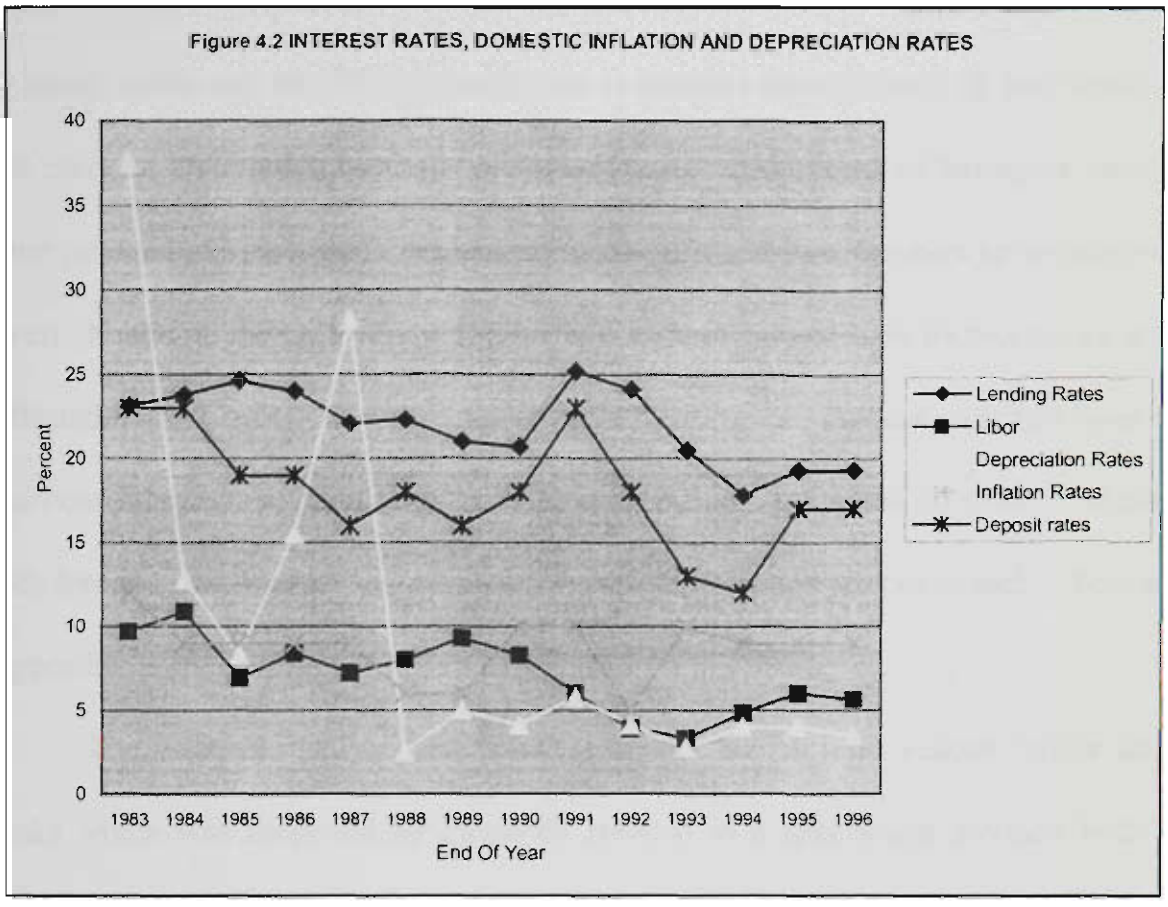
End of Period	State Bank		Private Bank		Regional Bank		Foreign Bank		Total	
	W	**I**	**W**	**I**	**W**	**I**	**W**	**I**	**W**	**I**
1983	17.7	18.0	25.1	26.3	21.7	17.6	22.2	25.5	23.1	20.6
1984	18.2	19.6	24.4	18.6	23.1	19.4	21.3	24.1	23.8	21.1
1985	19.9	18.4	26.2	21.3	23.8	20.0	26.4	27.2	24.6	22.3
1986	18.5	17.8	23.0	24.9	25.6	23.8	22.8	20.5	24.0	22.1
1987	20.0	18.7	23.6	23.7	22.9	20.1	22.9	22.8	22.1	19.0
1988	20.2	19.6	23.8	20.8	22.6	19.8	23.3	23.6	22.3	19.7
1989	19.7	19.4	21.7	17.0	22.2	18.5	19.5	22.3	21.0	19.3
1990	19.3	19.1	21.7	18.3	22.6	18.7	20.2	19.4	20.7	19.0
1991	23.3	21.1	23.8	19.7	27.1	21.1	24.8	23.1	25.2	20.9
1992	22.2	18.8	23.7	19.0	26.0	21.5	22.0	22.4	24.1	19.2
1993	19.4	16.3	23.6	18.8	21.7	20.5	16.7	20.4	20.5	17.1
1994	16.8	14.3	21.6	17.1	18.5	18.1	15.1	18.2	17.8	15.0
1995	17.2	14.8	20.8	15.9	20.4	20.1	18.2	19.1	19.3	16.1
1996	17.3	14.5	20.8	15.9	20.5	20.2	18.0	19.2	19.3	16.3

Note : W : Working Capital
I : Investment

Source: Bank Indonesia, Monthly Reports, various issues.

Although Indonesia liberalized the foreign exchange system in the 1970's, the domestic financial market has not been fully integrated into international financial markets. Nasution (1991) argued that such low integration between domestic and international financial markets was mainly due to limited information related to business opportunities in Indonesia and the presence of some constraints on commercial banks trying to access the global financial market.[15] Figure 4.2 shows that variations of international interest rates and exchange rates are not strongly correlated with domestic rates for both lending and deposits as well as the inflation rate.

[15] Commercial banks are subject to some constraints i.e. maximum foreign exchange loans from international market



4.2.2 Banking Institutions

In August 1970, the government issued a new policy to prevent new entrants for rural banks known as bank perkreditan rakyat or BPR. In 1973 the same policy was implemented for private banks. The government consistently encouraged existing banks to undertake mergers or consolidation where that merger was related to banks utilizing some facilities provided by the government such as in upgrading the bank status from a non foreign exchange bank to be a foreign exchange bank, etc. In 1973 there were 167 banks operating in Indonesia which consisted of 7 state owned banks, 26 regional development banks, 11 foreign/ joint venture banks and the rest were private national banks. In 1987, that number had fallen substantially to 112 banks, where the number of state and foreign/joint venture banks remained unchanged, the regional development

banks rose by one bank and the national private banks dropped from 123 banks in 1973 to 67 banks at the end of 1987 mostly due to mergers among them. It was worth noting that mergers undertaken by the banks were mostly in the form of buying or taking over other private bank licenses. This had driven the price of bank licenses up to unreasonable levels (Nasution 1991). Prior to 1988, the dominant role of state owned banks was also reflected in their networks where those seven state banks operated with 830 bank offices and contributed more than 50% of total bank offices at the end of 1987.[16] Meanwhile, each foreign/joint venture bank was only permitted to establish one branch office and one supporting branch which operated in Jakarta.

The establishment of new private national banks, joint venture banks and rural banks which was reopened by Pakto 88 resulted in a spectacular increase both in the number of banks as well as the number of bank offices. In 1989 or just about one year after the new entrants were permitted, the government granted licenses for the establishment of 37 new banks which consisted of 25 new private national banks and 12 joint venture banks. In 1996, the number of private national banks rose more than 300% compared with the position before Pakto 88 (67 banks). Joint venture banking which consisted of only one bank before Pakto (Bank Perdania), grew very rapidly and reached 42 banks in 1996. At the same period, the establishment of new rural banks known as post Pakto BPR or BPR Gaya Baru reached more than 1200 rural banks (BPR). Since the new licenses were only granted for establishment of new private national banks, joint venture banks and rural banks, then the number of state owned banks, regional

[16] Excluding special BRI Unit Desa which part of BRI special branch designed to facilitate banking servives in rural areas. In 1987 there were 1245 BRI Unit Desa and that number rose to 1432 in 1996.

development banks owned by local governments and foreign banks remained unchanged (see Table 4.3).

The increase in the number of banks was also accompanied by the expansion of the banking network which was reflected by a substantial increase in the number of bank offices. Under Pakto 88, the requirements for conducting bank office expansion as well as upgrading bank office status were simplified and only related directly to the soundness of the bank. State owned bank offices grew less rapidly than other groups of banks particularly private national banks, because the previous expansion of their banking networks were mostly related to their function in channeling government credit programs.[17] The deregulation policy along with the gradual reduction of subsidized credit programs forced state banks to adjust their network expansion based upon their capability to capture market opportunities. However, state owned banks might have had some constraints on them to accommodate the spirit of deregulation policy since their management still behaved as government bureaucrats and were not independent from government intervention.[18] Up to 1996, the state bank networks consisted of 1,312 bank offices and rose 55% compared to the position before Pakto 88 (830 bank offices). In the same period, the other groups of banks[19] grew by 3,256 reaching a total of 4,048 bank offices at the end of 1996, comprising 465 regional bank offices, 3,495 private national bank offices and 88 foreign/joint venture bank offices (see Table 4.3). Among those groups of banks, private national banks have been more active in expanding their

[17] See Nasution (1991).
[18] See Nasution (1991)
[19] Including regional development banks where the function is mainly as the cashier of their coresponding local governments (see Nasution 1991).

networks which rose by 2,957 bank offices or 550% reaching 3,495 bank offices at the end of 1996. The private national banks have also upgraded their bank status. Prior to Pakto 88, only 10 private national banks constituting 14% of total private national banks had licenses to operate as foreign exchange banks, [20] but by the end of 1996 more than 60% out of 167 existing private national banks had been granted licenses to upgrade their status as foreign exchange banks. Regional development banks and foreign/ joint venture bank offices grew by 232 bank offices and 67 bank offices respectively reaching a total of 465 bank offices and 88 bank offices respectively at the end of 1996. The expansion of regional development bank networks was mostly constrained by their nature where each of them just operates within the area of their own local government territory. Meanwhile, the expansion of foreign/joint venture bank networks are limited to seven main cities other than Jakarta, comprising Surabaya, Bandung, Semarang, Denpasar, Ujung Pandang, Medan and Batam.[21]

[20] Prior to Pakto 88, upgrading bank status to be a foreign exchange bank was related to bank ownership which was at least 50% of the shares owned by indigenous people known as pribumi, number of mergers and number of branches which at least located in 4 provinces and among those two branches were located in provinces outside Java (Bank Indonesia circular letter 29 April 1974).

[21] Before Pakto 88, Foreign/ joint venture banks were only allowed to operate in Jakarta, and the number of bank offices were limited to two branches, comprising one main branch and supporting branch.

Table 4.3 Number of Commercial Banks and Bank Offices in Indonesia

Year	State Bank		Regional Bank		Private Bank		Foreign Bank		Total	
End Of Period	**B**	**O**	**B**	**O**	**B**	**O**	**B**	**O**	**B**	**O**
1966	7	623	23	23	131	180	--	--	161	826
1967	7	657	23	23	133	296	--	--	165	976
1968	7	635	23	51	134	312	8	11	172	1,009
1969	7	635	23	51	134	312	8	11	172	1,009
1970	7	635	23	62	123	295	8	11	161	1,003
1971	7	632	26	80	129	290	11	15	173	1,017
1972	7	633	26	89	127	287	11	17	171	1,026
1973	7	635	26	94	123	284	11	20	167	1,033
1974	7	635	26	105	118	280	11	20	162	1,040
1975	7	632	26	112	105	267	11	21	149	1,032
1976	7	689	26	123	99	265	11	21	143	1,098
1977	7	697	26	130	93	269	11	21	137	1,117
1978	7	703	26	140	89	277	11	20	133	1,140
1979	7	707	26	144	83	279	11	20	127	1,150
1980	7	708	26	150	79	288	11	20	123	1,166
1981	7	728	26	158	78	297	11	20	122	1,203
1982	7	743	26	174	74	300	11	20	118	1,237
1983	7	759	26	192	71	324	11	20	115	1,295
1984	7	778	27	205	71	351	11	21	116	1,355
1985	7	795	27	219	69	480	11	21	114	1,515
1986	7	810	27	227	67	463	11	21	112	1,521
1987	7	830	27	233	67	538	11	21	112	1,622

Source : Bank Indonesia, Monthly Reports and Annual Reports, various issues.

Table 4.3 (Contd) Number of Commercial Banks and Bank Offices in Indonesia

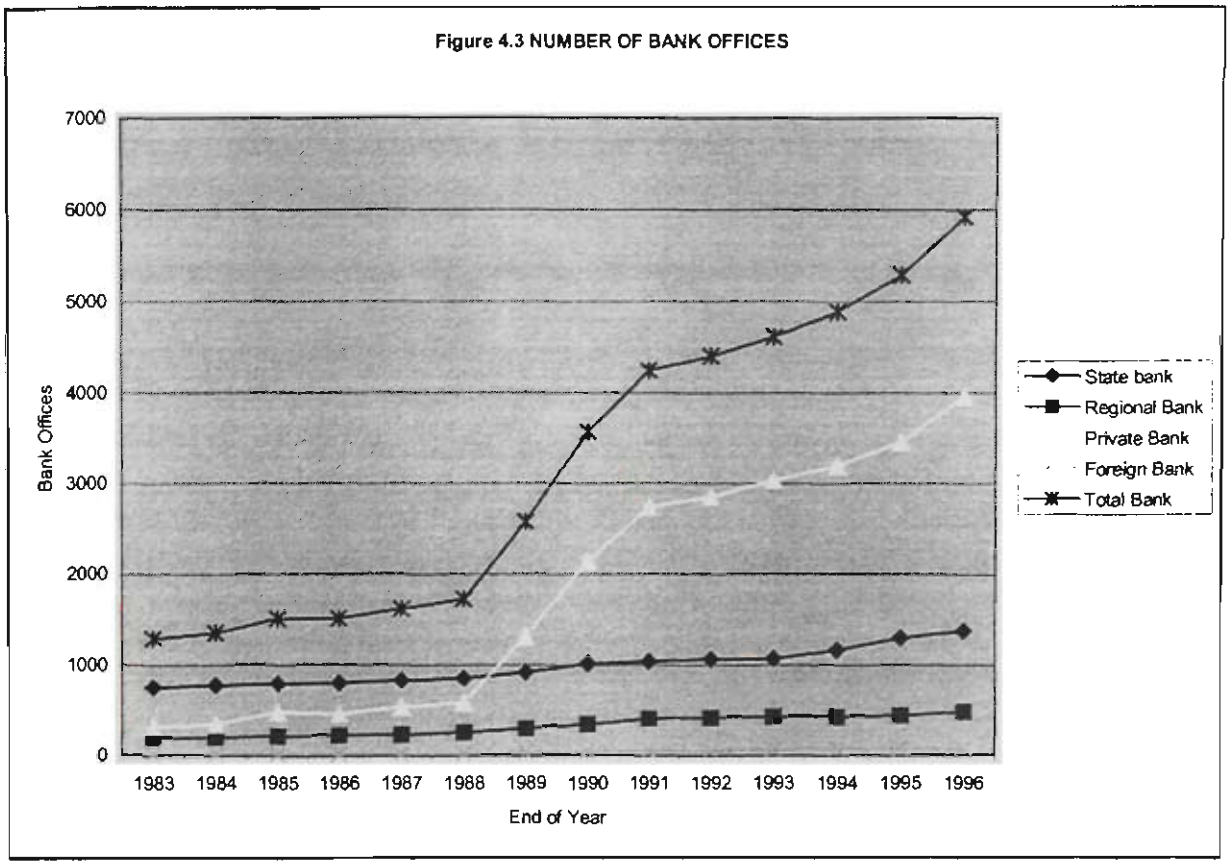
Year	State Bank		Regional Bank		Private Bank		Foreign Bank		Total	
	B	O	B	O	B	O	B	O	B	O
1988	7	856	27	262	66	593	11	21	111	1,732
1989	7	922	27	304	91	1,314	23	38	148	2,578
1990	7	1,018	27	352	109	2,145	28	48	171	3,563
1991	7	1,044	27	408	129	2,742	29	53	192	4,247
1992	7	1,066	27	425	144	2,855	30	56	208	4,402
1993	7	1,076	27	426	161	3,036	39	75	234	4,613
1994	7	1,171	27	431	166	3,203	40	83	240	4,888
1995	7	1,274	27	444	166	3,389	40	84	240	5,191
1996	7	1,312	27	465	168	3,495	42	88	244	5,360

Note: B : Number of bank

O : Number of Offices

Excluding BRI Unit and Rural banks

Source : Bank Indonesia, Monthly Reports and Annual Reports, various issues.



Despite the increase in the number of banks as well as the number of bank offices, the distribution of banks and their networks have not indicated any significant changes, in the sense that those banks and bank offices are mostly concentrated in five cities, namely Jakarta, Surabaya, Bandung, Semarang and Medan. In 1996 more than 50% of total commercial bank offices were located in those cities. It is worth noting that commercial bank offices which operate in those five major cities consist of head offices,[22] main branch offices and branch offices, while their banking networks outside those five major cities were dominated by small branch offices and sub- branch offices.

[22] In 1996 , 77% of commercial bank head offices are located in Jakarta.

4.2.3 Savings [23]

The oil boom in 1973 boosted oil and gas revenue as a dominant source of financing development programs. Since the government consistently adopted the balanced budget policy, then the increase in its revenues was directly transmitted to the increase in its expenditures both routine and development. The government did not intend to accumulate public saving explicitly as it would not only violate the balanced budget principle but also it would not be appropriate in the eye of the countries which provided grants and loans, because at the same time Indonesia still acquired foreign financial sources in the form of soft loans, and grants and aid (Nasution 1983). Public savings which are defined as total government revenues from domestic sources minus routine expenditures were allocated to development programs along with financing from foreign sources.

The decline in the oil price in the world market which started in 1983 consistently reduced the government's ability to be the main source of financing in development activities. This forced the government to make more room for the private sector to participate in the development process. To anticipate the decline in revenue generated from oil and gas exports, several policies have been issued to facilitate and to promote non oil and gas exports both in the real sector as well as in the financial sector.

In the financial sector, this momentum had inspired efforts to mobilize funds through financial institutions and the banking sector in particular. Prior to 1983, the banking sector especially state banks simply just acted as *channeling agents* or extended arms of the monetary authority in the sense that their activities were dominated by

[23] Defined as demand deposit, time deposit and saving deposit mobilized by commercial banks.

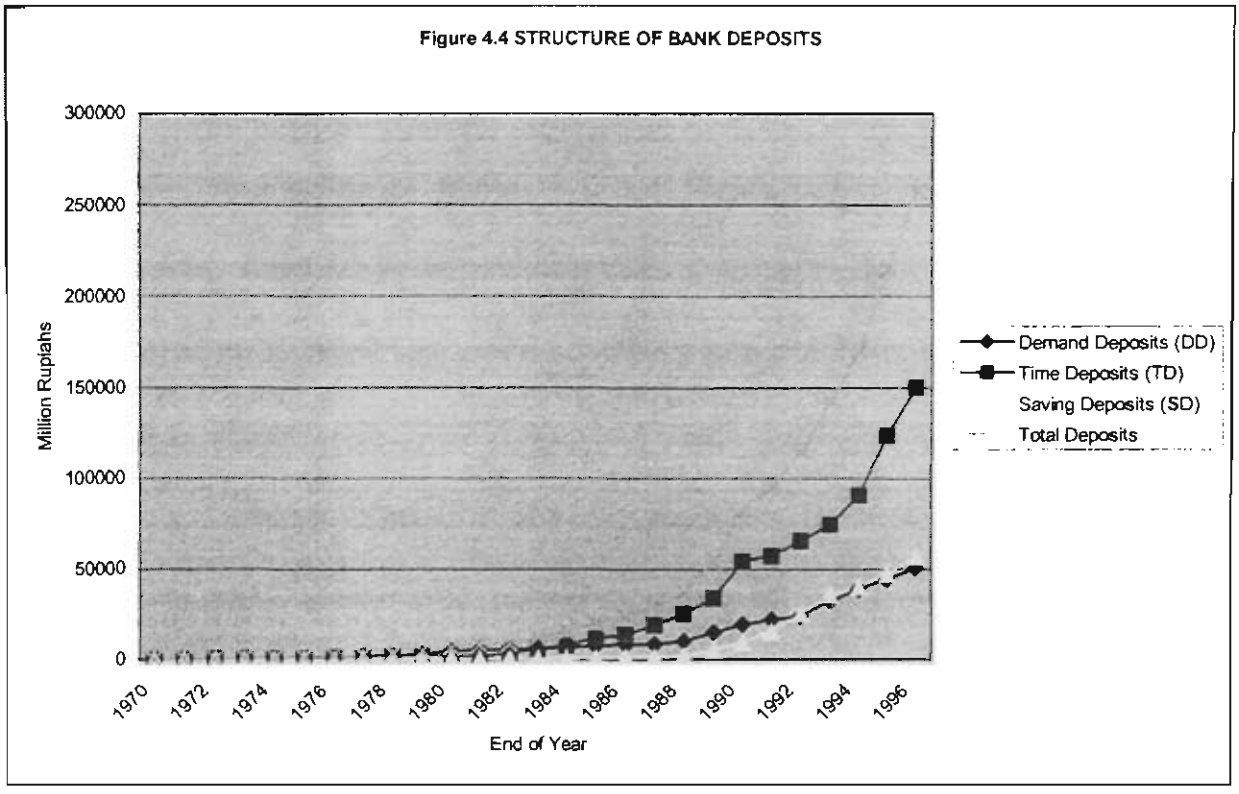
channeling credit programs which mostly were financed by the Central Bank with so-called *liquidity credit* (Nasution 1994).

Meanwhile, fund mobilization by state banks was also constrained by the existence of interest controls. Depositors were not encouraged to put their money in state banks, and this was reflected in setting deposit rates mostly below the prevailing inflation rates (see figure 4.1). However, prior to banking deregulation in 1983, fund mobilization in state banks was more dominant compared to that in private banks due to some privileges granted from the government such as the obligation of state entities to place their funds only in state banks, and the existence of implicit guarantees from the government since it was widely believed the government would never allow the state banks to be bankrupt.

After 1973 the economy experienced high growth rates, but fund mobilization through the banking system did not grow substantially. In other words, the growth of bank deposits were not always parallel to the growth in GDP. The sluggish growth in bank deposits might reflect the fact that the prevailing interest rates on deposits were not attractive enough to be an alternative form of fund settlement, meanwhile other financial investments such as marketable securities were still limited due to the lack of a developed security market. Cole and Slade (1995) suspected that part of income generated when the economy experienced high growth rates was invested in financial institutions overseas. Commercial banks, particularly state banks, more intensively utilized liquidity credit from the central bank instead using with their own funds mobilized from society.

When interest controls were removed in 1983 with further deregulation in 1988, bank deposits grew rapidly with some characteristics. First, the share of state owned

banks consistently decreased as shown at Table 4.4.1. Before the first banking deregulation in 1983, the share of state banks in total bank deposits accounted for more than 70% but that portion has been declining to be 60% and 38% in 1988 and 1994 respectively. On the other side, the share of private banks has grown remarkably. By the end of 1982 or just six months before the first banking deregulation was released, the share of private banks still accounted for 20%, but the share had jumped to 30 % in 1988. Since 1993 the share of private banks in mobilizing funds has even exceeded that of state owned banks. It reflected the fact that private banks are more responsive in accommodating their products to anticipate the market condition which resulted from banking deregulation. Meanwhile, state banks were sluggish in changing their behaviour and still stuck to previous attitudes regarding themselves as government bureaucrats instead of being professional bankers (Nasution, 1991).



Deregulation policy not only has stimulated the bank's efforts to mobilize funds but also consistently shifted the structure of bank deposits more and more towards saving deposits and time deposits. It is consistent with the outcome predicted by the supporters of deregulation policy that banking deregulation would increase deposit rates particularly in state owned banks where deposit rates were distorted, but at the same time it shifted the structure of bank deposits toward interest bearing funds. In the early 1970's, the contribution of saving deposits only accounted for 4% of total bank funds, while at the end of 1988 and 1994 these contributions had drastically increased to 21% and 35% respectively. The continuing increase in saving deposit share as a source of bank funds is consistent with the spirit of deregulation policy, which not only promoted competition but also stimulated banking innovation. Prior to the second banking deregulation (1998), although the banks were no longer subject to interest rate controls which were removed in

1983, the banks only had two kinds of saving deposits introduced by the Central Bank namely: Tabanas and Taska.[24] Immediately following Pakto 88 every bank had created and modified their own saving deposits with various incentives. In 1988, there were more than 200 type of saving deposits and some of them had already been supported by an integrated banking network and widely complemented with automatic teller machines (ATM). Saving deposits were widely used as an instrument to attract funds mainly due to the following reasons. Firstly, it can be designed to meet two customer needs simultaneously. On the one hand saving deposits have a similar function as demand deposits for supporting transactions due to flexibility in withdrawals (no limitation both in term of amount as well as the number of withdrawals). On the other hand, saving deposits can also be designed to have functions similar to time deposits in the sense that saving deposits bear interest rates which are close to these for time deposits. Secondly, saving deposits mostly can accommodate small depositors in the sense that most banks do not impose minimum amounts in opening this kind of banking account or even if the banks impose that particular requirement, the minimum amount is very low where even the low income groups can afford it.

[24] Tabanas and Taska are saving accounts designed by the Central Bank as instruments to promote saving behaviour through banking system.

Table 4.4 Outstanding Bank Funds

(In Billion Rupiahs)

End Of Period	DD	TD	Savings	Total
1966	11	4	--	15
1967	23	12	--	35
1968	43	20	--	63
1969	68	47	3	118
1970	105	71	14	190
1971	136	136	18	290
1972	232	186	26	464
1973	382	228	35	645
1974	560	356	48	964
1975	707	518	76	1,301
1976	987	700	114	1,801
1977	1,150	943	159	2,252
1978	1,536	1,287	201	3,024
1979	2,560	1,458	226	4,244
1980	4,.446	1,651	314	6,411
1981	5,380	2,210	420	8,010
1982	5,396	2,982	490	8,868

Note : DD : Demand Deposits

TD : Time Deposits

Source : Bank Indonesia, Weekly Reports and Monthly Reports , various issues.

Table 4.4 (Contd) Outstanding Bank Funds
(In Billion Rupiahs)

End Of Period	**DD**	**TD**	**Savings**	**Total**
1983	6,031	5,781	584	12,396
1984	6,965	7,779	754	15,498
1985	7,427	11,727	1,020	20,174
1986	8,517	13,967	1,387	23,511
1987	8,796	18,958	1,607	29,331
1988	10,350	24,986	2,154	37,510
1989	15,105	34,017	5,213	54,375
1990	19,254	54,239	9,661	83,154
1991	22,013	57,552	15,553	95,118
1992	23,762	65,619	25,469	114,850
1993	32,361	74,710	35,608	142,679
1994	39,097	90,990	40,319	170,406
1995	44,108	123,432	47,224	214,764
1996	57,491	162,661	61,566	281,718

Source : Bank Indonesia, Weekly Report, Monthly Report, various issues

Table 4.4.1 Outstanding Bank Funds By Group of Banks
(In Billion Rupiahs)

End Of Period	State Bank	Private Bank	Foreign Bank	Total
1966	14	1	--	15
1967	33	2	--	35
1968	57	6	--	63
1969	90	22	6	118
1970	142	34	14	190
1971	229	37	22	290
1972	372	47	45	464
1973	499	79	63	645
1974	777	112	75	964
1975	1,059	154	88	1,301
1976	1,518	189	94	1,801
1977	1,868	257	127	2,252
1978	2,384	395	245	3,024
1979	3,127	792	325	4,244
1980	4,635	1,195	481	6,411
1981	5,687	1,382	941	8,010
1982	6,169	1,695	1,004	8,868

Source : Bank Indonesia, Weekly Reports and Monthly Reports, various issues.

Table 4.4.1 (Contd) Outstanding Bank Funds By Group of Banks

(In Billion Rupiahs)

End of Period	State Bank	Private Bank	Regional Bank	Foreign Bank	Total
1983	8,381	2,119	498	1,398	12,396
1984	10,035	3,020	700	1,743	15,498
1985	12,916	4,550	825	1,883	20,174
1986	15,193	5,435	797	2,086	23,511
1987	18,111	8,040	954	2,226	29,331
1988	22,527	11,167	1,300	2,516	37,510
1989	29,731	19,655	1,674	3,315	54,375
1990	40,638	33,951	2,549	6,016	83,154
1991	41,813	43,142	3,228	6,935	95,118
1992	52,600	51,079	3,697	7,474	114,850
1993	61,683	67,541	4,773	8,682	142,679
1994	64,283	88,925	6,183	11,015	170,406
1995	75,920	117,451	7,812	13,581	214,764
1996	90,434	164,979	8,522	17,783	281,718

Note : excluding certificate of deposits

Source : Bank Indonesia, Weekly Reports and Monthly Reports, various issues.

Table 4.4.2 The Share Of Bank Deposits By Group Of Banks

(In Percentage)

Group Of Banks	1966-72	1973-82	1983-88	1989-94
State Banks	75	70	60	38
Private Banks	19	20	30	52
Regional Banks	--	4	4	4
Foreign Banks	6	6	6	6
Total	100	100	100	100

Source : Table 4.4.1

4.2.4. Credits

Prior to 1983, control of domestic credit was the main instrument for conducting monetary policy. In this regard, domestic credit extended by commercial banks was subject to credit ceilings imposed by the Central Bank. Since the allocation of credit ceilings was only based on past performance of banks then credit ceilings tended to favour large banks and potentially maintain the status quo in the sense that the large banks which were dominated by state banks were stimulated to grow faster because they received a larger portion of the credit ceiling allocation. Meanwhile small banks were constrained to develop their assets since their portion of credit ceilings allocation was too small.

Allocation of credit by groups of banks as shown in Table 4.5, indicates that in the early 1970's over 65% of credit was extended by state banks. Bank Indonesia extended 27% and the rest was extended by private banks including regional development banks and foreign banks. In 1982 , the share of direct credit extended by Bank Indonesia has steadily declined except in the period 1975-1978 when the Central Bank had to provide credits for financing government programs particularly to maintain essential goods as a hedge against inflation (Nasution 1983 pp. 96-97). From March 1979, direct credit to Pertamina (the National Oil Company) in foreign exchange was channeled through a state bank. Direct credit from Bank Indonesia was provided to BULOG mainly for food procurement, fertilizer subsidies and Pertamina. Direct credits were transformed into liquidity credits through commercial banks after Banking deregulation 1983, and only very specific government programs were financed directly by credit from the Central Bank.

In accordance with the spirit of banking deregulation in promoting the market mechanism in determining banking products, Bank Indonesia will not provide liquidity credit for commercial banks as part of their credit financing except for some scheme of credits which were still classified as priority credits. In 1991, the classification of priority credit schemes was simplified and reduced substantially and leaving only three credit schemes which remain supported by liquidity credit, namely: (i) credits designed to support government program in maintaining self sufficiency in rice production, (ii) credits for enhancing development of cooperatives, and (iii) credits for financing investment conducted in the eastern part of Indonesia. Meanwhile, liquidity credits designed to support small borrowers were abolished, but at the same time all commercial banks were

required to allocate credits for small borrowers (at least 20% of their credit portfolio).[25] Since the Central Bank will not provide liquidity to support small scale credits, then the interest rate on credit for small borrowers will be determined completely on the basis of the market mechanism. Nasution (1991) argued that small borrowers mostly will not have a serious problem with the Central Bank policy to charge interest rates on a market base. Small borrowers are accustomed to dealing with informal financial institutions such as individual money lenders who obviously charge much higher interest rates than formal financial institutions particularly banking institutions. Indeed, the ability of the banking system to reach small borrowers and provide the required financial support adequately and timely is much more important than just simply subsidizing the interest rate they have to pay. Providing subsidized credits which are followed by imposing credit ceilings leads the banks to conduct credit rationing. Since supply of credit was not sufficient to meet the demand side then the selection procedures applied by the banks tended to focus more on collateral aspects to cover the bank risk. Therefore, credit rationing led to credit allocation against small borrowers who faced problems in providing the collateral required by the banks (Nasution 1991). In examining the allocation of credit, Goultom (1994) found that banking deregulation policy improves small borrowers access to bank credits.

Credit allocation by economic sector mostly reflected the development of the real sector. In early period of the emergence of new order regime which came into power in 1966, the government intensively promoted investment especially in the extractive sectors such as mining, forestry, etc. When the economy moved towards a more significant

[25] Foreign banks have option either allocate at least 20% of credit portfolio to small borrowers or extend at least 50% of credit portfolio to support export financing.

contribution from the secondary and tertiary sector, the allocation of credit also shifted toward those sectors. In early 1970's the share of credit allocated to the manufacturing sector, trade sector and service rendering industry accounted for 20% and 21.% and 10% respectively, while in 1994 the share had risen substantially to32%, 24 % and 27% respectively.

With respect to interest rate deregulation, the demand for credit is continuously increasing regardless of the change in lending rates. The substantial drop in credit growth in 1992, particularly in private banks was mostly due to the implementation of prudential regulation, rather than a response to changes in lending rates which in fact even also decreased (Cole And Slade 1996, pp. 62). [26]

[26] To meet minimum required CAR (capital adequacy ratio), banks prefer to limit their credit expansion since it will be considered as higher risk assets which are required to provide higher capital .

Table 4.5 Credit Allocation By Group Banks

(In Billion Rupiahs)

End Of Period	BI	State Bank	Private Bank	Foreign	Total
1966	1	92	--	--	93
1967	12	154	5	--	171
1968	62	180	12	--	254
1969*	87	204	19	1	311
1970	97	233	24	8	362
1971	104	343	32	16	495
1972	127	461	44	26	958
1973	155	732	67	51	1,005
1974	235	1,077	85	63	1,390
1975	893	1,062	133	122	2,750
1976	1,212	2,007	197	150	3,566
1977	1,229	2,267	257	184	3,937
1978	1,935	2,832	365	262	5,394
1979	2,163	3,264	493	342	6,262
1980	2,454	4,295	711	414	7,874
1981	2,649	5,881	1,081	548	10,159
1982	2,771	8,031	1,544	666	13,022

Source : Bank Indonesia, Weekly Report, Monthly Report, various issues

Table 4.5 (Contd) Credit Allocation By Group Of Banks

(In Billion Rupiahs)

End Of Period	BI	State Bank	Private Bank	Foreign Bank	Regional Bank	Total
1983	2,356	9,787	2,200	862	94	15,299
1984	870	13,345	3,328	1,046	2 24	18,813
1985	964	15,374	4,311	1,073	435	22,157
1986	1,144	17,782	5,601	1,204	671	26,402
1987	1,347	21,676	7,462	1,406	961	32,852
1988	1,547	28,631	10,714	1,913	1,196	44,001
1989	696	39,579	18,591	3,115	1,625	63,606
1990	718	53,524	34,257	6,177	2,302	96,978
1991	783	59,861	41,053	8,512	2,616	112,825
1992	771	68,236	41,566	9,330	3,015	122,918
1993	158	71,543	60,441	14,733	3,554	143,301
1994	130	80,010	86,173	18,366	4,201	188,880
1995	71	93,480	111,573	24.245	5,242	234,611
1996	60	129,528	119,382	28.851	6,365	284,186

Source : Bank Indonesia, Weekly Report, Monthly Report, various issues

Table 4.6 Credit Allocation By Economic Sector

(In Billion Rupiahs)

End of	Sectors						
Period	**1**	**2**	**3**	**4**	**5**	**6**	**Total**
1966	3	18	29	32	9	12	93
1967	8	35	41	57	11	19	171
1968	15	47	67	81	16	28	254
1969	21	58	78	97	28	29	311
1970	29	61	91	107	39	35	362
1971	54	82	120	140	62	57	495
1972	100	195	230	237	108	88	958
1973	110	205	241	241	117	91	1,005
1974	139	221	356	395	126	103	1,390
1975	200	616	894	615	254	171	2,750
1976	210	992	1,021	862	285	196	3,566
1977	270	1,061	1,157	912	319	218	3,937
1978	345	1,699	1,624	1,114	389	223	5,394
1979	432	1,893	1,721	1,320	656	258	6,262
1980	539	1,867	2,213	1,976	946	333	7,874
1981	813	1,693	2,762	3,062	1,385	444	10,159
1982	1,025	1,472	3,923	4,129	1,867	606	13,022

Source : Bank Indonesia, Weekly Report, Monthly Report, various issues

Table 4.6 (Contd) Outstanding Bank Credits By Economic Sector

(In Billion Rupiahs)

End of Period	Sectors 1	2	3	4	5	6	Total
1983	1,226	806	5,207	5,132	2,277	651	15,299
1984	1,318	384	6,667	6,344	3,169	931	18,813
1985	1,656	258	7,592	7,255	4,183	1,213	22,157
1986	2,097	394	9,005	8,399	4,345	2,162	26,402
1987	2,656	385	10,917	10,247	5,460	3,187	32,852
1988	3,580	444	14,956	13,888	7,382	3,721	44,001
1989	5,283	591	20,333	20,109	10,424	6,866	63,606
1990	7,176	615	30,502	29,737	17,209	11,739	96,978
1991	8,465	743	33,131	33,049	20,066	17,371	112,825
1992	10,281	762	37,289	32,944	25,870	15,772	122,918
1993	12,057	777	51,432	35,824	35,826	12,387	143,301
1994	13,860	799	60,211	44,372	50,806	18,832	188,880
1995	15,525	913	72,088	54,224	66,584	25,277	234,611
1996	16,874	1,125	86,523	66,529	81,985	31,240	284,186

Notes : Economic Sectors
1. Agriculture
2. Mining Sector
3. Manufacturing Industry
4. Trade
5 .Service Rendering Industry
6. Others

Source : Bank Indonesia, Weekly Report, Monthly Report, various issues.

4.3 Monetary Aggregates

The growth of the money supply (M_2) was characterized by two important growth spurts. The first growth spurt was in the period 1968-1972 and the second one started in 1983 after the first banking deregulation. In the first growth spurt, the ratio of M_2 to GDP increased substantially from 6% in 1968 to 13% in 1972. Meanwhile, in the second growth spurt that ratio rose from 19% in 1983 to 30 % and 41% in 1988 and 1994 respectively. During the period in between those growth spurts, the M_2/GDP did not show any substantial growth. In this period, however, (1973-1982) Indonesia experienced high economic growth due to the oil boom. To analyze this puzzling situation, it is necessary to examine the composition of M_2. By definition M_2 is M_1 plus quasi money. Firstly it is important to evaluate the behaviour of M_1 based on growth periods when in analyzing M_2. If M_2/GDP experienced with two growth spurts, the same characteristic did not happen in M_1 /GDP. It means that only Quasi Money (QM)/GDP experienced the same growth pattern as M_2/GDP. Since quasi money consists of time and saving deposits which are more sensitive to changes in interest rates, then the main source of M_2/GDP or QM/GDP growth spurts is related to interest rates on those types of deposits. Although the two growth spurts were separated into periods before and after removal of interest rate controls in 1983, those two growth spurts had something in common, that is, the prevailing interest rates were higher than inflation rates. In other words, both in the first and the second periods of growth spurts, real deposit rates were always positive, regardless of the difference in determining those deposit rates.[27] Meanwhile, in the

[27] In the first growth spurt (1968-72) deposit rates were determined by the Central Bank, while in the second one (since 1983) , those rates were market determined.

Figure 4.5 SELECTED MONETARY AGGREGATES

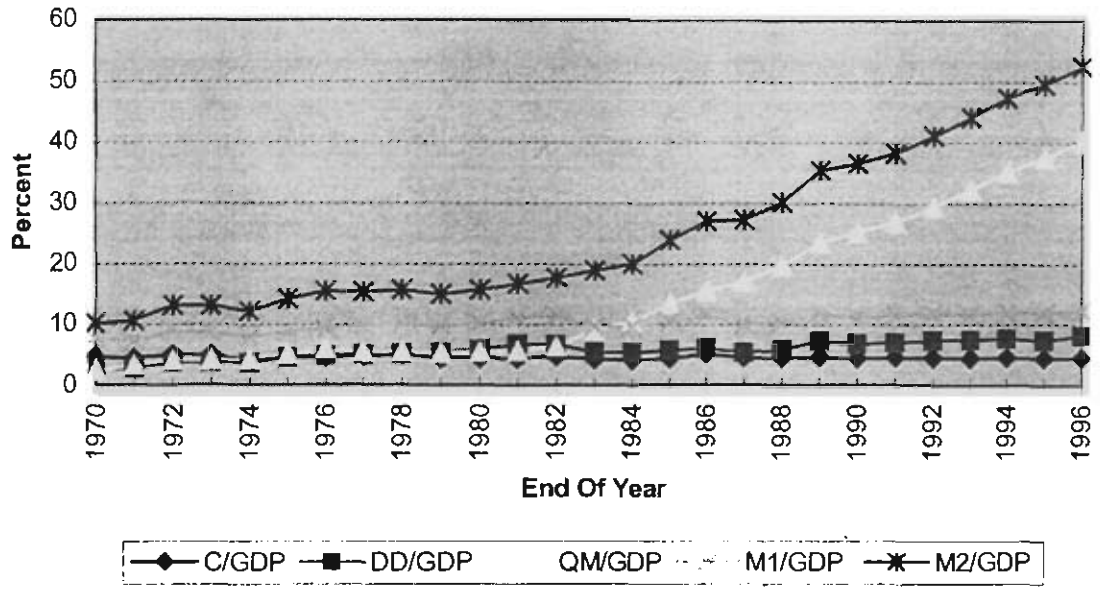
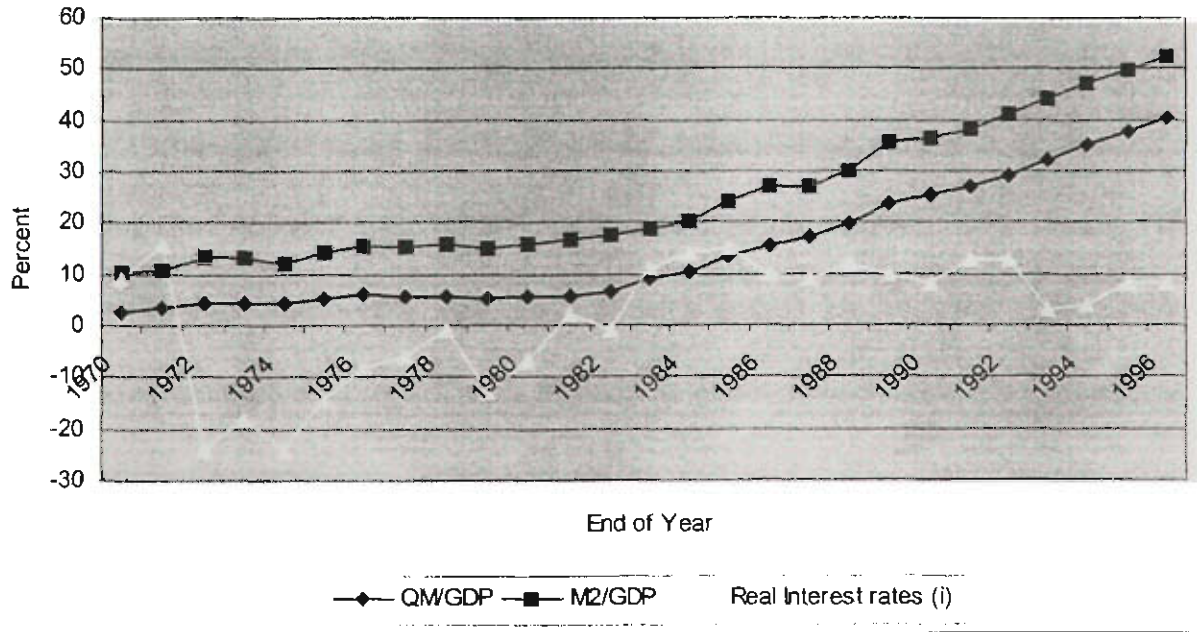


Figure 4.6 REAL DEPOSIT RATES, QM/GDP AND M2/GDP



period 1973 to 1982 deposit rates were mostly set below inflation rates which resulted negative real deposit rates. Consequently, during that period M_2/GDP increased very slowly especially when compared to the period where real deposit rates were positive.

Table 4.7 shows the composition of the money supply shifted towards interest bearing money (quasi money). Up to 1973, the share of currency was still higher than that of demand and time deposits, but by the end of 1974, 1984 and 1994 the share continuously decreased to be 33%, 21% and 11% respectively. It is worth noting that the continued increase in demand and time deposits in the money supply reflected a better and more deeply monetized economic system.

The expansion of the money supply is dependent on by both domestic and external factors. As regards domestic sources, domestic credit or net claims on the private sector has continuously contributed an expansionary effect on the money supply. It is important to notice that the rapid expansion of the claims on the private sector was made possible mainly by the remarkable growth of funds mobilized by the banking system, particularly after the government deregulated the banking sector. Meanwhile, the government sector shows an inverse contribution from significant expansionary impacts on the money supply during the 1960's and 1970's to be contractionary or slightly expansionary from the early 1980's (see Table 4.9). The contractionary impact on the government sector is mainly due to continuous increases in tax collection as tax administration improved.

4.4 Concluding Remarks

In this chapter, major banking and monetary aggregates are analyzed particularly to capture the impact of banking deregulation which is presumed to be important in line with evaluating the reliability of those aggregates for conducting monetary policy.

Banking aggregates in Indonesia experienced substantial changes in response to banking deregulation which was firstly unveiled in 1983. Interest rates or deposit rates in particular increased significantly to reach market clearing levels and yield positive real deposit rates. It is important to note that in the post banking deregulation period (1983q3-1996q4), inflation rates were mostly able to be maintained at relatively low levels (single digit inflation) so that positive deposit rates could be achieved at relatively low nominal rates. Saving mobilization through the banking system which was the main focus of banking deregulation indicates a significant increase particularly in time deposits (long term deposits) and saving deposits (saving accounts). This substantial increase in saving mobilization was mainly facilitated by the presence of positive real deposit rates, the increase in the number of banks and bank offices, and banking innovation which was promoted in the deregulated system. The expansion of credits in the post banking deregulation period reflected the expansion of savings mobilized by the banks since the removal of credit ceilings was accompanied by the removal of liquidity credits provided by the Central Bank which used to be part of financing in extending credits.

Monetary aggregates also moved in the same direction as savings in the sense that interest bearing money grew more rapidly than non interest bearing money. In conducting monetary policy, banking deregulation abolished the direct instrument to control monetary aggregates, and made it necessary for the Central Bank to use indirect instruments which are less certain in their effects. This issue will be discussed further in the subsequent chapters.

Table 4.7 Monetary Aggregates

(In Billion Rupiah)

End Of Period	C	DD	QM	M_1	M_2
1966	14	8	1	22	23
1967	34	17	2	51	53
1968	75	39	12	114	126
1969	116	68	47	184	231
1970	155	96	77	251	328
1971	199	121	141	320	461
1972	272	203	221	475	696
1973	375	294	319	669	988
1974	497	443	584	940	1,524
1975	625	625	728	1,250	1,978
1976	781	822	1,028	1,603	2,631
1977	979	1,027	1,123	2,006	3,129
1978	1,240	1,248	1,321	2,488	3,809
1979	1,552	1,833	1,837	3,385	5,222
1980	2,153	2,842	2,696	4,995	7,691
1981	2,557	3,929	3,230	6,486	9,716
1982	2,934	4,187	3,954	7,121	11,075

Source : Bank Indonesia, Monthly Reports and Annual Reports, various issues.

Table 4.7 (Contd) Monetary Aggregates

(In Billion Rupiahs)

End Of Period	C	DD	QM	M_1	M_2
1983	3,333	4,236	7,094	7,569	14,633
1984	3,712	4,869	9,356	8,581	17,937
1985	4,441	5,663	13,.049	10,104	23,153
1986	5,339	6,339	15,986	11,678	27,664
1987	5,782	6,903	21,200	12,685	33,885
1988	6,246	8,146	27,606	14,392	41,998
1989	7,426	12,688	38,590	20,114	58,704
1990	9,094	14,725	60,811	23,819	84,630
1991	9,346	16,996	72,717	26,342	99,059
1992	11,478	17,301	90,274	28,779	119,053
1993	14,431	22,374	108,397	36,805	145,202
1994	18,634	26,740	129,138	45,374	174,512
1995	20,807	31,870	169,961	52,677	222,638
1996	23,548	37,692	221,025	61,240	282,265

Note : C : Currency

DD: Demand Deposits

QM: Quasi Money

M1: Narrow Money (C + DD)

M2: Broad Money (M1+ TD)

Source : Bank Indonesia, Monthly Reports and Annual Reports, various issues

Table 4.8 Reserve Money (RM), Narrow Money (M_1) and Broad Money (M_2)

End of	RM		M_1		M_2	
Period	Absolute	Growth	Absolute	Growth	Absolute	Growth
	Rupiahs	(%)	Rupiahs	(%)	Rupiahs	(%)
1970	0.1	37.2	0.2	37.2	0.3	37.8
1971	0.2	39.1	0.3	28.3	0.5	38.3
1972	0.3	44.2	0.5	48.2	0.7	43.5
1973	0.5	47.5	0.7	41.4	1.0	45.4
1974	0.8	54.3	0.9	40.1	1.5	47.1
1975	1.0	34.4	1.3	33.3	2.0	36.2
1976	1.3	28.4	1.6	28.2	2.6	33.0
1977	1.7	25.3	2.0	25.1	3.1	19.0
1978	1.8	10.6	2.5	24.0	3.8	21.7
1979	2.4	31.1	3.4	35.8	5.2	36.9
1980	3.3	34.5	5.0	47.9	7.7	47.5
1981	3.8	17.8	6.5	29.8	9.7	26.3
1982	4.0	4.1	7.1	9.8	11.1	14.0

Source : Bank Indonesia

Note : the absolute value is in trillion rupiahs

Table 4.8 (Contd) Reserve Money (RM), Narrow Money (M_1) and Broad Money (M_2)

End of	RM		M_1		M_2	
Period	Absolute Rupiahs	Growth (%)	Absolute Rupiahs	Growth (%)	Absolute Rupiahs	Growth (%)
1983	4.9	22.3	7.6	6.3	14.7	32.4
1984	5.5	12.0	8.6	13.4	17.9	22.3
1985	6.4	17.6	10.1	17.7	23.2	29.1
1986	8.0	23.8	11.7	15.6	27.7	19.5
1987	8.7	8.8	12.7	8.6	33.9	22.5
1988	8.2	-5.7	14.4	13.5	42.0	23.9
1989	10.1	23.3	20.1	39.8	58.7	39.8
1990	12.0	19.0	23.8	18.4	84.6	44.2
1991	12.4	2.9	26.3	10.6	99.1	17.0
1992	14.7	19.3	28.8	9.3	119.1	20.2
1993	17.6	19.5	37.0	28.7	145.6	22.3
1994	21.0	19.3	46.5	25.5	177.9	22.2
1995	21.2	19.6	49.2	29.3	186.2	23.4
1996	22.2	20.1	51.7	32.1	191.3	24.8

Source : Bank Indonesia, Monthly Reports, Annual Reports, various issues.

Note : The absolute value in trillion rupiahs

Table 4.9 Money Supply And Its Affecting Factors

(In Percentage Annual Growth Rate)

End Of Period	M_2	a	b	c	d
1970	38.2	19.6	98.9	221.6	36.4
1971	29.3	22.4	87.2	251.2	34.3
1972	49.4	28.9	115.1	358.3	47.2
1973*	43.1	32.3	124.2	297.8	48.5
1974	47.1	38.2	126.1	364.5	54.1
1975	36.2	79.3	-77.4	170.1	-9.9
1976	33.0	29.8	182.5	100.3	7.1
1977	19.0	8.9	136.2	25.9	31.4
1978	21.7	38.0	72.9	33.8	157.3
1979	36.9	17.1	104.5	55.2	28.5
1980	47.5	26.4	84.3	91.0	8.6
1981	26.3	29.4	3.7	13.1	1.3
1982	14.0	28.5	-23.0	-11.7	21.6

Notes : a : Claims on the private sector
b : Net foreign assets
c : Government account (net)
d : Other items monetary system

Source : Bank Indonesia, Monthly Reports and Annual Reports, various issues

Table 4.9 (Contd) Money Supply And Its Affecting Factors

(Percentage Annual Growth Rate)

End of Period	M_2	a	b	c	d
1983	32.4	18.3	59.1	32.3	17.4
1984	22.3	24.2	51.6	73.8	21.9
1985	29.1	19.7	14.2	2.3	3.5
1986	19.5	20.5	13.2	-5.0	53.2
1987	22.5	24.7	15.3	-17.2	62.5
1988	23.9	33.3	-3.0	-3.3	26.9
1989	39.8	50.3	2.3	16.4	39.1
1990	44.2	49.5	-11.9	46.4	13.4
1991	17.0	19.3	46.1	11.1	48.8
1992	20.2	12.5	30.1	9.5	4.2
1993	22.3	22.7	-0.1	-5.4	16.5
1994	22.2	23.0	-2.6	13.7	11.2
1995	22.5	23.2	-2.4	12.4	12.0
1996	23.1	23.8	-3.1	11.7	12.4

Notes : a : Claims on the private sector
b : Net foreign assets
c : Government account (net)
d : Other items monetary system

Source : Bank Indonesia, Monthly Reports and Annual Reports, various issues

CHAPTER 5

ECONOMETRIC METHODS

5.1 Introduction

Econometric methods are intensively used in applied economics because econometrics can describe economic relationships in a quantitative way, such as determining the sign and the size of the parameters etc. which are considered to be useful not only for policy analysis, but also for forecasting purposes. In practice, the implementation of econometric models is made more convenient because it is supported by the presence of various econometric program packages. However, to achieve the optimal methods as well as to yield a better analysis for deriving more accurate conclusions, one should be cautious regarding their limitations and advantages.

The objectives of this chapter are to seek better understanding regarding the advantages and limitations of applying different econometric methods, and to search for the appropriate econometric methods to use in this study.

This chapter is organized as follows. Section 2 presents the value of econometric methods in applied economics, Section 3 describes the role of econometric methods for policy making, and Section 4 analyzes the limitations and advantages in applying econometric models. Section 5 discusses the econometric methods applied in this study, while Section 6 contains some concluding remarks.

5.2 The Value of Econometric Methods in Applied Economic Analysis

Economists are still split into different groups regarding the value of econometrics in applied economic analysis. The first stream argues that econometric methods do have valuable contributions to make in achieving better economic analysis, but the others believe that econometrics does not perform well in applied economic analysis.

Thurow (1983) stated that in the 1950's, econometric methods were shown to be good instruments for testing economic hypotheses and quantifying economic relationships, as well as for predicting purposes. However, in the 1970's when econometric models failed to predict accurately some macroeconomic variables, the economic profession became less confident about econometric forecasting. At the same time, mathematical models were more used widely in every branch of economics. Unfortunately, if formal models are used in economic analysis, it is necessary to deal with the estimation of parameter values. Since only econometrics can provide instruments to estimate the value of parameters, then applied economic analysis should employ econometric methods despite their limitations.

Economists who do not support the use of econometric methods in applied economic analysis argue that formal models could blur the focus on the main ideas. Some trivial ideas might easily be judged as brilliant when they are accompanied by complex equations. In many cases, empirical studies that employed econometric models often come to conflicting conclusions, and unfortunately there is no effective way to judge which conclusion is correct.

Mayer (1980), pointed out that tests of standard applied econometric techniques are insufficient, invalid and unreliable.[28] He also wondered about the application of some statistical tests particularly in deriving conclusions. For instance, if a parameter is proved to be statistically insignificant, it suggests that this particular variable has no effects on determining the dependent variable. However, since the relationships of this variable are not stable, so it is possible that this particular variable in fact still has a significant effect on the dependent variable.

The implementation of econometric models could also be constrained by data problems such as high multicollinearity among the variables, paucity of data points, etc. Under such circumstances, the behaviour of parameters will be unstable which will lead to a loss of the ability to determine true and false hypotheses. In this regard, econometric results will be more convincing if there are number of studies carried out separately with different sets of data, but which come to the same conclusions. Clearly, repetitive experiments should be considered more reliable than a single study even when the latter yields parameters with highly significant statistical tests. Therefore, validity of the results should be emphasized when evaluating the research project rather than technical process, since such complex and sophisticated models do not guarantee better results compared with the simple one (Hagen, 1994).

5.3 Econometric Methods and Policy Making

Econometric models can provide information required for facilitating policy analysis as well as for forecasting purposes. The implementation of econometric methods

[28] See also Ferber (1953, 1956), Schupak (1962), and Lovel (1983)

could derive information regarding the behaviour of variables, the effect of one variable to another, the sign and the size of parameters, forecasting, etc.

Navile (1981) argued that economic theory as well as econometric methods are almost irrelevant for government policy decisions, particularly for the big issues, since the formulation of such policies is heavily affected by pressure groups. Since policy analysis does not involve econometric models adequately, therefore, it is very difficult to expect the models to perform accurately for forecasting purposes, even if the models have been optimally constructed. The models will predict poorly since there is no information regarding the effect of different settings for policy variables and hypothetical values of exogenous variables.

Hawkins and Fitzgerald (1981) stated that most econometric models had poor forecasting records in the United States. In such situations, econometric models are much more useful in the area of policy analysis rather than for forecasting purposes. Even though econometric models are still difficult to use in policy making, the indirect role of econometric models to influence policy making is still very large as it provides benchmarks for policy makers.

5.4 The Limitations and Advantages of Econometric Methods

Despite the usefulness of econometric methods in applied economic analysis as well as in policy making, the implementation of these methods is subject to several limitations. Lack of knowledge regarding those limitations often leads to parameters which could be completely misleading and which end up with the wrong conclusions. In other words, awareness regarding the limitations as well as the advantages of econometric methods is not only required for constructing an optimal model but also for better

understanding about why and when the model might work as well as how to use the econometric results properly for policy analysis and policy making.

5.4.1 The Limitations of Econometric Methods

The first major limitation in the implementation of econometric methods is concerned with data problems. Econometric methods which are operated on the basis of historical data, would produce reliable results only if supported by the availability of adequate and accurate data. In many cases, the use of these methods is constrained by the presence of data problems such as inadequate and inaccurate data, etc.. Even though it is possible to replace the unavailable data by using a proxy technique or other methods, in the absence of the actual and reliable data, it will lose valuable information required to generate good parameters for example to identify the behaviour of data population, to determine the functional form, to evaluate the correlation with other variables, etc.. Even if data required to carry out the tests are available, most social science data are uncontrollable and subject to measurement errors. Unfortunately, there is no enough information to figure out what type of errors were made by the data collecting agencies in the construction of the data (Gujarati, 1995).

With regard to data problems, researchers should also deal with another problem particularly in selecting the types of data to carry out econometric tests. If time series data were selected, they would potentially have data problems particularly in finding adequate data when the models need large numbers of observations and the data were spread over a very long period of time. The longer period of time for the data the higher the probability the data will have different regimes which leads to structural breaks. In addition, employing time series data could lead to a higher probability of having a serial

correlation problem. Instead of employing time series data, the models could employ cross section data to reduce the probability of serial correlation problems. However, employing cross section data could have a higher probability of experiencing a heteroscedasticity problem. More importantly, since cross section data only describes a single snap shot of data, therefore, in general, cross section data cannot accurately capture the behaviour of the data which is required to determine model specification and evaluate correlation with other variables, etc.

Data problems can also be caused by the nature of economic variables employed in the model. Most economic variables are related to each other in a system, hence, they are more likely to be highly correlated. In contrast, some econometric methods e.g. the ordinary least square (OLS) requires independency among the explanatory variables to generate good parameters (best, linear, unbiased estimators). Another issue with the behaviour of economic variables is the presence of a causality relationship. Some methods had been introduced to cope with a causality relationship such as the Granger causality method, however, this method is still questionable mainly due to its sensitiveness to the lag length. The presence of a high degree of multicollinierity and a causality relationship would affect the estimated parameters and some times lead the results to contradict economic theory (Navile 1981).

5.4.2 The Advantages of Econometric Methods

Economic theory provides a valuable framework for analyzing economic phenomena by establishing economic relationships among variables, however, such relationships cannot always be expressed in a quantitative way. Econometrics, on the other hand, introduced instruments which enable us to estimate the size as well as the

sign of the relationship among variables described in economic theory. For instance, economic theory only describes the negative relationship between quantity demanded of a commodity and its own price, but does not explain the size, sign, and the appropriate functional form in that relationship. By estimating the size and sign of the parameters, it will provide more information required for undertaking a policy analysis as well as informing the policy making process. As part of providing more information for a policy analysis and a policy making process, econometrics also introduced instruments which facilitate experiments or simulations by using an analog model in order to get the optimal model. Such experimental opportunities are only possible through applying econometric models and never happen in reality (Navile 1981).

As a research tool, econometric methods can effectively be used as to transfer knowledge among researchers and give opportunities for reproducibility. However, the most outstanding contribution of econometric methods is its capability in providing instruments for forecasting purposes which could be a useful guide to policy decisions. Policy decisions which are based on econometric models will enable us to make more objective decisions and protect against self deception (Okun 1975). It is important to note, that the best fitted model cannot always perform well for forecasting purposes. Some adjustments based on professional experience and institutional knowledge to capture recent developments are generally justified. However, forecasting purely on the basis of personal judgements or intuitions was mostly not as good as econometric approaches and often even worse (Navile, 1981).

5.5 Econometric Methods Applied in this Study

When the conventional approach lost its power to predict demand for money in 1973, many studies were undertaken to analyze the existence of disturbances which influence the effectiveness of demand for money in facilitating monetary policy. Studies to evaluate the existence of a stable demand for money function in developing countries were mostly in response to deregulation in the financial sector particularly in the banking sector which emerged in the 1970's and 1980's as well as rapid financial innovations which blurred the distinction among monetary aggregates.

One of the primary requirements for deriving monetary policy is the presence of a stable demand for money function which reflects a stable relationship between monetary aggregates and the determinants of money demand. This suggests that monetary aggregates have a predictable relationship with monetary policy objectives such as real income, inflation rates, etc. Banking deregulation had substantial impact on banking behaviour both in mobilizing funds as well as in extending credit. Since monetary aggregates are mostly reflected in banking activities then banking deregulation will affect the relationship between monetary aggregates and monetary targets. Under such circumstances, formulation of monetary policy in which monetary aggregates are intensively used for channeling monetary targets, needs to be reevaluated in searching the most appropriate specification procedures as well as examining the parameter stability of the estimated demand for money. The impact of banking deregulation on bank activities particularly in mobilizing funds and extending credits, as well as the effectiveness of monetary aggregates as a measure in facilitating monetary policy also

needs to be determined. The error correction mechanism is intensively employed in this study, therefore, this procedure will be discussed below.

Error Correction Mechanism (ECM)

Melnick (1990) and Arize (1994) argued that in order to be able to draw meaningful inferences from statistical parameters, it is necessary to specify the appropriate dynamic structure of the statistical model since inappropriate dynamic specification particularly for short run might lead to econometric malfunctioning of the estimated equation. In this regard, therefore, this study applies an error correction model (ECM) in estimating the demand for money function. Hendry (1980) argued that ECM has several advantages. Firstly, it can avoid the possibility of obtaining spurious relationships among variables particularly for strongly trended data series or where the variables are not integrated at order zero. Secondly, both short run and long run relationships can be captured simultaneously through the inclusion of lagged level as explanatory variables. By the same token, the model can produce information for analyzing short run effects which are reflected by first difference variables as well as long run effects represented by lagged level explanatory variables. Thirdly, the lag structure in ECM is more general, therefore, it does not require too specific lag structures in the model. In addition, ECM provides information about Granger causality effects among variables which are employed in the system (Engle and Granger 1987).

Unit Root Tests

The common practice in the application of error correction models is conducted through several steps which mainly consist of evaluating the property of data

series and examining the existence of stable long run relationships between variables in the co-integration system as well as a valid error correction mechanism .

Unit root tests are conducted to evaluate the properties of time series data. The common problem of operating time series data is primarily related to the stationarity of the data, since non stationary data leads to the resulting statistical parameters becoming irrelevant. A variable is considered to be stationary if its mean, variance (σ) and covariance are independent of time. The unit root hypothesis has received considerable attention in the economic literature particularly since Nelson and Plosser (1982) argued that most macroeconomic variables are characterized by the presence of unit root. Clearly, most macroeconomic variables are non stationary at level. The statistical approaches to examine the unit root hypothesis have been developed to complement the existing method developed by Dickey and Fuller (1979 and 1981). Among others are the procedures proposed by Dickey and Pantula (1987), Cambel and Mankiw (1987, 1988), Phillips and Perron (1988) and Cochrane (1988). Meanwhile, some approaches have been developed which enable us to carry out tests for the unit root hypothesis in the presence of a structural break such as the test procedures proposed by Perron (1989), Zivot and Andrew (1992), Banerjee, Lumsdaine and Stock (1992), and Perron and Vogelsang (1992).

In this study, to evaluate the unit root hypothesis, the standard Dickey and Fuller (DF) and Augmented Dickey and Fuller (ADF) procedures will be adopted. Meanwhile, with regard to testing unit a root hypothesis which allows the presence of a structural break, the unit root test procedure introduced by Perron and Vogelsang (1992) will be employed.

The standard unit root test procedure introduced by Dickey-Fuller and Augmented Dickey-Fuller is formulated as follows.

$$\text{Let } x_t = \rho x_{t-1} + e_t \qquad 5.1$$

where e_t is stochastic error terms which follows the classical assumption.

Define $\Delta x_t = x_t - x_{t-1}$

Rearranging

$$x_t = x_{t-1} + \Delta x_t \qquad 5.2$$

Substitute equation 5.2 into equation 5.1, and rearranging

$$\Delta x_t = (\rho - 1) x_{t-1} + e_t$$

Rewriting the above equation

$$\Delta x_t = \alpha x_{t-1} + e_t. \qquad 5.3$$

Since $\alpha = \rho - 1$, then the null hypothesis for unit root test is $\alpha = 0$ (equivalently $\rho=1$). In the case that e_t is serially correlated then to make the error terms serially independent, the above equation is adjusted by inclusion of lagged difference terms, with the so-called Augmented Dickey and Fuller (ADF) test as follows.

With intercept but no trend: ADF (τ_u)

$$\Delta x(t) = \mu + \alpha x_{t-1} + \beta i \Sigma \Delta x_{t-j} + e_t. \qquad 5.4$$

With intercept and trend: ADF (τ_T)

$$\Delta x(t) = \mu + \delta T + \alpha x_{t-1} + \beta i \Sigma \Delta x_{t-j} + e_t. \qquad 5.5$$

The asymptotic distribution of the DF and ADF statistics are the same, therefore it is indifferent in setting of the null hypothesis as well as a critical value when those tests applied.

Various statistical procedures for testing unit root hypothesis have been developed to deal with the presence of a structural break. This type of unit root test procedure was pioneered by Perron (1989). In his earlier work, Perron (1989) assumed that time break was known, but later Perron and Vogelsang (1992) proposed another approach which involves unit root tests in the presence of a structural shift with an unknown time break.

Nelson and Ploser (1982) and subsequent empirical studies such as Wasserfallen (1986) etc. basically supported the unit root hypothesis, in the sense that most of macroeconomic variables are not stationary at level. In contrast, Perron (1989) argued those variables are indeed stationary at level. Perron (1989) stated: " *Our conclusion is that most of macroeconomic time series are not characterized by the presence of unit root and that fluctuations are indeed transitory*". Furthermore, he argued that in the presence of a structural break, the standard ADF test is biased toward non rejection of the null hypothesis.

Banerjee, Lumsdaine and Stock (1992) noted that the Perron model had some implications. First, given that the stationary/trend shift model is correct, then the previous studies which explored the conventional ADF test are biased towards non rejection. Second, it provides useful description related to the model with slowly changing trend component of the variable i.e. output. Third, it leads to incorrect inferences if the series is incorrectly specified. For instance, if the series is stationary with a breaking trend but treated as an integrated classification then it results in incorrect inferences. Fourth, empirical studies which employ the unit root hypothesis and co-integration procedures will lose their ground, again, if the time series variables are most likely to be

characterized by stationary with a breaking trend rather than non stationary or integrated model. Zivot and Andrews (1992), Banerjee, Lumsdaine, and Stock (1992) proposed an alternative procedure for testing unit root which also takes into account the possible presence of a structural break and provided empirical evidence which confirmed Nelson and Ploser's findings, in the sense that the results are mostly in favor of the integrated model.

Applying the procedure for testing the unit root hypothesis which allows for the possible presence of a structural break has at least two advantages. First, it prevents yielding a test result which is biased towards non rejection as suspected by Perron (1989). Second, since this procedure can identify when the possible presence of a structural break occurred, then it would provide valuable information for analyzing whether a structural break on a certain variable was associated with a particular government policy or other factors.

In this study, the Innovational Outlier (IO) unit root hypothesis test procedure proposed by Perron and Vogelsang (1992) is adopted. This test procedure is formulated as follows.

$$y_t = \mu + \delta DU + \theta D(TB)_t + \alpha y_{t-1} + \lambda_i \Sigma \Delta y_{t-j} + e_t \qquad 5.6$$

where y stands for the variable which is being tested. DU is a dummy variable. DU is equal to one if $t > T_b$ and zero otherwise. D(TB) is equal to one if $t = T_b + 1$ and 0 otherwise, while e_t is the error terms and t is a time period. Break time (T_b) is unknown, therefore it is determined through minimizing the t- statistic for testing $\alpha=1$, while k or the number of lag is determined based upon the F- statistic to evaluate the significance of

any additional lag.[29] The null hypothesis of unit root is conducted by testing $\alpha=1$ which also reflect $\delta=0$, when the above equation is estimated by the ordinary least square (OLS) method.

Given that the data are integrated at order one or non stationary at the level, however, the linear combination of non-stationary variables might be stationary which reflects the presence of a steady long run equilibrium among variables in the co-integrated system. In empirical studies, the standard residual based test for co-integration is widely applied for testing the stationarity of the residuals which result from cointegration regression. Meanwhile, on the statistical front, a number of alternative tests for co-integration have been developed, among others: Phillips and Oullaris (1990), Campos, Erricson and Hendry (1996), and Gregory and Hansen (1996).

The standard residual based test for co-integration can be formulated:

$$y_t = \mu + \alpha_i x_{i\ t} + e_t \qquad 5.7$$

where y is the dependent variable in the cointegration regression, x_i is the independent variables, e is the residuals, and t is the time period.

The test is designed to examine the null hypothesis of no co-integration against the alternative hypothesis which reflects the presence of co-integration among the variables in the co-integrated system. The variables are assumed to be co-integrated if the estimated residual (e) obtained from the above regression is stationary. The two step procedure proposed by Engle and Granger (1987) suggested employing the Augmented Dickey-Fuller unit root testing procedure (ADF) for testing the stationarity of the estimated residuals (e).

[29] See Jacques (1995)

There are a number of alternative procedures for testing the existence of co-integration among the variables in the cointegrated system. The procedure proposed by Gregory and Hansen evaluates the Phillips procedure (Z_α and Z_t) in a multivariate case. This procedure offers a more general type of co-integration in the sense that it deals with the presence of single unknown breakpoint in the sample period. They argued that in the presence of a regime shift, the conventional tests for co-integration which are based on the assumption that under the alternative hypothesis, the co-integrating vector is time invariant, is not appropriate. However, they reminded us that this type of hypothesis does not allow us to draw any conclusion related to whether a regime shift did occur or not, because the alternative hypothesis still refers to standard co-integration in the absence of a regime shift (Gregory and Hansen 1996: 117). This procedure is claimed to be able to provide a useful instrument for empirical researchers to employ the correct model specification. As Gregory, Nelson and Watt (1994) noted the power of standard ADF test for co-integration falls significantly if the series exhibits a structural break. As an extension of the standard residual based co-integration test, the Gregory and Hansen procedures can be formulated as follows.

$$y_t = \mu + \alpha_i x_i + e_t \qquad 5.8$$

As the conventional procedure test for co-integration, the co-integration test proposed by Gregory and Hansen (1996) is also conducted on the basis of stationarity tests on the residual estimated from the above regression. To accommodate to the presence of a structural shift, a dummy variable (dv) is introduced which allows level shift with or without trend and regime shifts. On the basis of the above standard test, the model is modified as follows:

Alternative 1, model with level shift:

$$y_t = \mu_1 + \mu_2\, dv \;\; + \alpha_i\, x_i + e_t \qquad 5.9$$

Alternative 2, model with level shift and trend (t):

$$y_t = \mu_1 + \mu_2\, dv \; + \beta\, t \;\; + \alpha_i\, x_i + e_t \qquad 5.10$$

Alternative 3, model with regime shift:

$$y_t = \mu_1 + \mu_2\, dv \; + \beta\, t \;\; + \alpha_{1i}\, x_{1i} + \alpha_{2i}\, x_{2i} + e_t \qquad 5.11$$

The procedure of determining breakpoint time (T_b) is similar to that applied by Zivot and Andrew in the sense that T_b is chosen on the basis of minimizing t_α which gives the highest chance of rejecting the null hypothesis. If the breakpoint is known through appealing to the data history, then the modified models proposed by Gregory and Hansen (1996) above can be solved by the OLS and the estimated residual (e) can be tested by the standard unit root procedure recommended by the Engle and Granger (ADF-test).

Campos, Ericsson and Hendry (1996) introduced another procedure for co-integration testing in the presence of a structural break. Unlike the testing procedure mentioned earlier which evaluated the stationarity of the estimated residual derived from regression of time series at level, this procedure is based on the estimated error correction model. This procedure can be viewed as an extension of the co-integration test procedure proposed by Banerjee, Donaldo, Hendry, and Smith (1986) which also based upon t-ratio of the coefficient on the error correction mechanism, in the sense that it encounters a structural break. This procedure is formulated as follows.

$$\Delta y_t = a\Delta z_t + b\,(\, y - \lambda z\,)_{t-1} + \varepsilon_t$$

$$z_t = \rho z_{t-1} + \delta\, D_t + u_t$$

where the dummy variable (D_t) is defined:

$D_t = 1$ if $t = T_o + 1, \ldots, T_1$ and 0 otherwise.

Another approach for co-integration testing was introduced by Johansen (1988) and extended by Johansen and Juselius (1990). Under this procedure it is assumed that all variables are endogenous in a vector autoregressive framework. Therefore, the results will be invariant in respect to the direction of normalization. The Johansen method also enables us to estimate all of the linearly independent cointegration vectors. Furthermore, certain restrictions could be imposed on cointegration vectors which result in the Johansen procedure being able to evaluate the appropriateness of the sign and size as suggested by economic theory.

Let $s_t = a'x_t$

where x_t is vector of time series and cointegrated at order k,p, $p>0$ and s_t is integrated at order 0. Regress Δx_t and $x_{t-q \text{ on }} \Delta x_{t-i}$ to get the associated n element of residual vector R_{ot} and R_{q0}. Solve $aS_{qq} - S_{qo}S_{oo}'S_{oq} = 0$, to obtain the test statistic for the number of cointegrating vectors. $S_q = T\Sigma R_{it} R_{jt}$, i,j=0,q

A valid error correction mechanism exists if the variables in the system are cointegrated. As noted in the Granger representation theorem, any co-integrated series has an error correction representation. However, Hendry (1980) argued that a valid error correction mechanism still exists even when the variables are not cointegrated. Given the specified variables in the system are cointegrated, then it is justified to employ the error correction mechanism (ECM) procedure. First used by Sargan (1964) and popularized by Engle and Granger (1987), ECM is designed to provide a mechanism to correct any deviation of the short run behaviour from the long run equilibrium path.

Let N x 1 is vector 1 which is co-integrated at rank r

A(1) has rank r and $A(0)= I_N$

$A(B)x_t = e_t + m$, where m represents the number of parameters

It exists N x r matrices, and error correction representation with:

$z_t = \alpha' x_t$, with r x 1 vector of stationary random variables.

$A^*(B)(1-B)x_t = - \gamma z_{t-1} + e_t + m$, where $A^*(0)= I_N$

Since the conventional test for co-integration resulting from testing over the estimated residuals is derived from the cointegration regression, therefore, the procedure in estimating the long run coefficients in the equation might have a substantial effect on the outcome of the co-integration test as well as the ECM equation. However, the issue regarding the procedure for estimating the long run equilibrium of the model also remains unsettled. Despite the property of time series data which are mostly not stationary at level, many researchers still employ the standard ordinary least square as an instrument to estimate parameters for the long run equilibrium.

Since the true value of the coefficients (b's) are unknown, then they can be estimated by the ordinary least square (OLS) method. If Y and X's are co-integrated which can be dictated from the stationarity of the OLS residuals, then ECM can be applied.

The long run equilibrium is expressed in the following form.

$$Y_t = a + b_i X_{i\,t} \qquad 5.12$$

and the estimated long run equilibrium can be expressed

$$\hat{Y}_t = a + b_i X_{i\,t} + e_t \qquad 5.13$$

The estimated residuals (e_t) is the difference between the actual value of Y and the estimated value of Y,

$$e_t = Y_t - \hat{Y}_t \qquad 5.14$$

substituting $\hat{Y}_t$ with equation 5.13

$$e_t = Y_t - (a + b_i X_{i\,t}) \qquad 5.15$$

The short run model with the ECM

$$\Delta \hat{Y}_t = \alpha + \sum_{i=1}^{n} bi\, \Delta Y_{t-i} + \sum_{i=1}^{n} \delta i\ \Delta X_{t-i} + d\, e_{t-1} + V_t \qquad 5.16$$

where $e_t = Y - \hat{Y}$ represents the error correction mechanism (ECM).

The ECM can also be expressed in the unrestricted form, where both the short run and long run parameters can be presented simultaneously as follows.

where e_{t-1} is derived from $Y_{t-1} - \hat{Y}_{t-1}$

rewrite $e_{t-1} = Y_{t-1} - (a + b_i X_{t-i})$ 5.17

substitute e_{t-1} in equation 5.17 into equation 5.16,

$$\Delta \hat{Y}_t = \alpha + \sum_{i=1}^{n} bi\, \Delta Y_{t-i} + \sum_{i=1}^{n} \delta i\ \Delta X_{t-i} + \phi\,(Y_{t-1} - (a + b_i X_{t-i}) + U_t \qquad 5.18$$

where the new intercept or $\gamma_0 = (\alpha - \phi\, a)$, the error term or the coefficient of ECM (d) is equal to ϕ, and $\gamma_i = \phi\, b_i$. Rewriting the equation 5.18, the unrestricted ECM is formulated as follows.

$$\Delta \hat{Y}_t = \gamma_0 + \sum_{i=1}^{n} bi\, \Delta Y_{t-i} + \sum_{i=1}^{n} \delta i\, \Delta X_{t-i} + \phi\,(Y_{t-1} - \gamma_i\ X_{t-i}) + U_t \qquad 5.19$$

where U_t is the random error.

The Temporal Causality Test

The temporal causality test employed in this study is adopted from the test procedure proposed by Engle and Granger (1987). As mentioned before the restricted ECM is formulated as follows.

$$\Delta \hat{Y}_t = \alpha + \sum_{i=1}^{n} bi\, \Delta Y_{t-i} + \sum_{i=1}^{n} \delta i\ \Delta X_{t-i} + d\, e_{t-1} + V_t \qquad 5.20$$

where Y Granger- causes X if the coefficient of X or the δ's is jointly significant or the coefficient of the error term (d) is statistically different from zero. To evaluate whether X Granger-causes Y, then the above equation can be rewritten:

$$\Delta \hat{X}_t = \varphi_0 + \sum_{i=1}^{n} \varphi i_i \Delta X_{t-i} + \sum_{i=1}^{n} \pi_i\, \Delta Y_{t-i} + \varphi_2\, e_{t-1} + U_t \qquad 5.21$$

Similarly, X is considered Granger-causes Y when π's is jointly significant or if the coefficient of the error term (φ_1) is statistically different from zero. Clearly, X is considered Granger-causes Y even when π's is not jointly significant but the coefficient of the error term (φ_1) is statistically different from zero.

5.6 Conclusion

Despite their limitations, econometric methods remain intensively employed in applied economics, mainly because econometrics introduces various instruments for describing economic relationships in a quantitative way such as estimating the sign and the size of the parameters, as well as providing instruments for forecasting purposes, etc.. The awareness of the limitations of econometric models for estimation of the parameters or forecasting purposes is useful in searching for the optimal model and deriving more appropriate conclusions for policy analysis as well as forecasting purposes.

In this study, some of banking and monetary aggregates will be tested to see whether they are still reliable for conducting monetary policy in the presence of banking deregulation. Therefore, the recent econometric test procedures particularly a unit root test and a cointegration test which allow for a possible structural break are considered important to capture the impact of banking deregulation.

The test procedure proposed by Perron and Vogelsang (1992) the so-called the innovational outlier (I-O) procedure is chosen to carry out the unit root test, along with undertaking conventional test procedures such as the Dickey-Fuller (DF) and Augmented Dickey Fuller (ADF) test procedures. Allowing for the presence of a possible structural break, the I-O procedure could prevent any bias towards non rejection of the null hypotheses. The I-O procedure is also able to determine when a possible structural break occured. Therefore, it would be a useful instrument to evaluate whether the presence of a possible structural break of the variables particularly banking and monetary aggregates corresponds to particular policies such as banking deregulation, etc..

The test procedure for cointegration which allows a possible presence of a structural break is carried out, along with other test procedures for cointegration, to evaluate the existence of a stable long run relationship between banking/monetary aggregates and the specified variables. The cointegration test procedure which allows for a possible presence of a structural break introduced by Gregory and Hansen (1996) is adopted to prevent any bias towards non rejection of the null hypotheses.

Having applied a test procedure for unit root and cointegration, the error correction mechanism (ECM) procedure is a fruitful exercise particularly when the data exhibit unit root problems but a stable long run relationship still exists. This procedure also provides an instrument for conducting a test for temporary causality among the variables in the system, which is useful for policy analysis.

CHAPTER 6

BANKING DEREGULATION AND BANKING AGGREGATES: AN ECONOMETRIC ANALYSIS

6.1 Introduction

In previous chapters, it was argued that banking deregulation in Indonesia was initially focused on boosting mobilization of savings through easing interest rate controls, eliminating barriers to entry as well as relaxing requirements for opening of new branches and stimulating product innovations. The implementation of banking deregulation was not preceded or immediately followed by adequate prudential regulation designed for maintaining public confidence, which is regarded as the most important factor in determining bank survival and promoting savings.

The main purpose of this chapter is not merely to evaluate the behaviour of banking aggregates in response to banking deregulation, but also to examine the possibility of using these aggregates as a guide for the conduct of monetary policy.

The organization of this chapter is as follows. Section 2 presents the econometric analysis, and section 3 presents some concluding remarks.

6.2. Banking Deregulation and Banking Aggregates: Econometric Analysis

It is argued that most developing countries are still subject to a domestic saving constraint in enhancing economic growth. Setting deposit rates under their market rates would discourage savings as well as constrain the supply of credits. To encourage savings, therefore, real deposit rates should be set at positive rates through setting nominal deposit rates above the prevailing inflation rates. It is suggested that stabilization

policy is an important part of deregulation policy, particularly in keeping inflation rates under control. The empirical investigations on the impact of deregulation particularly of interest rates on savings and investment, however, still come up with different conclusions.

6.2.1. Savings

MacKinnon and Shaw's (1973) hypotheses have been intensively tested with various econometric specifications and types of data. Several studies using cross country time series data reported ambiguous conclusions. The early study in this area by Fry (1978), revised (1988) and (1995) found positive effects of real interest rates on savings.[30] However, the interest elasticity was relatively small, so that it is not significant for policy recommendations, since small interest elasticity requires the bank to set deposit rates higher in order to achieve the same level of savings growth target. [31] Giovannini (1983, 1985) and Gupta (1987) found that the effect of real deposits on savings was either positive but statistically insignificant, positive and significant or negative but statistically insignificant.

---

[30] Initially Fry used domestic savings as a dependent variable, but in 1988 he used national savings instead.

[31] Despite the statistical significance, real deposit rates in predicting savings, Fry (1988) reported that interest elasticity is only around 0.1 percentage point. It means that on average, 1 percent increase in deposit rates only results in 0.1 percent increase in national savings.

Deaton (1990) pointed out that " the value of these sort of cross country studies is in any case dubious, particularly given the data problems, and several of the studies do not reach econometric standards that would allow the reader to take their results at face value". Studies on a specific country "in fact produced large and quite significant interest elasticities with respect to saving and investment. At the same time there are significant variations in the magnitude of measured elasticities among countries, suggesting that data should not be pooled without considerable caution" (Athukorala 1996, 3).

Studies conducted in a specific country with regard to the impact of interest rates on savings, however, also do not yield unanimous conclusions. Evaluating financial liberalization in Uruguay, De Melo and Tybout (1985) estimated the effect of real interest rates on aggregate domestic savings and domestic private savings. The result suggested a positive but insignificant effect of real interest rates on aggregate domestic savings, and negative but not significant effect on domestic private savings.

Ritterberg (1988) found that the sign and magnitude of real interest rates changes with different sample sizes or different functional forms. It suggests that real deposit rates indeed had a significant impact on savings but at decreasing rates.

Fernado (1991) reported some studies which supported the McKinnon and Shaw hypothesis where the impact of real interest rate is statistically significant and sizeable (between 1 and 1.7) relating to both private savings and investment.

Evaluating the impact of real deposit rates on national aggregate savings, however, has some weaknesses particularly if it is implemented in developing countries where public savings has a substantial contribution in formulating aggegate savings. Public saving generated by government as a result of a surplus in domestic revenue over

routine expenditure more likely will be independent of the real interest rates. Athukorala (1996) argued that the assessment of saving behaviour for developing countries on the basis of total domestic savings is unsatisfactory because public savings mostly contributed significantly to total savings. Since public savings are independent of interest rate movements, then the inclusion of public savings tends to obscure the positive impact of interest rates on savings. Along with estimating total saving and private saving functions, he estimated financial savings separately for investigating the possibility of substitution between financial assets and total assets, and evaluating the link between deposits rates and investments which operates through the supply of credits.

In this regard, since this study is designed to evaluate the impact of banking deregulation on banking aggregates i.e. savings and credits, the assessment of savings in response to interest rates will be focused on savings mobilized through the banking system. In the context of deriving policy recommendations, the saving function proposed in this study would enable us not only to derive policy recommendations related to mobilization of savings in the banking system, but also assess the possibility using this to facilitate monetary policy. Clearly, the saving function is designed for analyzing saving behaviour, and examining the possibility of using it as a guide for conducting monetary policy. This is due to the following reasons. First, savings mobilized through the banking system are more controllable by the Central Bank compared to other definitions of savings such as total domestic savings, private savings, financial savings, etc.. Second, savings employed in this study are derived from the liability side of commercial banks' balance sheet, so this aggregate is definitely more observable by the monetary authority then total domestic savings, private savings or financial savings.

The specification of the saving model is modified from the model proposed by Gavin, Hausmann and Talvi (1997). Along with deposit rates, real income is considered to be the scale variable, and the price level represents the opportunity cost of holding financial assets. Meanwhile, since Indonesia liberalized its capital accounts, then to capture the impact of international factors on domestic savings, particularly savings in the banking sector, nominal exchange rates will be introduced as a determinant of savings. The proposed saving function, then can be formulated as follows.

$$S = f(Y, R, P, E)$$

where, S represents Savings mobilized by the banking system, Y is real income, R stands for nominal deposit rates (3 month deposit rates), P is the price level, and E is exchange rates. The coefficients of real income, price levels and deposit rates are expected to be positive, while the coefficient of nominal exchange rates is supposed to be negative. Real income is expected to have positive relationship with savings because an increase in real income tends to increase the ability to save. The interest rate variable is expected to have a positive sign particularly in the post banking deregulation period when interest rate is freely market determined. Meanwhile, the coefficient of price level and exchange rate variable could be either positive or negative which mostly depends on the ability of banking system to maintain public confidence.

Empirical Results

Unlike the standard unit root test, applying the test procedure proposed by Perron and Wogelsang (1991), is not only to examine the property of the data series but also to determine when the possible structural break of a particular variable occurred. With regard to testing cointergation, the test procedure which allows the presence of a

structural break proposed by Gregory and Hansen (1996) is also adopted to prevent any bias towards non rejection.

Unit Root Test

The empirical results show that all variables with the exception of price levels are non stationary at level. On the basis of the unit root testing which allows a possible structural break (I-O procedure) with respect to the savings variable, it suggests that the most possible structural break occurs in the period after the second banking deregulation when broader deregulation was introduced (see Table 6.1).One plausible interpretation of this result is that the second deregulation had a more substantial impact on stimulating saving than the first one when banking deregulation only dealt with liberalizing interest rates and eliminating credit ceilings.

Table 6.1 Unit Root Test - Innovational Outlier (IO) Procedure[32]

	T_b	K	μ	δ	θ	α	t_α
DD	79	4	0.2133	0.0292	-0.0393	0.9800	-3.5281
	1989q2		(4.2098)	(2.0680)	(-0.8833)		
TD	79	4	0.2801	0.0405	-0.0532	0.9730	-3.4890
	1989q2		(4.1315)	(2.0757)	(-0.7866)		
SD	78	4	0.1607	0.0309	0.0013	0.9851	-3.2109
	1989q1		(3.6343)	(2.4349)	(0.0321)		
Total	79	4	0.1269	0.0227	0.0033	0.9912	-2.5307
Savings	**1989q2**		(3.2038)	(1.8567)	(0.0982)		
Cr	77	4	0.1042	0.0191	-0.0106	0.9926	-1.8748
	1988q4		(2.7451)	(1.3098)	(-0.2696)		

Critical value of t_α for testing α=1 at 5% level is -4.44

[32] This procedure is formulated: $\Delta x(t) = \mu + \delta T + \alpha x_{t-1} + \beta i \Sigma \Delta x_{t-j} + e_t$. More detail of this procedure is presented in Chapter 5.

Cointegration Test

Table 6.2 shows that the standard coitegration test without introducing possible structural breaks cannot reject the null hypothesis of no cointegration among the specified variables. However, when the possible presence of structural break was introduced, the null hypothesis of no cointegration can be rejected at the 10% level. It suggests the existence of a stable long run relationship between savings and its determinants after considering the impact of deregulation in the banking sector.

Despite the presence of a stable long run relationship and the fact that the interest rate is statistically significant in explaining savings, however, the sign is negative for the full sample period and the sub sample before banking deregulation (1970q1-1983q2). Meanwhile, in the sub sample after banking deregulation (1983q3-1996q4), the coefficient of interest rates is positive but its magnitude is low in the sense that the elasticity with respect to changes in interest rates is considered to be relatively low which is less than one. It suggests that if the interest rate was designed as an instrument to stimulate savings, it will require substantial changes in interest rates.

Table 6.2 Cointegartion Test for Savings

Variables in the co-integration regression (S , Y, P, R and E)

Without Structural Shift		With Structural shift			
		Level shift		Level and Time Shift	
Variable	Coefficient	Variable	Coefficient	variable	Coefficient
Constant	-0.505	Constant	-0.734	Constant	3.367
Y	1.468	Y	1.093	Y	0.192
P	1.075	P	1.040	P	0.754
R	-1.008	R	-0.146	R	-0.097
E	-.0334	E	-0.419	E	-0.016
		DV	0.314	DV	0.118
				T	0.037
$\overline{R}^2$	0.99	$\overline{R}^2$	0.99	$\overline{R}^2$	0.99
DW	0.25	DW	0.35	DW	0.28
DF	-2.50	DF	-3.08	DF	-3.26
ADF	-3.91	ADF$^+$	-4.60*	ADF$^+$	-4.74*

Note: all variables are in logarithmic form, except for DV and T which stand for a dummy variable and a time trend. ADF Critical Value (10% level) = 4.52.

Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively.

Table 6.3 The estimated Long Run Equilibrium for Total Savings

	Full Sample (1970q1-1996q4)		Sub Sample (1970q1 - 1983q2)		Sub Sample (1983q3 -1996q4)	
Regressor	**Phillips-Hansen**	**OLS**	**Phillips-Hansen**	**OLS**	**Phillips-Hansen**	**OLS**
Intercept	3.4227	-2.150	4.047	-0.5045	-5.719	-3.498
Y	0.329	0.382	0.242	0.3147	0.974	0.959
	(0.310)	(0.617)	(0.106)	(0.251)	(3.387)***	(2.043)**
P	1.217	1.368	1.466	1.4556	0.723	1.739
	(1.124)	(1.712)	(1.349)	(2.433)**	(1.070)	(3.509)***
R	-1.062	-1.256	-1.865	-1.4585	0.255	0.125
	(-2.681)***	(-3.90)***	(-2.798)***	(-3.90)***	(3.249)***	(2.135)**
E	-0.311	-0.304	-0.358	-0.3812	-0.420	-0.242
	(-0.464)	(-0.329)	(-0.196)	(-0.367)	(-2.728)***	(-2.131)**

Note: All variables are expressed in logarithmic forms.

Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively

Numbers in the parentheses are t-statistic

Error Correction Mechanism (ECM)

Table 6.3. shows that income and interest rates are statistically significant in determining saving only in the post banking deregulation sub sample period. Examining the magnitude of the interest rate coefficient (β_3), the result suggests that the null

hypothesis (H_o : $\beta_3=0$)[33] can be rejected at 5% level in the period of post banking deregulation (1983q4-1996q4). meanwhile, comparing income elasticity in sub sample periods indicates that income elasticity in the post 1983 banking deregulation sub sample period (1983q3 to 1996q4) is significantly higher than that in the pre banking deregulation sub sample period (1970q1 to 1983q2). This empirical evidence to some extent supports the view that under a regulated banking system, savings mobilized through the banking system were discouraged. This results also confirm the claim advocated by Cole and Slade (1995) that in the period of pre banking deregulation, part of the income generated during oil boom period was invested in overseas financial institutions. Interest elasticity also increases in the post banking deregulation sub period which reaches around 0.12 to 0.25. Meanwhile, in the pre banking deregulation sub sample period (1970q1 to 1983q2) the interest elasticity was negative. It suggests that setting the deposit rate to reach its market clearing level which yields positive real interest rates as promoted by banking deregulation, to some extent has positively encouraged people to save their money in domestic banks. There are some possible reasons why interest rate in the pre banking deregulation period (1970q1-1983q2) has negative coefficient. Firstly, the interest rate was administered to be mostly below the prevailing inflation rates and yielded negative real interest rates. It obviously discouraged people from investing their money in financial assets particularly in terms of deposits in the banking system. As argued by Mckinnon and others, allowing interest rates to obtain their market clearing level which resulted in positive real deposit rates would stimulate people

[33] Against the alternative hypothesis (H_a : $\beta_3>0$)

to invest their money in the form of financial assets including saving instruments provided by banking system. It is important to note that since the interest rate elasticity is relatively low, it is not sensible to use interest rates as a strategy to boost savings. The policy implications arising from this empirical result is that inflation rates should be maintained at a low level so that positive real interest rates can be achieved at relatively low nominal interest rates. In addition, achieving positive real interest rates at such relatively low nominal interest rates would not heavily discourage investment which is considered the important channel for supporting economic growth. This is parallel to McKinnon's view where he suggests if market liberalization leads to excessive increases in interest rates, then the government might intervene in order to reach more reasonable rates. McKinnon's advice, however, only seems sensible if the government can manage inflation which still enables the banks to offer positive real deposit rates otherwise the effort to promote saving would suffer. Secondly, the nominal interest rate is not an appropriate determinant of savings in that particular period, since it was determined by the central bank. While employing the real interest rate does not produce a better result (see for example: Fernando 1991), searching other variable as a proxy is constrained by the appropriateness and the availability of data particularly in the period of pre banking deregulation. Meanwhile, nominal exchange rates are statistically significant in explaining the variation of savings, particularly in the sub sample period after banking deregulation (1983q3 to 996q4).

In the deregulated environment, commercial banks were allowed to provide banking deposits particularly demand deposits and time deposits in foreign currency denominations. Under such circumstances, since public confidence in domestic banks

remain unchanged, there is no plausible reason for capital flight in response to exchange rate fluctuations because savings in domestic currency can be converted into savings in foreign currency denomination. In general, keeping their accounts in domestic banks in foreign currency denominations safeguarded people from risk due to exchange rate fluctuations, and it is more profitable, since domestic banks mostly offered higher deposit rates than overseas banks. Briefly, under the deregulated banking system if the banks could create an environment which enabled them to maintain public confidence on domestic savings, the public response to the exchange rate variations would only be reflected in the structure of savings in terms of currency denominations (domestic and foreign currency). In this case, if the return of keeping banking accounts in domestic currency is considered smaller than for foreign currency due to the deterioration of the domestic currency, the plausible solution is just simply to convert existing banking accounts from domestic currency into foreign currency accounts in domestic banks,[34] and the total savings in the domestic banking system remain unchanged. In this regard, it is important to note that the government should consistently ensure prudential regulation which enables it to guarantee the banking system will undertake sound and efficient banking practices (Gavin, Housmann and Talvi 1997).

[34] Under these circumstances, there will be shifting from non foreign exchange to foreign exchange banks, since the former are not allowed to provide banking accounts dealing with foreign exchange services, including to provide banking accounts in foreign currency.

Table 6.4 Error Correction Equation: Savings

Full Sample: 1970q1-1996q4		**Sub Sample 1970q1-1983q2**	**Sub Sample 1983q3-1996q4**	
Regressor	Coefficient			
Constant	0.075		Regressor	Coefficient
ΔY	1.283	None of the parameters are statistically significant	Constant	0.374
	(1.917)*		ΔS_{t-4}	0.185
ΔY_{t-4}	-1.735			(3.323)***
	(2.768)*		ΔE	- 0.185
				-(2.135)**
R-Bar-Squared	0.07		ΔE_{t-1}	0.185
S.E. of Regression	0.17			(2.159)
F-stat. F(4, 100)	4.79**		ECM_{t-1}	-0.130**
				(2.159)
DW-statistic	1.81		R-Bar-Squared	0.29
RESET	0.72		S.E. of Regression	0.03
			F-stat. F(4, 47)	6.67**
			DW-statistic	1.45
			RESET	0.15

The short run relationships between savings and its determinants produce some interesting results. First, in the sub sample before banking deregulation period (1970q1-1983q3) none of the short run parameters are statistically significant. Second, interest rates are not significant in explaining the short run variations of savings for all samples. It implies that in the short run interest rates cannot be used as a strategy to stimulate the efforts in mobilization of domestic savings through the banking system, even in a deregulated environment. Third, the role of exchange rates in determining savings in the short run is statistically significant only in the post banking deregulation sub sample

period. This reflects the behaviour of savings in response to exchange rate variations where in the short run it is significantly affected by the short run movement of exchange rates. R-Bar-Squared for the full sample is considered low mainly because the impact of pre banking deregulation periods where none of parameters are statistically significant. RESET applied in this study is in the linear form, where the critical value is 2.25. It suggests that there is no specification error in the saving function.

As discussed earlier, savings in the banking sector prior to banking deregulation were not only restricted by interest rate controls, but also indirectly discouraged by the availability of liquidity credits provided by the Central Bank as a source of funds in extending credits. Therefore, it is important to use some caution in interpreting the empirical results particularly in deriving policy recommendations on the basis of the temporal causality test. Prior to the first banking deregulation in 1983, mobilization of domestic savings through the banking system was not a top priority. The source of funds was still largely supported by revenue generated from the oil and gas sector along with foreign debt. Under such circumstances, as noted by Cole and Slade (1995) savings grew sluggishly despite the high growth in the economy during that particular period. Therefore, it is not surprising, if in the pre banking deregulation sub sample period, the temporary causality test does not produce strong causality between savings and real income. Under such circumstances, Gavin, Housmann and Talvi (1997) argued that government policies should be directed toward the removal of constraints in the real sector which limit investment or economic growth. However, the results should be interpreted with caution, since savings and income relationships could exist contemporaneously instead of in leading or lagging form. This is case for the Indonesian

experience particularly in the pre deregulation sub sample. Therefore, such policy recommendations as suggested by Gavin, Housmann and Talvi (1997) cannot be derived directly and rigidly based upon the empirical test results without considering the policy background on saving mobilization in the banking sector. Since savings in the banking sector especially in pre banking deregulation period seemed deliberately not to be encouraged, then it is sensible if economic growth or real income are not significantly correlated to savings. In this case, economic growth was largely supported by oil and gas revenue and foreign borrowings. Meanwhile, the capital account which had already been liberalized opens the opportunity for domestic funds to search for more profitable alternatives such as financial investments in overseas financial institutions. Therefore, the existence of such policies to promote financial institutions and savings in particular are still regarded as important to stimulate economic growth. However, based upon the empirical findings above, some adjustments to policies to promote savings in the banking sector are required. First, since savings mobilized by the banking system are only slightly affected by interest rates at least in the short run, the commitment of government policy to maintain the inflation rate at a low level is regarded as an important element for creating a conducive environment under liberalized interest rate mechanism. The presence of stable inflation rates at low levels will enable interest rates at market clearing level which are still attractive not only for savers but also for investors as well. It also prevents the commercial banks from extending credits on the basis of adverse selection

which endangers the quality of bank assets particularly the quality of credits.[35] Second, in the deregulated banking environment, commercial banks are allowed to provide banking products designed to mobilize domestic savings in some major foreign currency denominations. Clearly, the impact of exchange rate fluctuations particularly in the long run will be largely absorbed and reflected in the shift in the structure of savings based on currency denominations, and leave the total savings in the banking system largely unaffected, unless public confidence in the domestic banks starts to diminish. Banking deregulation which is designed to promote savings, therefore, should be accompanied by the existence of policies which reflect a strong commitment to maintaining public confidence in domestic banks. In this regard, banking deregulation needs not only to be accompanied with such prudential regulations to provide guidelines for the banks to undertake sound banking practices, but also guarantees that those prudential regulations are consistently implemented. Since the banking sector in Indonesia has been widely deregulated, then it urgently requires more prudential regulations that are consistently implemented to create a conducive environment for promoting a prudent, sound and efficient banking system in order to facilitate building and maintaining public confidence in the domestic banks. Briefly, in the environment where the banking sector has been widely deregulated, the success in building and maintaining public confidence in the domestic financial institutions and the banking sector in particular, along with the existence of a strong commitment to setting a low inflation rate as one of essential

[35] The higher nominal interest rate on savings will require the banks to charge higher interest on credits. If the prevailing interest rate is considered too high, then only such high risk projects might be eligible to get credits from the banks.

economic targets, is the fundamental element to promote savings, as well as to prevent domestic funds from flowing to overseas financial institutions as capital flight.

With regard to the possibility of savings as a guide for the conduct of monetary policy, the temporal causality test results suggest that savings is not robust in predicting the future course of price levels or real income. Therefore, savings could not be employed as a guide for monetary policy when the inflation rate or real income is set to be the monetary policy objective.

Table 6.5. Temporal causality between Savings and the Specified Variables

Full Sample (1970q1 - 1996q4)

	ΣΔY	ΣΔP	ΣΔR	ΣΔE	ΣΔS	ECM $_{-1}$
ΔS	-1.491 [5.55]**	-	-	-	-	-
ΔY	0.347 [6.36]*** (1)	0.051 [10.89]*** (1,4)	-	-0.033 [9.70]*** (3,4)	-	-
ΔP	0.739 [32.41]*** (1,2)	-0.479 [27.10]*** (1)	-0.046 [6.24)** (3)	0.103 [8.95]*** (3)	-	-
ΔR			-	-0.303 [2.97]* (3)		-
ΔE	-	-	-0.325 [8.77]*** (1,3)	-	-	-

Table 6.5 (Contd) Temporal causality between Savings and the Specified Variables

Sub Sample 1970q1- 1983q2

	ΣΔY	ΣΔP	ΣΔR	ΣΔE	ΣΔS	ECM $_{-1}$
ΔS	-	-	-	-	-	-
ΔY		-0.022 [13.98]*** (2,4)	-	0.250 [9.75]*** (4)	-	0.167 [4.36]**
ΔP	0.341 [7.56]**	-	0.288 [17.31]***	-0.036 [9.90]** (1,4)	-	-
ΔR			-	-	-	-
ΔE	-0.506 [15.26]*** (1,3)	-	-	-	-	-

Sub Sample 1983q3- 1996q4

	ΣΔY	ΣΔP	ΣΔR	ΣΔE	ΣΔS	ECM $_{-1}$
ΔS	-	-	-	0.195 [4.74]** (1)	0.385 [9.21]***	-0.113 [-4.97]**
ΔY	-	-0.001 (6.77]** (1,4)	-	-	-	-
ΔP	-	-	-	-0.068 [3.92]* (1)	-	-
ΔR	-		0.368 [7.96]*** (1)	-0.670 [9.42]*** (3)	0.641 [3.35]* (1)	-
ΔE	1.224 [7.15]*** (2)	-	-	-	-	-

Note: Sign * , ** and *** indicate significant at 10%, 5% and 1% level respectively.

Numbers in brackets represent chi squared statistic- LM-statistic and numbers in the parentheses are lag of independent variables employed in the equation. All variables are in first difference (Δ) and expressed in logarithmic form.

6.2.2. Credit

In early 1980's, credit was proposed as a guide to conduct monetary policy in addition to monetary aggregates. The subsequent studies regarding this particular issue, however, still came up with different conclusions. Horne and Monadjemi (1985), Bullock, Steven and Thorp (1988), found that credit perform no better than monetary aggregates in conducting monetary policy.

Credits as a direct instrument of monetary policy in Indonesia is no longer available since credit ceilings was abolished in 1983. However, this study attempts to investigate whether credit still contains such valuable information for conducting monetary policy. The specification of credit applied in this study is the modification of specification proposed by Horne and Monadjemi (1985). They introduced real income and interest rates to be the main determinants of credit. In this study, the nominal exchange rate is included to capture the responsiveness of credit to changes in variations of exchange rates which is important for evaluating the effectiveness of monetary policy.

Empirical Results

Econometric procedures which allow for the presence of a structural break are preferred not only to prevent any bias towards non rejection, but also to search for information regarding when the possible presence of a structural break occurred.

Unit Root test

Applying the same econometric procedures as applied to savings, some interesting findings emerge. Firstly, based upon the I-O procedure proposed by Perron and Vogelsang (1991) the results suggest that the possible structural break of credits occurred

in December 1988 or a quarter earlier than savings (see Table 6.1). It is possible because the 1988 banking deregulation (Pakto 88) not only promoted savings but, also reduced substantially the reserve requirement from 15% to 2%. Clearly, credit was boosted by the increase in savings and the decrease in reserve requirements simultaneously.

Cointegration Test

Table 6.5 indicates that under the standard residual based for cointegration test, credit was not cointegrated with the specified variables. However, when the cointegration test procedure which allows for the presence of structural shift was adopted (the Gregory-Hansen procedure), the results suggest that the null hypothesis of no cointegration can be rejected at 10% level. Clearly, a stable long run relationship does exist between credit and the specified variables, only when the presence of a structural break was anticipated.

Error Correction Mechanism (ECM)/Temporal Causality Tests

Since credit is evaluated mainly with regard to its possibility to be an alternative variable for guiding monetary policy, the analysis is focused on the relationship with the variables presumed as the objectives of monetary policy. In the long run, the parameter of interest rates is significant to explain the variations of credits, however, its magnitude is considered low which could not warrant any policy recommendation. Under such circumstances, a substantial change in interest rates is required to obtain a certain change in credits. It implies that employing credits as a target of monetary policy would be either too costly or ineffective.

Table 6.6 Cointegration Test for Credits

Variables in the co-integration system (Cr , Y, P, R and E)

Without Structural Shift		**With Structural shift**			
		Level shift		Level and	Time Shift
Variables	Coefficients	Variables	coefficients	variables	Coefficients
Constant	-0.921	Constant	0.293	Constant	0.712
Y	1.419	Y	0.791	Y	0.774
P	1.028	P	1.132	P	1.102
R	-0.364	R	-0.021	R	-0.022
E	-0.483	E	0.0402	E	.0413
		DV	0.129	DV	0.247
				T	0.002
$\overline{R}^2$	0.98	$\overline{R}^2$	0.99	$\overline{R}^2$	0.99
DW	0.18	DW	0.52	DW	0.54
DF	-2.09	DF	-4.26	DF	-4.41
ADF	-3.31	ADF^+	-5.19^*	ADF^+	-5.29^*

Note: all variables are in logarithmic form, except for DV and T which represent a dummy variable and a time trend. ADF+ represents the modified ADF by allowing for level shift and without a time trend. ADF Critical Value (10% level) = 4.52.

Sign *, **, and *** indicates significant at 10%, 5%, and 1% level respectively.

Table 6.7 The Estimated Long Run Equilibrium for Credit

	Full Sample (1970q1-1996q4)		Sub Sample (1970q1 - 1983q2)		Sub Sample (1983q3 -1996q4)	
Regressor	**Phillips-Hansen**	**OLS**	**Phillips-Hansen**	**OLS**	**Phillips-Hansen**	**OLS**
Intercept	1.524	-0.382	1.764	-1.181	-1.602	-3.065
Y	0.356	0.717	0.139	0.928	0.607	1.089
	(1.606)	(2.367)**	(0.267)	(1.796)*	(1.032)	(2.25)**
P	1.479	1.497	1.655	1.371	1.746	1.460
	(11.550)***	(9.058)***	(6.573) ***	(5.58)***	(2.807)***	(2.857)***
R	-0.188	-0.346	-0.182	-0.496	0.208	0.223
	(-2.383)**	(-3.571)***	(-1.120)	(-3.29)***	(2.843)***	(3.719)***
E	-0.394	- 0.279	-0.056	0.119	-0.432	-0.306
	(-3.071)***	(--1.677)*	(-0.148)	(-0. .29)	(-3.035)***	(-2.616)**

Note: All variables are expressed in logarithmic forms.

Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively

Numbers in the parentheses are t-statistic

Table 6.8 Error Correction Equation: Credit

Full Sample: 1970q1-1996q4	
Regressor	Coefficient
Constant	0.033
ΔCr_{t-1}	0.261
	(3.432)***
ΔCr_{t-2}	0.177
	(2.449)**
ΔY_{t-2}	-0.258
	(-2.082)**
ΔP_{t-1}	0.333
	(2.471)**
ΔR_{t-2}	-0.107
	(-3.512)***
ECM_{t-1}	-1.735
	(2.768)*
R-Bar-Squared	0.46
S.E. of Regression	0.03
F-stat. F(4, 100)	15.28**
DW-statistic	1.58
RESET	0.34

Sub Sample 1970q1-1983q2	
Regressor	Coefficient
Constant	0.056
ΔR_{t-4}	-0.139
	(-2.001)**
ECM_{t-1}	-0.116
	(-2.469)**
R-Bar-Squared	0.13
S.E. of Regression	0.05
F-stat. F(2, 46)	4.67**
DW-statistic	1.07
RESET	0.36

Sub Sample 1983q3-1996q4	
Regressor	Coefficient
Constant	0.009
ΔC_{t-1}	0.518
	(4.958)***
ΔP_{t-1}	0.929
	(3.335)***
ΔR	-0.049
	(1.559)*
ΔE_{t-3}	-0.101
	(-1.832)*
ECM_{t-1}	-0.141
	(3.152)
R-Bar-Squared	0.45
S.E. of Regression	0.02
F-stat. F(5, 47)	9.43***
DW-statistic	1.95
RESET	0.85

Note: Numbers in the parentheses are t-statistic
Sign *, ** and *** indicate significant at 10%, 5% and 1% level respectively.
All variables are expressed in logarithmic forms.
Δ represents first difference, e.g. $\Delta Y = Y - Y_{t-1}$ etc.

Table 6.9 Temporal causality between Credit and the Specified Variables

Full sample (1970q1 - 1996q4)

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta C_r$	ECM $_{-1}$
ΔC_r	0.254 [3.77]*** (1)	0.348 [5.83]** (1)	-0.009 [9.28]** (1)	-	0.387 [27.52]*** (1)	-0.051 [5.68]**
ΔY	0.307 [11.21]*** (2)	-0.240 [36.11]*** (2, 4)	-	0.011 [18.20]*** (3, 4)	-	-
ΔP	-0.057 [42.23]*** (1, 2, 4)	0.628 [33.89]*** (1, 2, 3)	-	-0.085 [20.59]*** (1, 2, 3, 4)	-	-0.046 [9.02]***
ΔR	-	-	0.218 [4.62]** (1)	-	-0.060 [7.33]** (3, 4)	-0.099 [3.487]*
ΔE	-	0.341 [2.57]* (3)	0.232 [9.38]*** (1, 3)	-	-	-

Sub Sample 1970q1- 1983q2

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta C_r$	ECM $_{-1}$
ΔC_r	0.583 [10.47]*** (1)	-0.372 [4.91] (3)	-0.333 [17.91]*** (2, 4)	0.311 [8.92]*** (4)	0.458 [4.91]** (1)	-0.158 [-15.89]***
ΔY	-	-0.285 [5.33]** (4)	-	-0.094 [14.51]*** (3, 4)	-	-
ΔP	0.301 [9.27]*** (1)	0.341 [10.44]*** (1)	-0.350 [26.84]*** (3, 4)	-0.271 [18.90]*** (1, 2, 4)	-0.179 [12.91]*** (2)	-
ΔR	-	-	-	-	-	-
ΔE	-	-	-0.329 [11.60]*** (3)	-	-	-0.101 [-2.93]*

Table 6.9 (Contd) Temporal causality between Credit and the Specified Variables

Sub Sample 1983q3- 1996q4

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta C_r$	ECM_{-1}
ΔC_r	-	0.930 [10.14]*** (1)	-0.049 [2.61]* (4)	-0.101 [3.53]* (3)	0.518 [18.20]*** (1)	-0.141 [- 9.25]***
ΔY	-	0.315 [3.42]* (1)	-	-	-	-
ΔP	-	-0.221 [2.62]* (2)	-	-	-	-
ΔR	-	-	-	-0.503 [5.71]** (3)	-	-
ΔE	1.213 [7.20]*** (2)	-	-	-	-	-

Note: Sign * , ** and *** indicate significant at 10%, 5% and 1% level respectively.
Numbers in brackets represent chi squared statistic- LM-statistic and numbers in the parentheses are lag of independent variables employed in the equation. All variables are in first difference (Δ) and expressed in logarithmic form.

Applying the general to specific procedure proposed by Hendry, the temporal causality test results suggest that changes in credit could perform well in explaining the future course of the price level only in the sub sample before banking deregulation(1970q1-1983q2). It is sensible since under regulated system, credit was subject to ceilings imposed by the Central Bank which was designed to achieve the desired monetary targets In a deregulated environment, credit could not perform well in predicting changes in the price level. The temporal causality tests also indicates that credits did not perform well in predicting real income for all sample periods

6.3 Concluding Remarks

Although there are an enormous number of studies on saving behaviour, however, they mainly focused on evaluating the behaviour of savings in response to financial deregulation and interest rate deregulation in particular. Various definitions of savings have been employed such as domestic savings, national savings, private savings, financial savings, etc. By defining savings as deposits in the commercial banks and using recent econometric procedures, this chapter has analyzed the behaviour of savings in response to banking deregulation, as well as examining the reliability of banking aggregates including savings as a guide to conducting monetary policy.

Applying the standard residual based test for cointegration, neither for savings nor credit can we reject the null hypothesis of no cointegration. However, when the Gregory-Hansen procedure which allows for the possible presence of a structural break was adopted, the null hypotheses can be rejected at the 10% level for both savings and credit.

With regard to the behaviour of savings some interesting findings emerged. First, the possible presence of a structural break of savings occurred in the second phase of banking deregulation (October 1988). It implies the second banking deregulation had a more substantial impact on stimulating savings than the first one. In other words, interest rates were less effective as a strategy to enhance savings compared to non price strategies such as product diversification, innovation, etc. which were intensively promoted in the 1988 banking deregulation. In fact, nominal deposit rates in the periods following Pakto 88 were lower than in the periods following Pakjun 83. The policy implications arising from that finding is that the strategy to promote savings in the banking sector should emphasize improving the banks' ability to provide better banking products in terms of

quality and quantity, along with creating and maintaining public confidence. The latter requires the existence of prudential regulation which is consistently implemented. Second, savings did not perform well as a guide for conducting monetary policy, since savings tend to be lagging rather than leading real income. In addition, a bi-directional relationship was also absent between savings and inflation rates. However, savings is eligible as a guide for monetary policy if real income is regarded as the objective of monetary policy.

Applying the same procedures, the results suggest that credit aggregates perform slightly better in facilitating monetary policy particularly when the price level is presumed to be the objective of monetary policy in the pre banking deregulation period. Meanwhile, the interest elasticity of credits was considered low, suggesting that to employ credits as a policy target would be either too costly or ineffective.

CHAPTER 7

BANKING DEREGULATION AND MONETARY AGGREGATES

7.1. Introduction

As mentioned in the previous chapter banking deregulation has a significant impact on banking and monetary aggregates. With regard to employing monetary aggregates as a guide for the implementation of monetary policy, Friedman (1956), noted that any study on the demand for money to facilitate the conduct of monetary policy is based upon the assumption that money has a stable long run relationship with real wealth or real income and its opportunity cost. However, even though the demand for money with respect to its determinants is very crucial for its reliability in facilitating policy operations, it is still remains unclear what happens to the demand for money after deregulation (Huang 1994).

Despite the impact of banking deregulation, banking and monetary aggregates still have some advantages as a guide to monetary policy, particularly in terms of the observability and controllability aspects compared to other variables such as nominal income (Milbourne 1990). In this regard, it is important to examine whether monetary aggregates still contain such reliable information as a guide for the implementation of monetary policy. The main purpose of this study is to investigate the existence of the demand for money in various definitions which could facilitate the conduct of monetary policy, by applying recent econometric techniques which allow for the presence of a possible structural break.

The organization of this chapter is as follows. Section 2 provides a brief overview regarding general approaches to building demand for money functions and section 3 overviews the existing demand for money estimations for Indonesia. Section 4 presents the proposed demand for money estimations, and the final section contains some concluding remarks.

7.2 A Brief Overview of Demand for Money

Despite the differences in point of view, economic theories put the concept of demand for money as the central issue in analyzing monetary problems. In classical theory, prices and wages are assumed to be flexible to response to demand and supply forces which maintain the economy in equilibrium. The price level is simply determined by the supply of money which can be described with the following identity:

$$MV = PT \qquad 7.1$$

where M stands for money supply, V is velocity of money in circulation, P is price level, and T is total transactions. The left hand side represents total expenditure while the right hand side indicates the total value of goods and services. Since V is considered to be constant at least in the short run and T is fixed due to the full employment assumption, then it is obvious from the identity that the price level is only determined independently by the monetary authority through setting the money supply.

The Cambridge School introduced the "cash balance theory" which is expressed with the identity:

$$M = k\,PY \qquad 7.2$$

k stands for the fraction of income which people want to hold in money (cash), and Y stands for output in the current period or real income, then the right hand side can treated

as demand for money. Therefore The Cambridge equation can be viewed as the monetary sector equilibrium where supply of money is equal to demand for money.

In the classical view, the function of money is limited to facilitating transactions. The interest rate is completely absent in the classical demand for money, since people will not demand money for its own sake but solely to finance transactions. In another words, the money market (supply of and demand for money) only determines the price level while the interest rate is determined in the goods market.

Keynes (1936) introduced other motives for people to hold money and classified these into the transaction motive (M_t), precautionary motive (Mp) ,and speculative motive (Msp) which determine demand for money or liquidity preference.

$$M_d = M_t + Mp + Msp \qquad 7.3$$

Similar to the Cambridge model, the first and second motives for holding money (transaction and precautionary motives) are proportional to the income level, while the speculative motive is influenced by the interest rate. Keynes' monetary models can be expressed as follows :

$$Md = k\,PY + L(r) \qquad 7.4$$

$$Ms = M \text{ (exogenous)}$$

Equilibrium in money market (Ms = Md) will determine interest rate equilibrium.

$$M = k\,PY + L(r) \qquad 7.5$$

In the Cambridge model of the Quantity theory, a change in the money supply will be transmitted only through the transaction function of money (k PY), but in the Keynesian model such a change in the money supply will also be transmitted through the store of value function of money as reflected in the second determinant of the demand for money.

Advocated mainly by Friedman (1956), monetarists introduced a demand for money function which was formulated as follows:

$$Md = f[\, P, rb, re, 1/P\,(dP/dt), h, u, Y \,] \qquad 7.6$$

Friedman includes forgone yields or opportunity cost if people decide to hold money as determinant of demand for real balances. These include yields from holding bonds (rb), equities (re) and physical goods [1/P(dP/dt)]. Monetarists assumed that money is a perfect substitute for financial and physical assets. Friedman also considered the ratio of non- human and human wealth (h), and taste (u) as variables in the demand for money model.

In the empirical studies, the determinants which are commonly used in estimating the demand of real balance related to the level of real income, the opportunity cost of holding money (interest rate), and the cost of holding money instead of physical goods (general price index). The operation of lag variables in the demand for money model imply that there is a time lag in formulating expectations and adjustment to equilibrium level.

The conventional demand for money model was proposed by Goldfeld (1973) based on the partial adjustment hypothesis which takes form:

$$m_t = b_0 + b_1 y_t + b_2 rtb_t + b_3 m_{t-1} \qquad 7.7$$

m represents the log of real balance (nominal cash balance deflated by GNP deflator), y is real GNP and rtb is the deposit interest rate. The inclusion of a lag of the dependent variable (m_{t-1}) reflects the fact that people do not adjust their actual real balance to the level they desire instantaneously. Some modifications on the inclusion of variables as explanatory variables for predicting money demand in subsequent research were made to

anticipate particular conditions and developments in financial institutions, for instance: income dispersion, deregulation, financial innovations, structural change etc., see Chan and Chen (1992), Rossiter (1995), Melnick (1995). The adaptive adjustment model is proposed to accommodate people's expectations in influencing their demand for money. Price expectations were found to be significant in determining money demand.

Milbourne (1982) introduced the Nominal Partial Stock Adjustment (NPSA) model in estimating the demand for money in Australia. He argued that changes in price, interest rates or income involved in nominal rather than in real term. Applying the partial adjustment model, the money demand function is formulated as follows:

$$\ln M_t - \ln M_{t-1} = \phi [\ln M^*_t - \ln M_{t-1}] + \mu_t \qquad 7.8$$

Long run desired real demand for money

$$\ln (M^*_t/P_t) = \alpha_0 + \alpha_1 \ln (Y_t/P_t) + \alpha_2 \ln R_t \qquad 7.9$$

where Y stands for nominal income, P is aggregate price level, and R is interest rate.

Substitute 7.9 into 7.8

$$\ln M_t = \gamma_0 + \gamma_1(Y_t/P_t) + \gamma_2 \ln R_t + \phi \ln P_t + (1-\phi)\ln M_{t-1} + \mu_t \qquad 7.10$$

subtract both side of equation 7.10 by $\ln P_t$, the NPSA model is expressed:

$$\ln (M_t/P_t) = \gamma_0 + \gamma_1 \ln(Y_t/P_t) + \gamma_2 \ln R_t + (1-\phi)\ln M_{t-1}/P_t) + \mu_t \qquad 7.11$$

or $$\ln (M_t/P_t) = \gamma_0 + \gamma_1 \ln (Y_t/P_t) + \gamma_2 \ln R_t + (1-\phi)\ln M_{t-1}/P_{t-1}) - \ln(P_t/P_{t-1}) + \mu_t \qquad 7.12$$

Empirically, the NPSA model yields better results compared with the Real Partial Stock Adjustment model (RPSA) in terms of expected signs of parameters and statistical parameters. However, price expectation was found to be statistically insignificant.

Originally proposed by Harry Johnson (1952) and supported theoretically by Leidler (1975), the buffer stock model emerged as an alternative approach in empirical study on monetary economics. The buffer stock model is sometimes also called the stock absorber or disequilibrium money model. It presumes money acts as a buffer to absorb unexpected inflows and outflows. In this case, if the actual money stock is higher than the desired level, the excess will be kept as a buffer. Meanwhile the money stock is assumed to be exogenous and independent of current variables. The equation for the buffer stock is expressed in the following form:

$$M_t = P_t + \beta X_t + \alpha (M_t - \hat{M}_t) + u_t \qquad 7.13$$

$$\hat{M}_t = \gamma Z_{t-1} + e_t \qquad 7.14$$

where M_t stands for money stock, P is price level, X is vector of standard demand for money determinants. $\hat{M}_t$ is anticipated money or the money stock at time t which is anticipated at time t-1. In this case $\hat{M}_t$ is estimated through regressing the money stock on the lag of the specified variables (Z_{t-1}).

Milbourne (1987) noted some problems regarding the implementation of the buffer stock model. First, Money stock (M_t) appears in both sides of the equation (equation 1), then u_t is correlated with M_t in the left hand side (the dependent variable). Therefore, the ordinary least square (OLS) method is not valid. Second, to make equation 7.13 theoretically meaningful, two restrictions should hold which relate the coefficient of price homogeneity (coefficient of price level equal to one), and the coefficients of M_t and $\hat{M}_t$ should be equal and have opposite sign. Third, if anticipated money ($\hat{M}_t$) is used

instead of unanticipated ($M_t - \hat{M}_t$), then cross-equation restrictions apply since X_t and Z_t contain common variables.

Swamy and Tavlas (1992) took deregulation in the financial sector into account when investigating their demand for money model. They used a Random Coefficient Estimation (RCE) model to cope with structural change due to deregulation policy. Each coefficient in the RCE model is estimated and contains two components: (i) non stochastic, which represents usual fixed coefficient, and (ii) a stochastic component by applying first order autoregressive process as follows:

$$Md_t = x'_t \beta_t \qquad 7.15$$

$$\beta_t = \beta + e_t \qquad 7.16$$

$$e_t = \gamma e_{t-1} + v_t \qquad 7.17$$

$E(v) = 0$

$E(vt\ v's) = \Delta$, if t=s and 0 otherwise

x'_t represent vector of independent variables

Combining equations 7.15,7.16 and 7.17, we get

$$Md_t = x'_t \beta + u_t \qquad 718$$

$$u_t = x'_t e_t \qquad 719$$

$e_t = \gamma e_{t-1} + v_t$, where estimation of β applies the generalized least square (GLS) method. Empirically, the RCE model is claimed to be better in explaining demand for money in the presence of structural change than the previous models.

The application of standard approaches for economic modeling particularly in predicting the demand for money by employing variables in the level basis, has been

challenged since Nelson and Plosser (1982) noted that most macroeconomic variables contain unit root problems and are not stationary at the level. It is argued that employing the non stationary data will lead to econometric problems where the resultant statistical parameters are misleading and therefore difficult to interpret properly. In the spirit of avoiding such spurious regressions, the error correction mechanism has been widely applied in recent empirical studies particularly when estimating demand for money. This procedure was popularized by Hendry and Richard (1983). The introduction of an error correction mechanism which is represented by the estimated residual derived from long run equilibrium, represents the speed of adjustment if the existing money stock departs from long run money demand. Technically, there exists a valid error correction if the variables in the system are co-integrated even if those variables are not stationary at the level.

7.3 The Studies of Demand for Money in Indonesia

The existence of a stable and predictable relation between targeted monetary aggregates and economic activity is one of the requirements for achieving successful implementation of monetary policy. Indeed such a reliable demand for money model will facilitate more appropriate monetary policy.

Building models for the monetary sector in Indonesia is mostly associated with formulating the demand for money function. More specifically, constructing a monetary model is focused on demand for money function. The more accurate we are in constructing the demand for money function, therefore, the better we will be in controlling the money supply as well as in conducting monetary policy (Boediono 1985).

The existing studies formulating demand for money in Indonesia were mostly constructed on the basis of data prior to the period when the banking sector experienced substantial change both in mobilizing funds as well as in extending credits due to deregulation policy. Even though some studies have already employed data series which include the post banking deregulation period and applied current econometric methods yet they did not utilize comprehensive statistical test such as parameter stability tests, causality test, etc. to confirm that their estimation of the demand for money function in Indonesia is still relevant for policy formulation.

7.3.1. The work of Sundrum

In evaluating demand for money in Indonesia for period the 1951-1972, Sundrum (1973) noted some important findings. The velocity of money in circulation (nominal narrow money) tends to increase when the economy exhibits a high inflation rate, and vice versa. He argued that such circumstances were mainly caused by the trend to financial deepening which was boosted by development of marketable products, the steady increase in the share of manufactured product in forming GDP, and change in money demand in response to price expectations. In line with the latest factors affecting velocity of money in circulation, Sundrum noted that demand for money was affected if people predict that inflation would increase as they then tend to reduce their money holding, and vice versa. Since price expectations are formed on the basis of previous and current information, then the actual price change will effect the velocity through price expectations. However, most of the findings were not supported by what we now regard as adequate statistical tests.

7.3.2 The work of Agevli

Agevli (1976) estimated a demand for money function as part of building a monetary model which was designed to derive policy targets such as economic growth and price levels. As argued by Boediono (1985) the choice of explanatory variables as demand for money determinants such as gross domestic product (GDP), price levels and deposit rates reflect the fact that money demand was isolated from the influence of overseas variables. Clearly, demand for money was assumed to be a domestic phenomenon in Agevli's study.

In estimating the demand for money, Agevli adopted the real partial adjustment (RPA) model which assumed that the public adjust their desired holdings of monetary assets at the end of the current period to the actual monetary assets they held in the last period. Some important results emerge from Agevli's findings. The Interest rate was found to be a significant determinant of demand for broad money. This is not surprising since the data employed in the estimation mostly covers the period when the government set positive real deposit rates (i.e. nominal deposit rates exceeded inflation rates). Under such circumstances, the deposit rate would significantly affect demand for monetary aggregates towards interest bearing money. Long run income elasticity were considered high, 2.18 and 2.29 for real narrow and broad money respectively. It is argued that the high income elasticity indicate that the economy was moving toward a more monetized economy as well as the limited availability of alternative monetary assets. Meanwhile, the short run income elasticity of narrow money (0.67) was higher than that of broad money (0.49) suggesting that if the income level increases, given other variables remain unchanged, in the short run people tend to increase holdings of narrow money more than

broad money. It also reflected the finding that the speed of adjustment of narrow money was higher than broad money.

Money supply, on the other hand was derived from reserve money or base money which consists of currency (C) and reserves (R) held by commercial banks.

$$RM = C + R \qquad 7.20$$

$M = m\ RM$, where m is money multiplier

Given the targeted economic growth and price levels (inflation), monetary policy is directed to achieve a money stock which is consistent with equilibrium between estimated demand for and supply of money.

In general, Aghevli's model shows satisfactory results in terms of statistical parameters such as: t- statistic, sign and magnitude of the coefficients, etc. However, some diagnostic tests which detect the normality, appropriate specification, the presence of autocorrelation, the stability of the parameters etc. were not provided, so that the estimated demand for money cannot be assessed accurately.

7.3.3 The Work of Nasution

Basically, the demand for money function proposed by Nasution (1987) was similar to that developed by Agevli in the sense both studies employed the same procedure (real partial adjustment) and similar variables as determinants of money demand. However, Nasution adopted a demand for money function proposed by McKinnon, which includes investment expenditure as a determinant of money demand along with scale and opportunity variables. The sign and magnitude of the parameters were similar to those of Agevli's work except that investment expenditure was

statistically significant and claimed to be an important variable in determining demand for money.

7.3.4 The Work of Boediono

Using a similar model to those developed by Aghevli, and Nasution, Boediono (1985) made some adjustments in dealing with the effect of foreign factors on domestic variables particularly those which are predicted to have significant influence on demand for money. In an open economy, Gross Domestic Income (GDI) is considered more appropriate than Gross Domestic Product (GDP), since the first one can accommodate the change in domestic real wealth due to fluctuations in the terms of trade. Boediono argues that changes in term of trade could change real purchasing power or domestic real income and have an effect on demand for money especially demand for quasi money, since it is more likely to depend on real income rather than GDP. GDI is calculated from GDP with the following adjustment:

$$GDI = \{d + x\,(Px/Pd) - m(Pm/Pd)\}GDP \qquad 7.21$$

d : the ratio of real domestic expenditure to real GDP

x : the share of exports in real GDP

m : the share of imports in real GDP

Px: the export price index

Pm: the import price index

Pd: domestic goods price index

Since Indonesia imposed a free foreign exchange regime (commencing in 1982), people have had choices to place their money at home or overseas. In this context, Boediono

believes that foreign interest rates and public expectation of exchange rate fluctuation will influence demand for money.

Some important results derived from that model are: (a) the effects of terms of trade fluctuations on real wealth can be captured in the demand for money model which would give a better picture for monetary policy application. (b) People immediately respond to the current inflation rate to form inflationary expectations as well as to determine their demand for money.

Agevli , Nasution and Boediono basically are in agreement in the sense that those studies adopt similar econometric procedures and employ the data from the period when monetary aggregates were yet to be influenced by the further banking deregulation in October 1988. The substantial difference is that Boediono tries to take into consideration international impact on demand for money which is reflected by modifying the scale variable and the inclusion of an interest differential.

As with Agevli's work, Nasution and Boediono also did not provide adequate diagnostic testing particularly for statistical tests which are designed to evaluate the stability and parameter constancy as well as detect the presence of serial correlation and heteroscedasticity which are considered to be important requirements for formulating a demand for money function which is reliable for implementing monetary policy.

7.3.5 The Work of Gupta and Muazzami

Gupta and Moazzami (1989) constructed demand for money functions for several Asian countries including Indonesia by applying three methods: (i) the static version, (ii) the partial adjustment model and (iii) Error Correction Model (ECM). They found that ECM is more appropriate for most of the Asian Countries under study in estimating

demand for money. Malaysia and Pakistan are exceptions where it is more appropriate to employ the static model, while the partial adjustment is the best model for South Korea. In estimating demand for money in Indonesia in particular, beside preferring the model which employs ECM rather than the static or partial adjustment model, they found that employing consumption expenditure instead of Gross Domestic Product as a scale variable performs slightly better. Gupta and Mazzami convinced that stable demand for money function in the sample observed does exist.

Following the procedure proposed by Hendry and Richard (1983) in performing model selection, which involves some criteria such as data admissibility, parameter constancy, absence of autocorrelation/heteroscedasticity and compatibility with a priori expectations related to sign and magnitude of the estimated parameters, this study provides general guidance in selecting the most appropriate specification as well as the best econometric procedures for estimating demand for money. However, in employing an error correction model, it is determined a priori (without conducting formal test for co-integration). In this case the real narrow money and scale variable (either income or consumption expenditure level) is assumed to be co-integrated. Granger's theorem (1987) says if the variables are co-integrated, then there will be a valid error correction model. Furthermore, the expression of ECM which does not include a lag of the independent variable, presumes that real balance responds instantaneously to the change in the scale variable. This assumption is implausible, particularly if ECM is employed on the basis of a shorter data period (quarterly or monthly) where in the short run, the dependent variable might respond to various orders of lag length of independent variables.

7.3.6 The Work of Wihana Kirana

In formulating his demand for money function, Wihana Kirana (1990) adopted partial adjustment and buffer stock or shock absorber methods. Comparing those two methods, he confirmed that the latter performed better in terms of statistical diagnostic. However, the buffer stock model or stock absorber model which he claimed performs better, is subject to some limitations. Milbourne (1987) argued that the implementation of a buffer stock model is subject to a number of cross-equation restrictions. Those restrictions need to be tested to confirm that the model is consistent with both econometric and economic theory. Therefore, conducting a restriction test on the coefficient of buffer stock (a) is completely inconsistent with the expected sign as suggested by the stock absorber model ($0<a<1$) when the original buffer stock model was transformed to eliminate M_t as an explanatory variable. Since such a restriction test was employed in the Wihana Kirana study, then the buffer stock model is not firmly justified.

7.3.7 The Work of Tseng and Corker

Tseng and Corker (1991) have contributed an empirical study to investigate the impact of financial liberalization on demand for money and monetary policy implementation in several Asian countries including Indonesia. Applying a two stage procedure, they confirmed the existence of a stable long run relationship between monetary aggregates or at least one of the monetary aggregates with the specified determinants of money demand, particularly the income level and interest rates in most of Asian countries under study. In the case of Indonesia in particular, this study justified the presence of stable long run relationship for both narrow and broad money with the specified determinants of money demand. Furthermore, by applying Hendry's procedure

for testing the parameter's constancy, this study also proved the existence of a stable error correction model for estimating money demand in some of the Asian countries under study and Indonesia in particular.

In general, Tseng and Corker have conducted more comprehensive statistical tests for investigating the existence of stable money demand in Indonesia compared to the previous work proposed by Gupta and Muzammi (1989). In constructing error correction model they admitted to using a fairly low order of lag length (the order of lag length is two for independent variables and one for the error correction term). Since the order of lag length is relatively low particularly for employing ECM on quarterly data basis, then it cannot be concluded simply that there is no short run relationship between the independent and dependent variable if the parameter of an explanatory variable is statistically insignificant. This particular circumstance might be due to the possibility that the existing error correction model cannot capture higher orders of lag length if the response in the short run dynamic occurred over a longer period than the lag period specified in the model. Clearly, the limited order of lag length might potentially not capture the accurate short run parameters. Along with investigating the impact of financial deregulation on demand for money, Tseng and Corker also examine on monetary policy implementation. However, they did not conduct any further tests such as a temporary causality test proposed by Granger to explore the short run causal relationship between monetary aggregates and the specified determinants of money demand as well as to display the possible monetary policy which could be undertaken when monetary aggregates are still appropriate to be used as monetary targets.

7.3.8. The Work of Price and Insukindro

Along with applying an error correction mechanism (ECM), Price and Insukindro (1994) also employed forward looking specification. To some extent, their findings were consistent with the previous studies e.g. Agevli (1977) particularly in terms of the magnitude of income elasticity. Apart from their important findings particularly in identifying the speed of adjustment among various monetary aggregates and confirming that demand for money in Indonesia is not domestic phenomenon, yet this study had not introduced the econometric procedures which allow for the presence of a structural break.

7.4 The Proposed Demand for Money in Indonesia

One of the issues concerning specification is related to determining the relevant variables in the demand for money function. Miller (1991), pointed out that regardless of the differences concerning the inclusion of appropriate variables in the system, in general, the long run demand for money is established on the basis of a stable relationship with a number of economic variables. Friedman (1956) proposed that the long run demand for money function be constructed based upon assumptions regarding the existence of stable relationships between real balances, real income or real wealth as well as the opportunity cost of holding that real balance. Such relationships can be expressed in the following form:

$$y_t = \alpha_0 + \Sigma \alpha_{it} x_{it} + u_t \qquad 7.22$$

where x_t is monetary aggregates which consists of various definitions of money and x_{it} represents economic variables selected in the model.

Scale variable, opportunity cost of holding money, own interest rates and price levels are the most common variables used in designing demand for money functions. However, the choice of variables to represent scale variable and opportunity cost of holding money is also debatable. Cagan (1956) and subsequent studies regarding with demand for money mostly applied Gross National Product as a scale variable. Another measure has been proposed as an alternative as scale variable. Arize (1994), and McCallum and Goodfriend (1987) provided a theoretical analysis suggesting that consumption expenditure showed a closer relationship to consumers' demand for money. It implies that consumption expenditure is more appropriate to represent scale variables compared with other variables such as Gross National Product, Gross Domestic Product etc. Mankiew and Summers (1986), Gupta and Moazzami (1989) and Mehra (1991) provided empirical evidence which gave support for employing consumer spending as a scale variable. However, as Mehra pointed out consumer expenditure is a better scale variable only in formulating a short run demand for money function. Meanwhile, in constructing demand for money functions for some Asian countries, Gupta and Moazzami found that applying consumer expenditure as a scale variable produced better results only for some particular countries while in other Gross Domestic Product performs better as a scale variable.

The inclusion of the term structure to capture opportunity cost of holding real or nominal money was supported theoretically by Friedman (1969).The issue about the type of interest rates which are considered to be the most appropriate ones to represent the opportunity of holding money remained unsettled. Feige and Pearce (1977) suggested applying both short term and long term interest rates since a single interest rate might not

adequately capture the opportunity of holding money. Pole (1988) and Hoffman and Rasche (1996) found that the long term interest rate is more appropriate to capture the opportunity cost of holding money. However, Hafer and Jansen (1991) noted that some empirical studies incorporating term structure to represent the opportunity cost of holding money had limited success. Meanwhile, the inclusion of own interest was supported by Heller (1988) and Small and Porter (1989).

Apart from the important requirements particularly related to stability and predictability of demand for money which reflects the existence of a stable long run relationship between monetary aggregates and scale variables and interest rates, under a flexible exchange rate regime the effectiveness of monetary policy is also influenced by movements of the exchange rate. Mundell (1963) provided the theoretical background regarding the importance of the inclusion of the exchange rate in the demand for money model. He stated : " *The demand for money is likely to depend upon the exchange rate in addition to the interest rate and the level of income; this would slightly reduce the effectiveness of a given change in the quantity of money, and slightly increase the effectiveness of fiscal policy on income and employment under flexible exchange rates, while , of course, it has no significance in the case of fixed exchange rates*". In this regard, Mundell argued that monetary policy will be less effective if demand for money depends largely on exchange rate variables. An intuitive explanation provided by Oskooee and Pourheydarian (1990) stated that the effectiveness of monetary policy will be affected through public expectations in response to the movement of exchange rate (depreciation or appreciation). Further empirical evidence regarding the importance of the

inclusion of the exchange rate in the demand for money model were provided by Oskooee and Malixi (1991), Perera (1993), and Parikh(1997). In general, those studies supported the notion that the exchange rate has an important role in determining demand for money, thus, in formulating monetary policy as well. In this study, therefore, beside the inclusion of common variables such as real income , interest rates, and price levels, nominal effective exchange rates will be included as a determinant of demand for money. Based upon this specification, the long run demand function is expressed in the following form:

$$M_d = \alpha_0 + \alpha_1 Y_t + \alpha_2 R_t + \alpha_3 P_t + \alpha_4 E_t + u_t \qquad 7.23$$

All variables are expressed in logarithmic forms. M_d stands for monetary aggregates,[36] Y is a scale variable (real income), R is nominal deposit interests, P is the price levels, E is effective nominal exchange rates, u is the error term and t is time period. The coefficient of the scale variable (α_1) is expected to be positive for all definitions of money, and α_2 is supposed to be negatively related to non interest bearing monetary aggregates (currency, base money or reserve money, and narrow money), but positively related to interest bearing aggregates (modified narrow money and broad money). The coefficient of the

[36] They represent various definitions of monetary aggregates which vary from currency (C) to the broader one (M_2)

price index (α_3) is expected to be positive, while the coefficient of exchange rates (α_4) is possibly either positive or negative.[37]

The Empirical Results

This section reports the empirical results regarding the estimation of demand for money in various definition by applying the error correction mechanism (ECM) procedures to examine the reliability of monetary aggregates for facilitating monetary policy. The first part reports the results concerning unit root tests to evaluate the degree of integration of the data or more specifically to examine the stationary of the data. Along with employing the standard Dickey-Fuller (DF) and augmented Dickey-Fuller (ADF) test procedure, this study also employs the innovational outlier (I-O) test procedure which allows for the possible presence of a structural break. This procedure is useful not only to prevent any bias in results towards non rejection of the null hypothesis so that the unit root hypothesis can be more accurately tested, as well as allowing us to determine when the possible structural break occurred. The second part displays the cointegration test results to investigate the existence of a stable long run relationship between monetary aggregates and the variables specified as the determinants of money demand. To deal with the impact of banking deregulation on the stability of the long run relationship between

[37] Depreciation of the domestic currency will increase demand for the domestic currency, but if it continues to depreciate, demand for the domestic currency might decrease through the expectation for future depreciation. In addition, the relationship between demand for money and exchange rate fluctuations is affected by the implentation of banking deregulation allows commercial banks to provide banking services particularly savings accounts and time deposits in foreign currency denominations. In this case, the conversion from domestic to foreign currency denominations does not have any impact on total monetary aggregates since it remains in the national banking system (see the definitions of monetary aggregates described in chapter VI).

monetary aggregates and the specified variables in the cointegration system, this study also carries out the cointegration test procedure which allows for the presence of a possible structural break. Accordingly, this procedure could also prevent any bias in results towards non rejection and facilitate testing the hypothesis more accurately. The third part reports the demand for money functions in the error correction model as well as the temporary causality tests between monetary aggregates and the variables specified as the determinants of money demand. The data employed in this study are collected from the reports published by the Central Bank (Bank Indonesia), The Central Bureau of Statistics (BPS), and International Financial Statistics (IFS). This study covers a relatively long period where the number of observations representing pre and post banking deregulation period are relatively equal. Therefore, along with conducting empirical test on the basis of the full sample periods, it enable us to undertake empirical tests on each sub sample (pre and post banking deregulation period) separately to sharpen the analysis particularly regarding the impact of banking deregulation.

Unit root test

The results of applying the DF and ADF procedures for testing the order of integration is presented in Table 7.1 below. The DF and ADF test results suggest that for the level data are below their respective critical values (2.890 and 3.435). It implies the null hypothesis for non stationarity cannot be rejected at the 5 percent level. Clearly, the level of data series exhibit unit root or not being integrated at order zero. Following the common procedure to achieve stationarity by differencing the data series and applying the same procedure for testing stationarity (DF and ADF test procedure) the results suggest

that the DF and ADF statistics are above the critical values at the 5 percent level. Since the rejection of the unit root hypothesis series are achieved only after differencing at one degree, it is suggesting the data series are integrated at order one. Briefly, under DF and ADF procedures for unit root testing, the results show that all series are non stationary at level but stationary at first difference.

Table 7.1. Unit Root Tests

A. The Dickey Fuller regressions include an intercept but not a trend

Variables	DF	ADF	DF	ADF
	Level		First Difference	
C	-2.01	-2.55	-11.90	-8.17
DD	-2.25	-2.14	-8.79	-5.48
QM	-1.22	-1.03	-8.05	-5.57
Rm	-0.71	-0.70	-12.18	-7.88
M_1	-1.53	-1.40	-9.06	-4.98
M_2	-0.37	-0.32	-8.92	-5.73
R	-1.14	-1.14	-11.50	-8.33
E	-0.60	-0.58	-9.45	-6.74
P	-2.79	-2.24	-6.14	-4.85
YP	0.20	0.27	-11.40	-6.26

95% critical value for ADF statistic = -2.890

B. The Dickey Fuller regressions include an intercept and a linear trend

Variables	DF	ADF	DF	ADF
	Level		First Difference	
C	-2.58	-2.44	-11.90	-8.17
DD	-2.86	-2.85	-9.04	-5.69
QM	-1.98	-2.36	-8.08	-5.61
Rm	-2.86	-2.48	-12.67	-8.33
M_1	-2.34	-2.47	-9.55	-5.33
M_2	-1.84	-2.32	-9.19	-5.73
R	-1.98	-2.52	-7.78	-5.85
E	-2.06	-2.02	-9.45	-6.76
P	-1.83	-1.93	-6.99	-5.64
Y	-0.02	-1.69	-11.35	-6.24

95% critical value for ADF statistic = -3.435

Perron argued that conventional unit root tests tend to be biased toward non rejection if the series exhibit a structural break. To anticipate any possible misleading results from applying the conventional test procedures, this study also conducts unit root tests by employing procedures which allow for the possible presence of structural breaks. In this regard, the unit root test procedure proposed by Perron and Vogelsang, the so called innovational outlier (IO) procedure which allows one time structural shift in the mean of time series is adopted. As shown in Table 7.2, the results still produced a similar conclusion, in the sense that the unit root hypothesis cannot be rejected even at the 10 percent level. Only the price level (CPI) can convincingly reject the null hypothesis even at the 1 percent level which suggests it is stationary at level after considering the effect of the time break on testing procedure. It is worth noting that applying IO testing procedures mostly produces similar results to those of conventional approaches such as DF, ADF and Phillips- Perron procedures, however, IO procedure might provide some interesting results. Firstly, the *possible* breakpoint (T_b) for the price level occurred in period 8 or in the fourth quarter of 1972. It implies that breakpoint of price level does not correspond to the period in which banking deregulation took place. Secondly, the *possible* structural breakpoint for monetary aggregates, credit, scale variable (GDP) and interest rate occurred in periods 78 and 79 which correspond to the fourth quarter of 1988 and the first quarter of 1989 respectively. Under the IO unit root hypothesis testing procedure, the *possible* structural breakpoint which is determined by selecting T_b to minimize t_α occurred in the periods immediately following the implementation of the second banking deregulation suggesting to some extent the impact of that policy on those particular variables. The *possible* structural breakpoint for

deposit rates, however, occurred earlier in period 56 or the third quarter of 1983 which reflected the commercial banks responding to the first banking deregulation (June 1983) when the Central Bank abolished interest rate ceilings. Meanwhile the *possible* structural breakpoint for the exchange rate which occurred in period 37 and corresponded to the fourth quarter of 1978 also reflected the exchange rate changes in response to government policy which started adopting flexible exchange rates in November 1978. Briefly, it can be stated that applying IO procedure to avoid such biased test results toward non rejection from employing conventional procedures in the presence of possible structural break as pointed out by Perron still produces very similar results, namely that most of the time series exhibit unit root. However, since this procedure allows us to determine the possible breakpoint time (T_b) through testing procedures to minimize t_α then the IO test procedure still provided other valuable information. The possible structural breakpoints for all variables but the price level which are employed to estimate the demand for money function in this study reflected the immediate impact of deregulation policy on banking aggregates.

The possible presence of structural breakpoints will also be addressed later when conducting tests for co-integration on the basis of stationarity tests on the residual proposed by Gregory and Hansen (1996).

Table 7.2 Unit Root Test - Innovational Outlier (IO) Procedure

	T_b	K	μ	δ	θ	α	t_α
C	79	4	0.2133	0.0292	-0.0393	0.9800	-3.5281
	1989q2		(4.2098)	(2.0680)	(-0.8833)		
Rm	79	4	0.2801	0.0405	-0.0532	0.9730	-3.4890
	1989q2		(4.1315)	(2.0757)	(-0.7866)		
M_1	78	4	0.1607	0.0309	0.0013	0.9851	-3.2109
	1989q1		(3.6343)	(2.4349)	(0.0321)		
M_2	79	4	0.1269	0.0227	0.0033	0.9912	-2.5307
	1989q2		(3.2038)	(1.8567)	(0.0982)		
Y	78	4	0.088519	0.01392	-.00688	0.9870	-1.8439
	1989q1		(2.3183)	(1.5358)	(-0.25871)		
P	8	4	0.047513	0.066839	-0.0100	0.9793	-5.1627
	1972q4		(3.5298)	5.0447	(-0.3878)		
R	56	4	0.1164	0.0701	-0.0213	0.8540	-3.3772
	1983q3		(3.0196)	(2.3697)	-(0.1831)		
E	37	4	0.034345	-0.0797	0.03663	0.9569	-2.9607
	1978q4		(2.0327)	(-3.5682)	(0.4654)		

Critical value of t_α for testing α=1 at 5% level is -4.44

Co-integration Analysis

Testing for co-integration is conducted by employing the two step co-integration test procedure proposed by Engle - Granger and Johansen's multivariate procedure. The co-integration test procedure with structural breaks is applied particularly if the conventional residual based procedure cannot reject the null hypothesis, since in the presence of a structural break the standard test is presumed to have less power to reject the null hypothesis.

The standard application of the co-integration test under the Engle and Granger procedure is to run regression co-integration by applying the ordinary least square (OLS) method on the variables which are included in the co-integration system. The second step is to conduct a stationarity test of the residuals resulting from the co-integration regression test. The variables in the co-integration system are considered to be co-integrated when the residuals are stationary.

Miller (1991) showed that omission of the important variables from the co-integrated system might cause a non co-integration result. In the same spirit Melnick (1995) argued that the failure to introduce such a variable, which represents the stage of financial development, might produce a biased result towards non rejection (no co-integration). In evaluating the Engle and Granger finding that monetary aggregates in various definitions and nominal gross domestic product are not co-integrated with possible exception of M_2, he argued that the velocity of circulation theoretically influenced not only nominal income but also the interest rate. Therefore, the lack of co-integration among the variables in the system might be due to the omission of an important variable in the system as argued by Miller above, and the presence of a

structural break. As noted by Gregory and Hansen (1996), under such particular circumstances, the conventional residual base test for co-integration recommended by Engle and Granger (ADF-test) will be biased towards non rejection. The application of standard ADF-test for co-integration and the modification of the ADF-test proposed by Gregory and Hansen in response to the presence of possible structural breaks are reported below.

Table 7.3 Cointegration Tests for Currency

Variables in the Co-integration System: C, Y, P, R and E

Without Structural Shift		With Structural shift			
		Level shift		Level and Time Shift	
variables	coefficients	variables	Coefficients	Variables	Coefficients
constant	-0.848	constant	-1.020	Constant	1.077
Y	0.854	Y	0.890	Y	0.678
P	1.0056	P	0.993	P	0.982
R	-0.076	R	-0.078	R	-0.065
E	-0.076	E	-0.035	E	0.030
		DV	0.037	DV	0.029
				T	0.006
$\overline{R}^2$	0.99	$\overline{R}^2$	0.99	$\overline{R}^2$	0.99
DW	0.59	DW	0.61	DW	0.60
DF	-4.56**	DF	-4.89**	DF	-5.45*
ADF	-4.88 **	ADF+	-5.15**	ADF+	-5.15*

Note: all variables are in logarithmic form, except for DV and T which represent a dummy variable and a time trend. ADF+ represents the modified ADF by allowing for level shift and without a time trend. Critical value of ADF (10% level) is 4.52

Sign *, **, and *** indicates significant at 10%, 5%, and 1% level respectively.

Table 7.4 Cointegration Tests for Reserve Money

Variables in the Co-integration System: Rm, Y, P, R and E

Without Structural Shift		With Structural shift			
		Level shift		Level and Time Shift	
Variables	coefficients	variables	Coefficients	Variables	Coefficients
Constant	-0.848	constant	0.584	Constant	0.492
Y	0.448	Y	0.596	Y	0.535
P	1.201	P	1.149	P	1.146
R	-0.194	R	-0.204	R	-0.200
E	-0.134	E	-0.031	E	-0.049
		DV	-0.149	DV	-0.147
				T	0.002
$\overline{R}^2$	0.99	$\overline{R}^2$	0.99	$\overline{R}^2$	0.99
DW	0.50	DW	0.53	DW	0.53
DF	-4.22	DF	-4.36	DF	-4.37
ADF	-3.91	ADF$^+$	-4.62*	ADF$^+$	-4.58*

Note: all variables are in logarithmic form, except for DV and T which represent a dummy variable and a time trend. ADF+ represents the modified ADF by allowing for level shift and without a time trend. Critical value of ADF (10% level) is 4.52

Sign *, **, and *** indicates significant at 10%, 5%, and 1% level respectively.

Table 7.5 Cointegration Tests for Narrow Money

Variables in the co-integration system: M_1, Yp, P, R and E

Without Structural Shift		With Structural shift			
		Level shift		Level and Time Shift	
Variables	coefficients	variables	Coefficients	Variables	Coefficients
Constant	-2.0768	constant	-1.880	Constant	-1.1988
Y	1.1224	Y	1.077	Y	0.9065
P	1.1225	P	1.164	P	1.1160
R	-0.0351	R	-0.030	R	-0.022
E	0.1425	E	0.1560	E	0.2198
		DV	-0.032	DV	-00810
				T	0.0060
$\overline{R}^2$	0.99	$\overline{R}^2$	0.99	$\overline{R}^2$	0.99
DW	0.38	DW	0.38	DW	0.38
DF	-3.45	DF	5.87**	DF	5.24*
ADF	-5.46 **	AD F+	-5.49**	ADF+	-5.17*

Note: all variables are in logarithmic form, except for DV and T which represent a dummy variable and a time trend. ADF+ represents the modified ADF by allowing for level shift and without a time trend. Critical value of ADF (10% level) is 4.52

Sign *, **, and *** indicates significant at 10%, 5%, and 1% level respectively.

Table 7.6 Cointegration Tests for Broad Money

Variables in the Co-integration System: M_2, Y, P, R and E

Without Structural Shift		With Structural shift			
		Level shift		Level and Time Shift	
variables	coefficients	Variables	Coefficients	Variables	Coefficients
constant	-2.484	Constant	-0.734	Constant	3.367
Y	1.673	Y	1.093	Y	0.192
P	0.713	P	1.040	P	0.754
R	-0.195	R	-0.146	R	-0.097
E	-0.489	E	-0.419	E	-0.016
		DV	0.314	DV	0.118
				T	0.037
$\overline{R}^2$	0.99	$\overline{R}^2$	0.99	$\overline{R}^2$	0.99
DW	0.25	DW	0.35	DW	0.28
DF	-2.50	DF	-3.08	DF	-3.26
ADF	-3.91	ADF^+	-4.60^*	ADF^+	-4.74^*

Note: all variables are in logarithmic form, except for DV and T which represent a dummy variable and a time trend. ADF+ represents the modified ADF by allowing for level shift and without a time trend. Critical value of ADF (10% level) is 4.52

Sign *, **, and *** indicates significant at 10%, 5%, and 1% level respectively.

Table 7.7 Cointegration Tests for Modified Narrow Money

Variables in the Co-integration System: M^+, Y, P, R and E

Without Structural Shift		With Structural shift			
		Level shift		Level and Time Shift	
variables	Coefficients	variables	Coefficients	Variables	Coefficients
constant	-0.848	constant	-1.020	Constant	
Y	0.925	Y	0.908	Y	0924
P	1.0056	P	0.998	P	1.082
R	0.081	R	0.077	R	0.075
E	-0.023	E	-0.041	E	0.021
		DV	0.037	DV	0.029
				T	0.006
$\overline{R}^2$	0.99	$\overline{R}^2$	0.99	$\overline{R}^2$	0.99
DW	0.59	DW	0.61	DW	0.60
DF	-4.56**	DF	-4.89**	DF	-5.45*
ADF	-4.88 **	ADF^+	-5.15**	ADF^+	-5.15*

Note: all variables are in logarithmic form, except for DV and T which represent a dummy variable and a time trend. ADF+ represents the modified ADF by allowing for level shift and without a time trend. Critical value of ADF (10% level) is 4.52

Sign *, **, and *** indicates significant at 10%, 5%, and 1% level respectively.

As given in Tables 7.3 and 7.5, the results indicate that currency (C) and narrow money (M_1) are co-integrated with the specified determinants of demand for money when standard residual based tests for co-integration (ADF-test for estimated residuals) are applied. It implies the presence of a stable long run relationship between those monetary aggregates (C and M_1) and the specified determinants of demand for money are not significantly affected by financial deregulation and/or financial innovation. Meanwhile, applying the same method (the standard residual based ADF-test for co-integration) for other monetary aggregates including credit, the null hypothesis of no co-integration can not be rejected even at the 10% level. Following the possible break point identified from adopting the innovational outlier (IO) unit root test and through appealing to the data, then the co-integration test in the presence of a structural break as proposed by Gregory and Hansen (1996) can be performed by applying the standard unit root test for the estimated residual. As shown in tables 7.4 and 7.6 to 7.7 employing the co-integration test with the inclusion of level shift, with and without trend shows the null hypothesis of no co-integration can be rejected at the 10 % level. The results, therefore, support Melnick's finding that lack of co-integration might be due to neglecting a variable which represent the stage of financial development particularly if the financial system is affected by financial deregulation and innovation.

Following some empirical studies which employed either stochastic or deterministic trends as a proxy to capture the impact of financial development (see Melnick 1992 in this regard), a variable was employed to represent the impact of banking deregulation and/or innovation which is reflected by allowing for level shift with or without time trend. The cointegration test results after allowing for level shift with or

without a trend as proposed by Gregory and Hansen, confirm the presence of a stable long run relationship between those particular monetary aggregates (reserve money, modified narrow money, and broad money) as well as credit aggregates with the specified determinants of money demand. In other words, regardless of the impact of banking deregulation, the stable long run relationship still exists between reserve money, modified narrow money, broad money and credit with the specified determinants of money demand, thus, they are cointegrated.

The existence of stable relationship between monetary or credit aggregates with the specified determinants of money demand is also tested by applying Johansen's procedure. Under Johansen's co-integration procedure, there are two test statistics for the number of co-integrating vectors. Firstly, it is based upon the number of significant eigenvalues of the co-integrating matrix . The null hypothesis under the maximum eigenvalue is $r \leq q$ against the alternative hypothesis $r = q$. The second statistical test is the trace where under the null hypothesis $r \leq q$ as against the alternative hypothesis $r \geq q$. The main purpose in applying the co-integration test is to evaluate the presence of a stable long run equilibrium between monetary aggregates and the determinants of demand for money as well as to examine the appropriateness of monetary aggregates in facilitating monetary policy. The variables included in the co-integration system, therefore, involve monetary aggregates, and determinants of demand for money. Along with examining the existence of a stable long run relationship between variables in the co-integrated system, the co-integration test is also employed to evaluate the validity of applying the error correction model. In this regard, the co-integration test employed exactly the same

variables as those used in the co-integration test under the residual base approach which consisted of nominal and/or real money aggregates[1], real Gross Domestic Product (Y), nominal deposit rates (R) price level (P) and nominal exchange rates (E), which are all expressed in logarithmic form. The results of the co-integration test under the Johansen procedure are reported in Tables 7.8 to 7.12 and each of the monetary aggregates is analyzed separately.

Currency (c)

The co-integration results based on Johansen's procedure suggests that the null hypothesis of no co-integration can be rejected at the 95% level. This suggests the presence of a stable of long run relationship among the those specified variables. Normalizing on Ln C and imposing some restrictions on the co-integrating vector indicates that coefficients of income and price are statistically significant and different from zero. However interest rates and exchange rates are found to be statistically insignificant. Under the full sample (1970q1-1996q4), the hypothesis unit price elasticity can be accepted at the 5% level. Splitting samples into two periods before and after banking deregulation, shows that the latter yield lower income elasticity but higher price elasticity which is presumed to be the common impact of financial deregulation and innovation (Miller 1991). Financial deregulation and innovations also stimulate more variations in banking services, as well as enhancing the emergence of other financial assets which have similar functions as money particularly those which are designed to support transactions.

Table 7.8 Cointegration Test for Currency (Johansen's Procedure)

Variables in the co-integration system : C Y P R E (all in logarithmic form)

Maximal Eigenvalue of Stochastic Matrix

		Statistic	Critical Value	
Null	**Alternative**		**95%**	**90%**
r=0	r=1	40.78	37.86	35.04
r≤1	r=2	25.42	31.79	29.13
r≤2	r=3	16.58	25.42	23.10
r≤3	r=4	13.27	19.22	17.18
r≤4	r=5	6.66	12.39	10.55

Trace of Stochastic Matrix

		Statistic	Critical Value	
Null	**Alternative**		**95%**	**90%**
r=0	r≥1	89.71	87.17	82.88
r≤1	r≥2	61.93	63.00	59.16
r≤2	r≥3	36.52	42.34	39.34
r≤3	r≥4	19.94	25.77	23.08
r≤4	r≥5	6.67	12.39	10.55

LR- STATISTIC FOR TESTING HYPOTHESIS

Co-integrating Vector (1.0, β_1 β_2 β_3 β_4)

Null Hypothesis	LR- STATISTIC	
Ho: $\beta_1 = 0$	21.12	
Ho: $\beta_2 = 0$	4.90	
Ho: $\beta_3 = 0$	2.77	
Ho: $\beta_4 = 0$	20.18	
Ho: $\beta_1 = 1$	2.19	
Ho: $\beta_2 = 1$	4.81	$\chi 2$ value = 5.99 , df : 2 with 5% level.

Reserve Money (LRM)

The variables specified in the co-integration system are as follows:

RM Y P R E ; with the co- integrating vector (-1, β_1 β_2 β_3 β_4)

Most of the co-integration results based on Johansen's procedure applied on reserve money are similar to those applied on currency. The result shows that the null hypothesis of no co-integration can be rejected at the 90% level, suggesting that there is a co-integrating vector. It implies the presence of a stable long run relationship between nominal reserve money and the specified variables. Normalizing reserve money (Log RM) in the co-integration vector yields the same results as those in the currency co-integration test, in the sense that income and price levels play a significant role in explaining nominal reserve money. Even though real income is statistically significant in explaining the variations of reserve money, however, its magnitude is much lower compared to the other aggregates (see also Table 7.9).[38] If the share of the reserve held by commercial banks to total reserve money is more significant, then it is expected that the income elasticity tends to be smaller. It is due to the fact that reserve held by the banks is more likely designed to meet the requirement set by the Central Bank and to maintain liquidity aspects rather to respond to changes in real income. Imposing the restrictions to test the magnitude of interest and exchange rate coefficients ($\beta_3 = \beta_4=0$), the null hypothesis cannot be rejected at the 10% level. The insignificant role of interest and

[38] The income elasticity of reserve money is only around 0.5 while the other aggregates are nearly double (around one).

exchange rates in determining nominal reserve money reflects that the reserves held by commercial banks are managed to meet the minimum required reserve set by the Central Bank and to provide daily liquidity for supporting customer service rather than in response to interest and exchange rate changes. Meanwhile, as one of the available monetary instruments, the reserve ratio is not frequently changed to support monetary targets such as the price level, interest rates, etc.

Table 7.9 Co-integration Test for Reserve Money (Johansen's Procedure)

Variables in the co-integration system : Rm Y P R E

Maximal Eigenvalue of Stochastic Matrix

		Statistic	Critical Value	
Null	**Alternative**		**95%**	**90%**
r=0	r=1	39.22	37.86	35.04
r≤1	r=2	16.53	31.79	29.13
r≤2	r=3	16.15	25.42	23.10
r≤3	r=4	11.86	19.22	17.18
r≤4	r=5	6.32	12.39	10.55

Trace of Stochastic Matrix

		Statistic	Critical Value	
Null	**Alternative**		**95%**	**90%**
r=0	r≥1	88.98	87.17	82.88
r≤1	r≥2	50.76	63.00	59.16
r≤2	r≥3	34.23	42.34	39.34
r≤3	r≥4	18.17	25.77	23.08
r≤4	r≥5	6.32	12.39	10.55

LR- STATISTIC FOR TESTING HYPOTHESIS

Co-integrating Vector (1.0, β_1 β_2 β_3 β_4)

Null Hypothesis	LR- STATISTIC
Ho: $\beta_1 = 0$	34.72
Ho: $\beta_2 = 0$	3.93
Ho: $\beta_3 = 0$	2.47
Ho: $\beta_4 = 0$	2.20
Ho: $\beta_1 = 1$	2.10
Ho: $\beta_2 = 1$	4.63

$\chi 2$ value = 5.99 , df : 2 with 5% level.

Narrow Money (M_1)

The variables specified in the co-integration system are as follows:

M_1 Y P R E ; with the co- integrating vector (-1, β_1 β_2 β_3 β_4)

At the 95% critical value level, the LR statistic can reject the null hypothesis of no co-integration vector. This implies the presence of a stable long run relationship among the those specified variables. At the same level of critical value, we can accept the null hypothesis that at most there is one co-integrating vector. Some restrictions are applied in this model to test a number of hypotheses related to some properties of the long run demand for money. The results suggest that the hypotheses $\beta_3=0$ cannot be rejected at 5%, implying that the nominal deposit rate is not significant in explaining long run demand for nominal narrow money. Meanwhile exchange rate is found to be a powerful determinant of demand for narrow money. The hypotheses of unit price ($\beta_4=1$) is accepted at the 5% level, suggesting that in the long run nominal narrow money aggregate functions can be treated as real terms. Splitting the sample into 2 periods (pre and post deregulation) produces similar conclusion with previous monetary aggregates (C and Rm) in the sense that income elasticity tends to be lower while price elasticity is higher in the later period. Most empirical researchers believed these circumstances reflect the impact of financial deregulation and innovation (Miller 1991).

Table 7.10 Co-integration Tests for Narrow Money (Johansen's Procedure)

Variables in the cointegration system : M_1 Y P R E (all expressed in logarithmic form)

Maximal Eigenvalue of Stochastic Matrix

		Statistic	Critical Value	
Null	**Alternative**		**95%**	**90%**
r=0	r=1	59.67	37.86	35.04
r≤1	r=2	30.00	31.79	29.13
r≤2	r=3	18.57	25.42	23.10
r≤3	r=4	9.61	19.22	17.18
r≤4	r=5	5.42	12.39	10.55

Trace of Stochastic Matrix

		Statistic	Critical Value	
Null	**Alternative**		**90%**	**95%**
r=0	r≥1	123.28	87.17	82.88
r≤1	r≥2	63.61	63.00	59.16
r≤2	r≥3	33.60	42.34	39.34
r≤3	r≥4	15.03	25.77	23.08
r≤4	r≥5	5.42	12.39	10.55

LR- STATISTIC FOR TESTING HYPOTHESIS

Co-integrating Vector (1.0, β_1 β_2 β_3 β_4)

Null Hypothesis	LR- STATISTIC	
Ho: $\beta_1 = 0$	3.95	
Ho: $\beta_2 = 0$	5.18	
Ho: $\beta_3 = 0$	2.85	
Ho: $\beta_4 = 0$	12.8	
Ho: $\beta_1 = 1$	0.18	
Ho: $\beta_2 = 1$	2.31	$\chi 2$ value = 3.84 , df : 1 with 5% level.

Broad Money (M2)

The variables specified in the co-integration system are as follows:

M2 Y P R E; with the co- integrating vector (-1, β_1 β_2 β_3 β_4)

At the 95% critical value level the LR statistic test results reject the null hypothesis that there are zero co-integrating vectors, suggesting the presence of a stable long run relationship among those specified variables. However, for broad money (M2), the hypothesis that at most there is one co-integrating vector is rejected at the 5% level (Table 7.11). Since the number of co-integrating vectors of M2 are more than one, the co-integrating vector which is more appropriate with the economic theory particularly in terms of size and sign of the parameters is selected. Applying some restrictions in this model to test a number of hypotheses related to some properties of the long run demand for money, the results suggest that the hypotheses of null hypothesis for all parameters can be rejected at the 5% level. The hypotheses of unit price (β_3=1) cannot be rejected at 5% level, suggesting that in the long run nominal broad money aggregates functions can be expressed in real terms. Meanwhile the LR statistic rejects the unit income elasticity hypotheses or Ho: β_1= 1 at the 5% level. The hypothesis of $\beta_3 = \beta_4$=0 is rejected at 5% level. It indicates that demand for broad money is sensitive enough to respond to the change in interest rates and exchange rates.

Table 7.11 Co-integration Tests (Johansen's Procedure)

Variables in the cointegration system : M_2 Y P R E (all expressed in logarithmic form)

Maximal Eigenvalue of Stochastic Matrix

		Statistic	Critical Value	
Null	**Alternative**		**95%**	**90%**
r=0	r=1	50.59	37.86	35.04
r≤1	r=2	33.40	31.79	29.13
r≤2	r=3	17.88	25.42	23.10
r≤3	r=4	7.60	19.22	17.18
r≤4	r=5	6.14	12.39	10.55

Trace of Stochastic Matrix

		Statistic	Critical Value	
Null	**Alternative**		**90%**	**95%**
r=0	r≥1	105.61	87.17	82.88
r≤1	r≥2	75.12	63.00	59.16
r≤2	r≥3	34.60	42.34	39.34
r≤3	r≥4	15.75	25.77	23.08
r≤4	r≥5	6.28	12.39	10.55

LR- STATISTIC FOR TESTING HYPOTHESIS

Co-integrating Vector (1.0, β_1 β_2 β_3 β_4)

Null Hypothesis	LR- STATISTIC
Ho: $\beta_1 = 0$	34.02
Ho: $\beta_2 = 0$	3.93
Ho: $\beta_3 = 0$	4.17
Ho: $\beta_4 = 0$	29.29
Ho: $\beta_1 = 1$	32.17
Ho: $\beta_2 = 1$	4.36

$\chi 2$ value = 5.99 , df : 2 with 5% level.

Alternative Definitions of the Monetary Aggregate

The monetary aggregate defined as narrow money comprises currency in circulation (C) and demand deposits in commercial banks (DD). Since the motive for holding narrow money (M_1) is mainly to facilitate transactions, then saving deposits are not conventionally classified as M_1, but are included in the broad money (M2) definition instead. Banking deregulation which provides more room for innovation particularly in banking services has transformed saving accounts into a banking account which facilitates transactions. For instance, saving accounts can be easily converted into checking accounts or demand deposits with insignificant cost and no penalty. Supported by the advanced technology widely applied in the banking sector, most saving accounts can be used as a direct transaction measure through direct debit to the account. It also provides a greater flexibility in withdrawal either through ATM or bank counters if the withdrawal exceeds the maximum withdrawal allowed from an ATM. Under such circumstances, the demand for money to facilitate transactions might not be well represented by the conventional narrow money definition (M_1). In this regard, we investigates whether modifying the definition of narrow money through the inclusion of saving accounts will provide valuable information for conducting monetary policy. Clearly, saving accounts which are conventionally classified as quasi money and included in the broad money definition will be included as part of narrow money (M_1) and can be called modified narrow money or M_1+.

The co-integration test results are presented in Table 7.12

The variables specified in the co-integration system are as follows:

M+ Y R P E; with the co- integrating vector (-1, β_1 β_2 β_3 β_4)

At the 95% critical value level, the LR statistic test results reject the null hypothesis that there are zero co-integrating vectors, suggesting the presence of a stable long run relationship among the specified variables. At the same level, the hypothesis that there is at most one co-integrating vector cannot be accepted. Since the number of co-integrating vectors of m_1+ are more than one, the co-integrating vector which is more appropriate with economic theory particularly in terms of size and sign of the parameters is selected. Applying some restrictions in this model to test a number of hypotheses related to some properties of the long run demand for modified narrow money, the results suggest that the null hypothesis of Ho: $\beta_1 = \beta_4 = 0$ can be rejected at the 5% level. However, the results cannot reject the null hypothesis of Ho: $\beta_2 = \beta_3 = 0$. It indicates that demand for narrow money in both definitions is not sensitive enough to respond the changes in interest rates and exchange rates, but narrow money plus is affected significantly by the real income variable.

Table 7.12 Cointegration Tests (Johansen's Procedure)

(Variables in the cointegration system :M_1^+ YP R E P)

Maximal Eigenvalue of Stochastic Matrix

		Statistic	Critical Value	
Null	**Alternative**		**95%**	**90%**
r=0	r=1	50.59	37.86	35.04
r≤1	r=2	23.40	31.79	29.13
r≤2	r=3	17.88	25.42	23.10
r≤3	r=4	7.60	19.22	17.18
r≤4	r=5	6.14	12.39	10.55

Trace of Stochastic Matrix

		Statistic	Critical Value	
Null	**Alternative**		**90%**	**95%**
r=0	r≥1	105.61	87.17	82.88
r≤1	r≥2	55.02	63.00	59.16
r≤2	r≥3	31.63	42.34	39.34
r≤3	r≥4	13.75	25.77	23.08
r≤4	r≥5	6.14	12.39	10.55

LR- STATISTIC FOR TESTING HYPOTHESIS (Variables in the co-integration system : M_1^+ YP R E P)

Co-integrating Vector (1.0, β_1 β_2 β_3 β_4)

Null Hypothesis	LR- STATISTIC	
Ho: $\beta_1 = 0$	3.89	
Ho: $\beta_2 = 0$	0.44	
Ho: $\beta_3 = 0$	0.99	
Ho: $\beta_4 = 0$	9.28	
Ho: $\beta_2 = 1$	0.02	
Ho: $\beta_4 = 1$	8.14	$\chi 2$ value = 3.84 , df : 1 with 5% level.

Error Correction Mechanism (ECM)

Most of the monetary aggregates tested so far are co-integrated with the specified determinants of demand for money, both under the standard residual based procedure and the Johansen multivariate approach. Some monetary aggregates (reserve money, broad money, modified narrow money) and credit aggregates are co-integrated after applying a co-integrating test procedure which allows the presence of a possible structural break. If the set of variables are co-integrated, then as mentioned earlier, under Granger's representation theorem, there is a valid error correction representation of the time series. In other words, since the monetary aggregates are co-integrated with real income, price level, interest rate and exchange rate, then the error correction model is strongly justified for constructing the demand for money function. In addition, the results of unit tests also indicate that most of the macroeconomic series exhibit a unit root problem even when the unit root test was conducted by employing a test procedure which allows for the presence of structural break. It suggests that data series are not stationary at level. Therefore, applying a static or partial adjustment model might cause some econometric problems. The co-integration regression presented in Table 7.3 to 7.2.7 resulted in a high adjusted R^2 but low DW-statistics which reflects a serial correlation problem. Under such circumstances, as suggested by Hendry (1980), the application of a co-integration and error correction model is a fruitful exercise.

The error correction mechanism (ECM) represents the path of adjustment when the short run equilibrium departs from the long run equilibrium. Since statistically, it is derived from the estimated long run equilibrium, then the first problem arises with the

procedures for determining the estimated long run equilibrium. In this study, the long run equilibrium is estimated by the Engle and Granger procedure which employs the ordinary square (OLS) method as applied in testing the co-integration regression.[39] For the purpose of comparison, the estimated long run equilibrium under Phillip-Hansen, Hendry (ADRL) and Johansen's procedures are reported. As presented earlier, the presence of a stable long run relationship between monetary aggregates and determinants of money demand has already been justified through applying a co-integration regression test proposed by Engle and Granger and Johansen's co-integration procedure.

The long run equilibrium relationship is formulated in the following form:

$$y = \alpha o + \Sigma \alpha i \, x_i + e_t \qquad 7.24$$

where y stands for monetary aggregates such as C, Rm, M_1, M_2, and x_i (i = 1,2,3 .....n) are determinants of demand for money such as real income, price levels, etc.

The long run steady state equilibrium obtained by applying the Phillips- Hansen, auto distributive lag (ADRL), ordinary least square (OLS) and the Johansen procedures produce almost the same results in terms of the magnitudes of the estimated parameters. Splitting the sample into two sub sample periods before and after banking deregulation (June 1983) produces the same pattern for various definitions of monetary aggregates which confirms the impact of banking deregulation and innovation. The income elasticity tends to be slightly smaller in the sub sample period (i.e. the post deregulation period 1983q3- 1996q4). In contrast, price and interest elasticity tend to be higher during that post deregulation period, suggesting that: (i) since the implementation of financial

[39] Under the procedure proposed by Engle and Granger, a cointegration test is conducted by examining the stationarity of the residuals derived from the cointergration regression.

deregulation, people have more alternatives for their savings both in banking and other financial institutions, (ii) people are more responsive and anticipate changes in interest rates and price levels. Meanwhile, the interest rate elasticity of the demand for money particularly broad money is higher in the sub sample post banking deregulation (1983q3 to 1996q4). It indicates demand for that particular type of money i.e. quasi money is more sensitive in response to changes in interest rates when the prevailing interest rate is freely allowed to reach its market clearing levels.

The results of the estimated long run equilibrium with various approaches are presented in Tables 7.13 to 7.17 below.

Table 7.13 The estimated Long Run Equilibrium of Currency (C)

Regressor	Phillips-Hansen	ADRL	OLS	Johansen
Intercept	-0.6778	-0.4298	-.84843	-0.4313
Y	0.8652	1.0408	0.8535	0.73957
P	0.9567	0.7459	1.0056	1.0229
R	0.1064	0.2342	0.0755	-0.0922
E	-0.1274	0.1799	-0.0760	-0.1905

Table 7.14 The estimated Long Run Equilibrium of R_m

Regressor	Phillips-Hansen	ADRL	OLS	Johansen
Intercept	1.3313	0.6019	1.2469	1.3306
Y	0.4217	0.8902	0.4217	0.3292
P	1.1886	0.7891	1.2040	1.2820
R	-0.2010	0.2498	0.1824	-0.0605
E	-0.1725	0.1684	-0.1450	-.09545

Note: All variables are expressed in logarithmic forms.

Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively

Numbers in the parentheses are t-statistic

Table 7.15 The estimated Long Run Equilibrium of M_1

Regressor	Phillips-Hansen	ADRL	OLS	Johansen
Intercept	-2.2556	-2.6409	-2.0768	-3.007
Y	1.1789	1.5013	1.1224	1.4342
P	1.0870	0.8253	1.1225	0.9622
R	0.0278	0.1271	-0.0351	-0.004
E	0.1574	0.1859	0.14247	0.3044

Table 7.16 The estimated Long Run Equilibrium for M_2

Regressor	Phillips-Hansen	ADRL	OLS	Johansen
Intercept	-0.5260	-0.3722	-.73354	2.6757
Y	1.0845	1.3553	1.0929	1.0049
P	1.0094	0.6994	1.0398	0.9804
R	0.1805	-0.1007	0.1459	-0.1282
E	0.4665	0.4809	-0.4185	-0.5215

Note: All variables are expressed in logarithmic forms.

Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively

Numbers in the parentheses are t-statistic

Table 7.17 The estimated Long Run Equilibrium of M^+

Regressor	Phillips-Hansen	ADRL	OLS	Johansen
Intercept	-4.6214	-3.6602	-3.0763	-2.7011
Y	1.1121	1.2334	1.1041	1.3040
P	1.0521	0.9823	1.0425	0.9687
R	0.0171	0.0211	0.0243	0.0190
E	0.0920	0.0140	0.0524	0.1123

Note: All variables are expressed in logarithmic forms.

Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively

Numbers in the parentheses are t-statistic

Tables 7.13 to 7.17 show the estimated long run equilibrium based on the Phillip-Hansen procedure, the ADRL approach, the OLS and the Johansen procedure. Several interesting results emerge. First, the price elasticity of money demand in the full sample (1970q1- 1996q4) is close to unity almost for all types of monetary aggregates (C, M_1 , and M_2), except for those generated from applying ADRL procedure. Second, the income elasticity (the coefficients of income level) for M_1 and M_2 are in neighborhood of one, again except for those which resulted from employing the ADRL method. Under Johansen's approach, imposing restrictions on price homogeneity (β_2=1), the null hypothesis cannot be rejected at the 5% level (see Table 7.15 and 7.16). However,

imposing unitary income elasticity on Johansen's procedure (β_1=1), the null hypothesis is rejected at 5% level. The price homogeneity hypothesis implies that particular long run nominal money demand apparently can be treated as real money demand. Income and price homogeneity are part of an important requirement in achieving stable money velocity, which in turn is more than useful in facilitating monetary policy.

The short run equilibrium model in the error correction mechanism is formulated as follows:

$$\Delta Y_t = \beta o + \Sigma (\beta ij \, \Delta X_{i, t-j} + \delta \Delta Y_{t-j-1}) + \Gamma \, ECM_{t-1} + u_t \qquad 7.25$$

Δ represents the difference operator, α_i, β_i and δ are statistical parameters.

Applying the same variables used in co-integrating analysis, the model can be expressed in the following form:

$$\Delta X_{i\,t} = a_0 + \Sigma(a_{1i} \, \Delta YP_{t-i} + a_{2i} \, \Delta P_{t-i} + a_{3i} \, \Delta R_{t-i} + a_{4i} \, \Delta E_{t-1} + a_{5i} \Delta X_{t-i}) +$$

$$a_6 \, ECM_{t-1} + u_t \qquad 7.26$$

where X_i stands for the log of monetary aggregates (various definition of money). The selection of lag length is based on Hendry's *general to specific* procedure which first included certain lags for the explanatory variables and one lag for the error correction mechanism, and deleted those coefficients which were statistically insignificant. Under the restricted ECM equation (case 1), only the short run relationship between dependent and independent variables with an error correction term is explained. This represents the speed of adjustment toward equilibrium in the presence of shocks which cause the money stock to depart from its long run equilibrium level. In case 2 (unrestricted ECM), not only the short run relationship but also the long run relationship in single equations can be presented as well. In this case, the error term (the coefficient of ECM) is replaced by a

lag of explanatory variables at level and one lag of dependent variables at level. Clearly, case 2 in the presentation of the ECM equation (unrestricted ECM) is conducted to capture the long run relationship between the dependent variable and the specified determinants of money demand which can not be captured when applying restricted ECM (case 1). The unrestricted ECM can be expressed as follows:

$$\Delta \text{Ln } X_{i\,t} = c_0 + \Sigma \left(a_{1i}\, \Delta \text{Ln } YP_{t-i} + a_{2i}\, \Delta \text{Ln } P_{t-i} + a_{3i}\, \Delta \text{Ln } R_{t-i} + a_{4i}\, \Delta \text{Ln } E_{t-i} + a_{5i}\, \Delta \text{Ln } X_{t-i} \right) + b_1 \text{ Ln } X_{t-1} + b_2 \text{ Ln } Yp_{t-1} + b_3 \text{ Ln } P_{t-1} + b_4 \text{ Ln } R_{t-1} + b_5 \text{ Ln } E_{t-1} + u_t \qquad 7.27$$

It is obvious that the unrestricted ECM above can be derived in a straight forward fashion from the restricted ECM and the long run equation as follows:

The ECM coefficient (a_6) = b_1

The intercept and parameters of lag level:

intercept = $c_0 = (a_0 - a_6\alpha_0)$

$b_2 = - a_6\alpha_1$

$b_3 = a_6\alpha_2$

$b_4 = a_6\alpha_3$

$b_5 = a_6\alpha_4$

Tables 7.18 to 7.22 show some interesting results. First, in general (except for currency), the broader definition of money has a slower speed of adjustment towards

equilibrium level which is indicated by the coefficients of their respective ECM $_{t-1}$. In other words, in the presence of a disturbance which led to demand for money departing from its long run equilibrium level, people will adjust faster to changes in their demand for money for transaction purposes compared with other purposes. The more detailed analysis of the ECM results is presented below. Second, all coefficients of error correction terms are statistically significant for all definitions of monetary aggregates which validates the existence of an equilibrium relationship between variables in the cointegration system e.g. monetary aggregates and the specified determinants of money demand.

Table 7.18 shows that the coefficient of the error correction term for nominal currency demand is -0.22 which is statistically significant. The significant coefficient of ECM verifies the existence of a stable relationship between variables in the cointegrated system. In the short run,[40] demand for currency (ΔC) responds significantly to changes in real income (ΔY) and price level (ΔP). Meanwhile, in the long run the demand for currency is also significantly affected by the variations in the lags for real income (Y_{t-1}) and lagged price levels (P_{t-1}). In contrast, the result suggests that nominal currency does not correspond to fluctuations in effective nominal exchange rates. It implies a lack of substitution between domestic and foreign currency, since only domestic currency is used as an official medium of exchange for domestic transactions. All statistical diagnostics perform satisfactorily.

[40] All variables are expressed in first difference (Δ).

Table 7.18 Error Correction Equation : Currency (C)

Case : 1			Case : 2		
Regressor	Coefficient	T-Ratio	Regressor	Coefficient	T-Ratio
constant	0.026	3.093	constant	-0.212	-0.929
ΔY	0 .289	1.791	ΔY	0.172	1.001
ΔP	0.621	3.468	ΔP	0.256	1.293
ΔC_{t-1}	-0.309	-3.484	ΔC_{t-1}	-0.225	-2.283
ΔC_{t-4}	0.225	2.526	ΔC_{t-4}	0.219	2.402
ECM_{t-1}	-0.222	-4.158	C_{t-1}	-0.222	-2.944
			Y_{t-1}	0.246	3.011
			P_{t-1}	0.167	2.027
			R_{t-1}	-0.034	-1.795
			E_{t-1}	-0.025	-0.802
R-Bar-Squared	0.29		R-Bar-Squared	0.27	
S.E. of Regression	0.04		S.E. of Regression	0.04	
F-stat. F(5, 97)	9.32		F-stat. F(9, 93)	5.19	
DW-statistic	1.63		DW-statistic	2.03	
$N\chi^2$	0.32		$N\chi^2$	0.34	
.AR F	0.18		AR F	0.22	
ARCH F	0.89		ARCH F	0.92	
X^2	1.12		X^2	1.14	
RESET	0.34		RESET	0.38	

Note: All variables with the exception of dummy variable (DV) are expressed in logarithmic form. Δ refers to first difference, for instance $\Delta Y=Y-Y_{t-1}$, etc.

Table 7.19 Error Correction Equation : Nominal Reserve Money

Case : 1

Regressor	Coefficient	T-Ratio
Constant	0.030	3.588
ΔP	0.619	2.841
ΔR	-0.081	-1.578
ΔR_{t-4}	0.127	2.457
ECM_{t-1}	-0.414	-5.390

R-Bar-Squared	0.28
S.E. of Regression	0.05
F-stat. F(4, 97)	10.67
DW-statistic	2.10
$N\chi^2$	0.35
AR F	0.19
ARCH F	0.90
X^2	1.14
RESET	0.36

Case : 2

Regressor	Coefficient	T-Ratio
constant	0.347	1.081
ΔP	0.360	1.427
ΔR	-0.056	-1.038
ΔR_{t-1}	0.152	2.796
$R_{m\,t-1}$	-0.354	- 4.867
Y_{t-1}	0.252	3.311
P_{t-1}	0.318	3.299
R_{t-1}	-0.061	-2.110
E_{t-1}	-0.065	-1.468
DV	-0.056	-2.467

R-Bar-Squared	0.28
S.E. of Regression	0.05
F-stat. F(8, 93)	5.95
DW-statistic	2.29
$N\chi^2$	0.38
AR F	0.21
ARCH F	0.93
X^2	1.15
RESET	0.38

Note: All variables with the exception of dummy variable (DV) are expressed in logarithmic form. Δ refers to first difference, for instance $\Delta Y = Y - Y_{t-1}$, etc.

Table 7.20 Error Correction Equation : Nominal Narrow Money

Case:1			**Case :2**		
Regressor	Coefficient	T-Ratio	Regressor	Coefficient	T-Ratio
Constant	0.018	2.272	constant	-0.529	-2.443
ΔY	0.277	1.976	ΔY	0.224	1.558
ΔP	0.406	2.664	ΔP_{t-1}	0.245	1.387
ΔP_{1-4}	-0.275	-1.754	ΔP_{t-4}	-0.291	-1.755
ΔR	-0.090	-2.873	ΔR	-0.080	-2.345
$\Delta M_{1(t-1)}$	0.168	1.909	$\Delta M_{1(t-1)}$	0.116	1.206
$\Delta M_{1(t-2)}$	0.319	3.529	$\Delta M_{1(t-4)}$	0.279	2.985
ECM_{t-1}	-0.222	-4.017	$M_{1(t-1)}$	-0.225	-3.949
			Y_{t-1}	0.300	3.917
			P_{t-1}	0.212	3.029
			R_{t-1}	-0.011	-0.649
			E_{t-1}	0.035	1.263
R-Bar-Squared	0.34		R-Bar-Squared	0.35	
S.E. of Regression	0.03		S.E. of Regression	0.03	
F-stat. F(7, 93)	8.28		F-stat. F(11, 89)	5.59	
DW-statistic	2.10		DW-statistic	2.14	
$N\chi^2$	0.35		$N\chi^2$	0.38	
AR F	0.21		AR F	0.22	
ARCH F	0.95		ARCH F	0.98	
X^2	1.16		X^2	1.17	
RESET	0.44		RESET	0.48	

Note: All variables with the exception of dummy variable (DV) are expressed in logarithmic form. Δ refers to first difference, for instance $\Delta Y=Y-Y_{t-1}$, etc.

Table 7.21 Error Correction Equation: Nominal Broad Money

Case : 1			**Case : 2**		
Regressor	Coefficient	T-Ratio	Regressor	Coefficient	T-Ratio
constant	0.038	5.298	constant	-0.013	-0.079
ΔY	0.277	2.447	ΔY	0 .206	1.644
ΔP	0.433	3.570	ΔP	0.325	2.279
ΔP_{t-3}	-0.324	-2.953	ΔP_{t-3}	-0.321	-2.745
ΔR	-0.046	-1.822	ΔR	-0.038	-1.398
ΔR_{t-3}	0.042	1.674	ΔR_{t-3}	0 .051	1.825
ΔE	0.065	1.366	ΔE_{t-3}	0.050	0.981
$\Delta M2_{t-2}$	0.279	3.424	$\Delta M2_{t-4}$	0.247	2.810
ECM_{t-1}	-0.161	-5.254	$M2_{t-1}$	-0.142	-4.613
			Y_{t-1}	0.175	3.205
			P_{t-1}	0.110	2.828
			R_{t-1}	-0.021	-1.438
			E_{t-1}	-0.077	-3.037
			DV	0.045	2.924
R-Bar-Squared	0.39		R-Bar-Squared	0.36	
S.E. of Regression	0.02		S.E. of Regression	0.02	
F-stat. F(8, 93)	9.11		F-stat. F(13, 88)	5.31	
DW-statistic	2.07		DW-statistic	2.12	
$N\chi^2$	0.33		$N\chi^2$	0.37	
AR F	0.22		AR F	0.24	
ARCH F	0.93		ARCH F	0.99	
X^2	1.12		X^2	1.14	
RESET	0.39		RESET	0.43	

Note: All variables with the exception of dummy variable (DV) are expressed in logarithmic form. Δ refers to first difference, for instance $\Delta Y=Y-Y_{t-1}$, etc.

Table 7.19 shows that nominal reserve money responds to variations in the price levels and interest rates both in the short run and the long run. Unlike demand for currency which is significantly affected by changes in real income both in the short run and long run, demand for reserve money only responds to changes in real income in the long run. However, the response to exchange rate fluctuations is similar to that of nominal currency in the sense that reserve money is absent from any impact from exchange rate variations both in the short run and long run. Eliminating the exchange rate variable from short run and long run equation which does not cause in rejection of RESET test, justifies the observation that the exchange rate variable is not an important variable in explaining demand for reserve money. It is worth noting that the inclusion of a dummy variable in the unrestricted ECM equation (case 2) is statistically significant, suggesting that banking deregulation which substantially changed reserve requirements set by the Central Bank in 1989, has affected nominal reserve money significantly. Meanwhile all statistical diagnostic tests applied in nominal currency also perform well for nominal reserve money.

Table 7.20 shows that the demand for nominal narrow money responds significantly to variations in income and price level, both in the short run and in the long run as well. Meanwhile, the interest rate is significant only in the short term. The coefficient of the error correction term is statistically significant suggesting the existence of an equilibrium relationship between variables in the co-integration system.

Table 7.21. shows that nominal broad money responds significantly to variations in all specified determinants of money demand both in the short run and long run. The error correction term is statistically significant (-0.16) which implies the presence of an

equilibrium relationship between variables in the co-integration equation. However the speed of adjustment toward equilibrium level when money stock departs from long run money demand is much slower than those for other monetary aggregates. It is important to note that the coefficient of dummy variable is positive and statistically significant. It indicates that banking deregulation has promoted the shifting of financial portfolio from non interest bearing money to interest bearing money, i.e. quasi money. All statistical diagnostic tests which were applied in the previous analysis of other monetary aggregates (see the diagnostic tests for nominal currency) also perform well in testing the error correction equation for nominal broad money.

Causality Between Money Supply And Determinants Of Money Demand

The property of co-integration stated that since variables are co-integrated there exists causality at least in one direction. Following the error correction procedure, the causality test is performed:

$$\Delta Y = a_0 + \sum_{i=1}^{n} ai\, \Delta Y_{t-i} + \sum_{i=1}^{n} bi\, X_{t-i} + e_t \qquad 7.28$$

Accordingly, X Granger causes Y when the parameters of X (b_i) are jointly significant or the coefficient of ECM_{t-1} is significant. Since the coefficients of ECM_{t-1} are derived from equations of co-integrated variables which means they share a common trend, then significant ECM_{t-1} coefficients imply the presence of causality from independent variables to dependent variables at level.

Applying the test of temporal causality proposed by Engle and Granger (1987) results in a similar pattern for various definitions of the monetary aggregates, particularly

regarding the direction of causality and the mechanism for restoring the equilibrium when monetary aggregates deviate from their long run equilibrium. For various sample periods employed in this analysis, it is suggested that the sign and the magnitude of the ECM coefficients are mostly matched for providing policy application. Negative signs for the money stock, interest and exchange rates on one side and a positive sign for real income and price, suggests that any shock which causes the money stock to exceed the long run demand for money will push the price level and income up. Therefore, if monetary policy is proposed to stabilize the shock, then the Central Bank should impose monetary policy which is directed towards decreasing the money stock, increasing interest rates and appreciating the exchange rate.

Table 7.23 to 7.27 show that in the full sample period (1970q1 - 1996q4) most of the coefficients of ECM_{t-1} are statistically significant only on the money aggregates using various definitions, interest rates and exchange rates. It suggests that if the money stock departs from its long run equilibrium, the correction mechanism toward equilibrium is mainly through the money and exchange rate markets. Splitting the samples into two periods which represent the periods before and after banking deregulation, shows that in the former period both the goods and services market as well as financial markets restored the equilibria, while the latter period, money and foreign exchange markets were more dominant in restoring the disequilibrium as shown in the temporal causality tests in the post banking deregulation period where the ECM coefficients mostly only affect the money stock, interest and exchange rates. In other words, banking deregulation has made the money and foreign exchange markets more important in overcoming any economic disequilibrium. There is no strong evidence that income and the price level are

exogenous, since in the short run, changes in income and prices respond significantly to some other variables. Interestingly, in the short run, changes in the exchange rate do not have any significant effect on any definitions of money with the exception of narrow money (m_1). In other words, any change in the exchange rate does not cause significant change in any monetary and credit aggregates. One of the possible explanations of that particular finding is that any change in the exchange rate, causes economic agents to adjust their financial portfolio within domestic financial institutions in the short run. In the long run, the adjustment might involve changes in the financial portfolio among financial institutions both domestic and international which leads to capital movements across the border. Meanwhile, the significant coefficient of the sum of lags in the price level and exchange rate equation implies that in the short run dynamic, the price level and the exchange rate adjust to changes in the nominal money stock.

Table 7.22 Temporal causality

Nominal Currency and Determinants of Money Demand

Sub sample (1970q1- 1983q3)

	ΣΔY	ΣΔP	ΣΔR	ΣΔE	ΣΔC	ECM $_{-1}$
ΔC	-	-	-0.0.094 [5.69]** (2)	-	0.289 [9.90]*** (4)	-0.255 [11.82]***
ΔY	0.307 [12.28]*** (2)	-0.195 [40.24]*** (0, 2, 4)	-	-0.003 [18.40]*** (3, 4)	-	-
ΔP	0.102 [52.52]*** (0, 1, 2)	0.601 [41.39]*** (1, 2)	-0.027 [3.45]** (3)	0.030 [18.57]*** (3, 4)	-	0.132 [17.04]***
ΔR	-	-0.991 [6.05]** (4)	0.209 [4.10]* (1)	-	-	-0.114 [4.67]*
ΔE	-	0.332 [1.54] (3)	0.067 [2.44] (2)	-	-	-0.178 [13.84]***

Sub Sample (1983q3- 1996q4)

	ΣΔY	ΣΔP	ΣΔR	ΣΔE	ΣΔC	ECM $_{-1}$
ΔC	-	-1.562 [4.63]** (1)	-	-	-	-0.214 [-2.67]***
ΔY	0.364 [5.58]** (1)	0.443 [5.69]** (1)	-	-0.072 [5.55]** (2)	-	-
ΔP	0.049 [6.60]** (3, 4)	-0.282 [4.52]** (2)	-	-0.147 [11.25]*** (1, 3)	-	-
ΔR	-	-	0.252 [3.62]** (1)	-	-	0.355 [2.02]
ΔE	-	-	-	-	0.323 [8.01]*** (1)	-0.310 [-3.05]***

Full sample(1983q4-1996q4)

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta C$	ECM_{-1}
ΔC	-	-	-0.0.094 [5.69]** (2)	-	0.289 [9.90]*** (4)	-0.282 [11.82]***
ΔY	0.207 [12.28]*** (2)	-0.195 [40.24]*** (0, 2, 4)	-	-0.003 [18.40]*** (3, 4)	-	-
ΔP	0.152 [52.52]*** (0, 1, 2)	0.601 [41.39]*** (1, 2)	-0.027 [3.45]** (3)	0.030 [18.57]*** (3, 4)	-	0.182 [17.04]***
ΔR	-	-0.991 [6.05]** (4)	0.209 [4.10]* (1)	-	-	-0.114 [4.67]*
ΔE	-	0.332 [1.54] (3)	0.067 [2.44] (2)	-	-	-0.178 [13.84]***

Sign * , ** and *** indicate significant at the 10%, 5% and 1% level respectively.

Numbers in brackets represent t - statistic for ECM coefficient and chi squared statistic- LM-statistic for others . Numbers in the parentheses are lag of independent variables employed in the equation.

Note: All variables are in first difference (Δ) and expressed in logarithmic form.

Table 7.23 Temporal causality

Nominal Reserve Money and Determinants of Money Demand

Sub Sample (1970q1 - 1983q2)

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta r_m$	ECM_{-1}
ΔR_m	-	-	-	-	0.251 [3.42]* (1)	-0.217 [-1.82]*
ΔY	0.207 [3.26]** (2)	0.556 [12.84]*** (2)	-0.144 [7.63]** (1,2)	-0.100 [15.18]*** (3,4)	-0.401 [9.92]*** (1,2)	0.219 [2.96]***
ΔP	0.666 [9.53]*** (1,2)	-	-	0.171 [4.15]** (4)	-	-
ΔR	-	-2.399 [13.37]*** (1,4)	-	-	-	-1.027 [5.54]***
ΔE	-	-	-0.276 [8.95]*** (3)	-	0.348 [5.54]**	-

Sub Sample (1983q3- 1996q4)

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta r_m$	ECM_{-1}
ΔR_m	-	-1.562 [4.63]** (1)	-	-	-	-0.314 [-2.67]***
ΔY	0.364 [5.58]** (1)	0.443 [5.69]** (1)	-	-0.072 [5.55]** (2)	-	-
ΔP	0.049 [6.60]** (3,4)	-0.282 [4.52]** (2)	-	-0.147 [11.25]*** (1,3)	-	-
ΔR	-	-	0.252 [3.62]** (1)	-	-	0.355 [2.02]
ΔE	-	-	-	-	0.323 [8.01]*** (1)	-0.310 [-3.05]***

Full Sample (1970q1- 1996q4)

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta R_m$	ECM_{-1}
ΔR_m	0.580 [5.64]** (1)	-	-	0.240 [5.32]** (4)		-0.266 [-3.38]***
ΔY	0.200 [4.46]** (2)	0.025 [18.66]*** (3)	-	-0.001 [12.54]*** (3,4)	-	-
ΔP	0.641 [27.19]*** (1,2)	0.349 [27.57]*** (1)	-0.040 [5.39]** (1)	0.010 [9.27]*** (4)	0.069 [5.67]** (4)	0.056 [2.20]**
ΔR	-	-0.900 [4.80]** (4)	-	-	-	-
ΔE	-	-	-0.226 [8.74]** (1,3)	-	-	-

Sign * , ** and *** indicate significant at 10%, 5% and 1% level respectively.

Numbers in brackets represent t - statistic for ECM coefficient and chi squared statistic- LM-statistic for others . Numbers in the parentheses are lag of independent variables employed in the equation.

Note: All variables are in first difference (Δ) and expressed in logarithmic form.

Table 7.24 Temporal causality

Nominal Narrow Money and Determinants of Money Demand

Sub Sample (1970q1 - 1983q2)

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta M_1$	ECM_{-1}
ΔM_1	0.212 [4.88]*** (1)	-0.391 [5.01]** (2)	-0.216 [4.16]** (2)	0.114 [3.58]* (4)	0.288 [15.81]** (3)	-0.214 [4.50]***
ΔY	-0.093 [3.17]** (1)	-0.027 [10.03]*** (1,4)	-	-0.108 [6.23]*** (3)	-	-
ΔP	0.250 [11.42]*** (1)	0.179 [10.08]*** (2, 5)	-0.112 [9.97]*** (3)	0.029 [4.43]** (4)	-	0.102 [2.74]*
ΔR	-	-	-	-	-0.142 [9.02]*** (1, 3)	-
ΔE	-	-	-0.418 [9.57)** (1,3)	-	0.381 [3.41)* (4)	-

Sub Sample (1983q3 - 1996q4)

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta M_1$	ECM_{-1}
ΔM_1	0.182 [5.14]*** (1)	-0.302 [5.21]** (2)	-0.346 [4.16]** (2)	0.204 [4.58]* (3)	0.397 [18.81]** (3)	-0.280 [5.35]***
ΔY	-0.193 [4.72]** (1)	-0.053 [13.93]*** (2,4)	-	-0.102 [7.13]*** (3)	-	-
ΔP	0.411 [20.90]*** (2)	0.681 [39.08]*** (1, 3)	-0.089 [7.77]*** (3)	0.076 [4.73]** (4)	-	0.098 [3.24]*
ΔR	-	-	-	-	-0.221 [14.02]*** (1, 3)	-
ΔE	-	-	-0.218 [8.54)** (1,3)	-	0.271 [3.39)* (4)	-

Full Sample (1970q1 - 1996q4)

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta M_1$	ECM_{-1}
ΔM_1	0.332 [5.28]*** (1)	-0.346 [5.16]** (3)	-0.346 [4.16]** (2)	0.114 [3.58]* (4)	0.488 [20.81]** (4)	-0.221 [4.32]***
ΔY	-0.193 [4.72]** (1)	-0.053 [13.93]*** (2,4)	-	-0.102 [7.13]*** (3)	-	-
ΔP	0.451 [22.90]*** (1)	0.678 [33.08]*** (1, 5)	-0.059 [9.77]*** (3)	0.076 [4.73]** (4)	-	0.065 [2.00]*
ΔR	-	-	-	-	-0.221 [14.02]*** (1, 3)	-
ΔE	-	-	-0.218 [8.54)** (1,3)	-	0.271 [3.39)* (4)	-

Sign * , ** and *** indicate significant at 10%, 5% and 1% level respectively.

Numbers in brackets represent chi squared statistic- LM-statistic and numbers in the parentheses are lag of independent variables employed in the equation.

Note: All variables are in first difference (Δ) and expressed in logarithmic form.

Table 7.25 Temporal causality

Nominal Broad Money and Determinants of Money Demand

Sub Sample 1970q1- 1983q2

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta M_2$	ECM_{-1}
ΔM_2	-	-0.451 [7.47]*** (3)	-0.166 [9.67]*** (4)	-0.128 [3.08]* (1)	-	-0.226 [-3.39]***
ΔY	-	0.384 [9.17]*** (2)	0.079 [5.41]** (3)	-0.130 [16.79]*** (3.4)	-	0.118 [2.58]***
ΔP	0.368 [10.26]*** (1)	-	-0.256 [20.67]*** (3,4)	-8.8E-05 [15.17]*** (1,2,4)		-0.133 [-3.62]***
ΔR					-1.287 [8.09]*** (4)	-
ΔE	-	-	-0.306 [1049]***	-	-	-0.201 [-2.00]*

Sub Sample 1983q3- 1996q4

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta M_2$	ECM_{-1}
ΔM_2	-	-0.668 [5.01]** (1)	-	-	-	-0.123 [-2.49]**
ΔY	0.275 [9.86]*** (2)	-0.250 [38.01]*** (1,4)	-	-0.002 [10.34]*** (3)	-	-
ΔP	0.464 [8.36]** (1,3)	-0.323 [5.76]**	-	-0.080 [5.68]** (1)	-	-
ΔR	-	-	0.441 [10.21]*** (1)	-0.660 [10.62]*** (3)	0.815 [3.40]* (1)	-
ΔE	1.072 [5.72]** (2)	-	-	-	-	-

Full Sample (1970q1 - 1996q4)

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta M_2$	ECM_{-1}
ΔM_2	-	-0.007 [13.11]** (3)	-	-	0.315 [13.61]*** (4)	-0.133 [18.58]*** (1)
ΔY	0.287 [9.86]*** (2)	-0.206 [38.01]*** (2,4)	-	-0.002 [10.34]*** (3)		-
ΔP	0.2088 [51.19]*** (1,2)	0.578 [42.94)*** (1,2)	-0.034 [4.39]*** (3)	-0.076 [21.32]*** (1,3,4)	-	0.037 [4.35]** (1)
ΔR	-	-0.052 [5.99]** (1,2)	0.198 [4.25]** (1)	-		-0.121 [5.64]** (1)
ΔE	-	-	-	-	0.174 [5.198]* (2,4)	-0.132 [9.04]* (1)

Sign * , ** and *** indicate significant at 10%, 5% and 1% level respectively.

Numbers in brackets represent chi squared statistic- LM-statistic and numbers in the parentheses are lag of independent variables employed in the equation.

Note: All variables are in first difference (Δ) and expressed in logarithmic form.

Table 7.26 Temporal causality

Nominal Modified Narrow Money (M^+) and Determinants of Money Demand

Sub Sample 1970q1- 1983q2

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta M^+$	ECM_{-1}
ΔM^+	-	-0.124 [4.47]** (3)	-0.166 [9.67]*** (4)	-0.128 [3.08]* (1)	-	-0.246 [-4.53]***
ΔY	-	0.384 [9.17]*** (2)	0.079 [5.41]** (3)	-0.130 [16.79]*** (3,4)	-	0.141 [4.80]***
ΔP	0.328 [8.26]*** (1)	-	-0.122 [10.67]*** (4)	-0.055 [10.11]*** (1, 4)		-0.153 [-5.16]***
ΔR					-1.287 [8.09]*** (4)	-
ΔE	-	-	-0.306 [1049]***	-	-	-0.191 [-2.31]*

Sub Sample 1983q3- 1996q4

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta M^+$	ECM_{-1}
ΔM^+	-	-0.814 [7.70]** (1)	-	-	-	-0.158 [-3.19]**
ΔY	0.175 [6.99]*** (2)	-0.115 [19.51]*** (4)	-	-0.012 [8.73]*** (3)	-	-
ΔP	0.214 [6.36]** (1,3)	-0.323 [5.76]** (2)	-	-0.028 [3.88]** (1)	-	-
ΔR	-	-	0.321 [8.11]*** (1)	-0.704 [6.62]** (3)	0.714 [3.81]* (1)	-
ΔE	1.072 [5.72]** (2)	-	-	-	-	-

Full Sample (1970q1-1996q4)

	$\Sigma\Delta Y$	$\Sigma\Delta P$	$\Sigma\Delta R$	$\Sigma\Delta E$	$\Sigma\Delta M^+$	ECM_{-1}
ΔM^+	0.441 [8.83]*** (0)	0.060 [10.87]*** (0,3)	-	0.111 [3.49]* (3)	0.277 [9.53]*** (4)	-0.204 [21.05]***
ΔY	-	-0.334 [11.77]*** (0)	-	-0.007 [13.78]*** (3,4)	0.132 [5.15]** (0)	-
ΔP	0.244 [49.70]*** (0,1,4)	0.583 [34.60]*** (1,2)	-	0.043 [16.53]*** (1,4)	-	-0.031 [3.98]*
ΔR	-	-	-	-	-1.177 [21.40]*** (0,1,3)	-0.102 [4.56]**
ΔE	-	0.397 [3.35]* (3)	-	-	-	-0.148 [10.49]***

Sign *, ** and *** indicate significant at 10%, 5% and 1% level respectively.

Numbers in brackets represent chi squared statistic- LM-statistic and numbers in the parentheses lag of independent variables employed in the equation.

Note: All variables are in first difference (Δ) and expressed in logarithmic form.

7.5. Concluding Remarks

This chapter is devoted to evaluating the reliability of monetary aggregates as a guide for the conduct of monetary policy. Demand for money in various definitions is estimated using some recent econometric procedures which allow for the presence of a possible structural break. Along with preventing any bias towards non rejection of the null hypothesis, the I-O unit root test procedure proposed by Perron and Vogelsang (1992) is employed to determine when the possible presence of a structural break occurred. Meanwhile, applying the Gregory-Hansen test procedure for cointegration is also to prevent any bias towards non rejection of the null hypothesis, if the standard

residual based cointegration test was employed. Clearly, applying these procedures will enables us to obtain more reliable results for determining the properties of variables employed in this study, and examine the long run relationships between variables in the cointegrated system.

Applying the I-O unit root test procedure, the results suggest that all variables employed in this study, with the exception of the price level, are not stationary at level. On the basis that the possible break point occurred when t_α is minimum, the lO-test procedure for unit root provided information that monetary aggregates and other macroeconomic variables respond immediately following government policy changes relating to monetary aggregates and exchange rate variables. In this case, the possible structural break for interest rates, monetary aggregates and real income occurred in the period after banking deregulation, while the possible break point for the exchange rate occurred in the period after the fixed exchange rate system was replaced with the flexible exchange rate system. Only with the price level, the possible break point does not reflect a response to any government policy but rather corresponds to domestic and global factors which pushed the inflation rate to its highest level since the government started its stabilization program in the late 1960's.

With regard to the cointegration test, the results suggest that only nominal currency (C) and narrow money (M_1) are cointegrated with the specified variables when the standard residual based tests for co-integration are employed. Meanwhile, applying the same procedure for interest bearing money, i.e. modified narrow money, quasi money, and broad money, the null hypotheses cannot be rejected at the 10% level. However, when the Gregory-Hansen test procedure for cointegration is employed, the results

indicate that all monetary aggregates are cointegrated with the specified variables. Therefore, it confirms that in the presence of a structural break, the standard residual based test procedure is irrelevant and biased toward non rejection. Meanwhile, applying the Johansen test procedure for cointegration also indicates the presence of a stable long run relationship between monetary aggregates in various definitions and the variables specified as determinants of money demand.

The properties of the data series which exhibit unit root problems and the existence of a stable long run relationship between monetary aggregates and the determinants of money demand validate the error correction mechanism (ECM) for estimating the demand for money. The empirical results from employing the ECM indicate that error correction terms are statistically significant for all definitions of monetary aggregates. It implies that in the long run monetary aggregates respond significantly to changes in determinants of money demand. However, in the short run, the sign and magnitude of the parameters do not provide robust information for policy recommendations.

Applying the Engle-Granger temporal causality test procedure resulted in some interesting findings. First, none of the monetary aggregates perform well in explaining the future course of real income or price levels. Second, money and exchange rate markets play a more important role in restoring economic equilibrium in the post banking deregulation sub sample period (1983q3-1996q4). In contrast, in the pre banking deregulation sub sample period (1970q1-1983q2), the adjustment towards equilibrium occurred in goods and services markets.

Briefly, in the long run perspective, the findings validate the reliability of all monetary aggregates to facilitate in conducting monetary policy. However, in the short run, since the sign and magnitude of the parameters are not robust along with the lack of causal relationship between monetary aggregates and the variables presumed as the objective of monetary policy i.e. real income and price levels, then in the short run monetary aggregates are not reliable as a guide for conducting monetary policy.

Applying different econometric procedures, the issue related to the reliability of monetary aggregates as a guide for conducting monetary policy will be explored further in the following chapter.

CHAPTER 8

BANKING/MONETARY INDICATORS AND MONETARY POLICY

8.1 Introduction

As discussed in the previous chapters, banking deregulation and innovation has downgraded the reliability of banking and monetary aggregates in facilitating monetary policy in Indonesia, particularly in the short run. The validity of monetary aggregates as intermediate targets has been challenged particularly when the stability of monetary aggregates are questioned as a result of financial deregulation and innovation. Some efforts to investigate alternative variables such as credit aggregates, nominal income, etc., however, have not resulted in unanimous conclusions. Under such circumstances, it is argued that the Central Bank can refer directly to the achievement of the ultimate objectives of monetary policy such as inflation rates, real income, etc. which means abandoning the need for intermediate targets. However, applying that approach requires us to investigate the appropriate variables which contain useful information as a guide to predicting variations in the future course of the variables that are used as the ultimate objectives of monetary policy.

This study evaluates the issues related to the reliability of banking and monetary aggregates as leading indicators in conducting monetary policy. More specifically, this chapter attempts to investigate whether the banking and monetary aggregates still contain useful information for predicting real income and inflation rates which are presumed to be the objectives of monetary policy. The organization of this chapter is as follows. Section 2 describes monetary policy under the regulated system, while section 3 presents

monetary policy under the deregulated environment. Section 4 investigates the variables which might be sensibly proposed as leading indicators in conducting monetary policy, and section 5 contains some concluding remarks.

8.2 Monetary Policy in The Regulated System (1970 to 1983)

Having experienced hyperinflation in the early 1960's, the emergence of the so called *new order* regime led to a re-designed monetary policy which was accompanied by the discipline of a balanced budget[41] in order to maintain internal and external stability, promote economic growth and increase employment. During the oil boom period, however, the substantial rise in external resources resulting from the boom in the oil and gas sector along with the steady increase in foreign aid and loans, created problems with maintaining internal stability. As mentioned in chapter IV, the balanced budget which was consistently adopted by the new regime prevented Indonesia from accumulating public saving. The rise in government revenue then was directly transmitted into expenditures both routine as well as developmental. Under these circumstances, the government had to sterilize the impact through the monetary sector. On the other hand, the Central Bank had limited instruments to sterilize their impact. Implementation of open market operation policy was constrained by the absence of a well developed secondary money market. Prior to banking deregulation (1983), the Central Bank still had direct instruments to control the money supply by imposing credit ceilings. The targeted money supply level was achieved by imposing ceilings on credits extended by

[41] In the early stabilization program to cope with hyperinflation, the new order regime started by placing the government budget under one department, namely the Department Of Finance, while under the previous regime each department could manage its own budget.

commercial banks which technically can be expressed in the following formula as follows.

$$\Delta M = NCG + NFA + NDC + NOI$$

ΔM : Change in Money Supply

NCG : Net Claims On Central Government

NFA : Net Foreign Assets

NDC : Net Domestic Credits

NOI : Net Other Items

From the above identity, two of the main sources affecting the money supply namely NCG and NFA are not controllable by the Central Bank with the available monetary policy instruments. Monetary policy, therefore, was conducted on the basis of direct control over the remaining sources affecting the money supply (NDC) through controlling domestic credit expansion. Under this strategy all banks were subject to credit ceilings which were designed as an adjustment factor in response to changes in other sources of factors affecting the money supply, so that enabled the Central Bank to control the total money supply at the desired levels. Clearly, domestic credits extended by the banks were designed to achieve the money supply level which is required to support economic targets such as the rate of inflation, economic growth, etc.

The indirect monetary instruments have been implemented since 1983 when the government began to introduce banking deregulation which removed credit ceilings. In implementing indirect monetary instruments, in early 1984 the Central Bank started introducing a marketable security, the so-called *Sertifikat Bank Indonesia* (SBI) or Certificate of Bank Indonesia for open market operation policy so in 1985, another money

market instrument was introduced for undertaking open market operations, namely the *Surat Berharga Pasar Uang (SBPU)* or marketable money market securities.

8.3. Monetary Policy in The Deregulated System

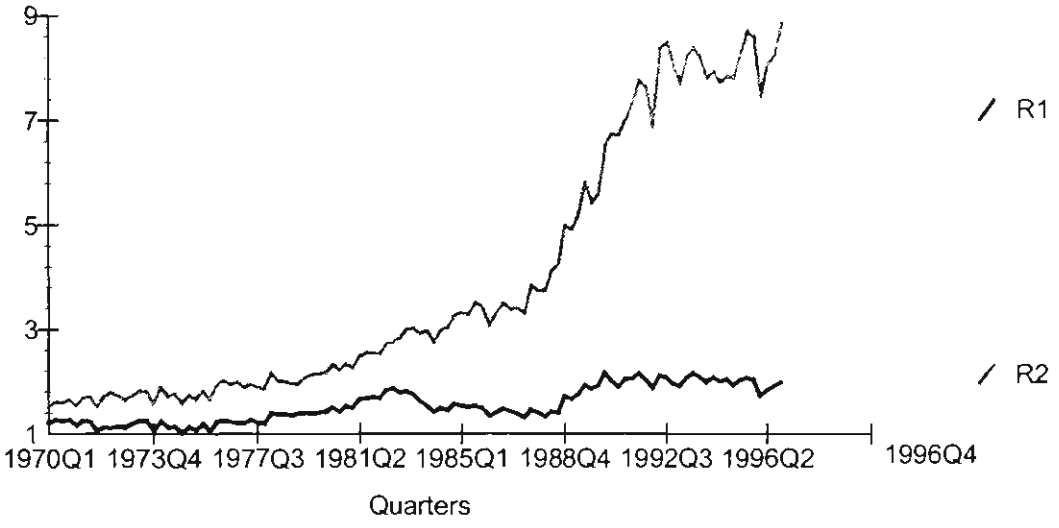
As described in section 8.2, the conduct of monetary policy in the deregulated environment cannot be attributed to direct controls over domestic credit by imposing credit ceilings in order to achieve the desired level of the money supply to support the achievement of the desired level of economic targets such as economic growth and inflation rates. The best available option for the Central Bank is to influence domestic credit through affecting its price. In this regard as noted by Marsden, Healey and Doyle (1989), in the absence of quantitative controls over credit, then the effectiveness of controlling credit depends upon the sensitivity of investment in response to changes in interest rates. It implies that if investment is less sensitive with respect to changes in interest rates, the policy which relies upon money stock through controlling domestic credit will be less effective, since to achieve the same level of investment growth requires larger changes in interest rates. Briefly, in the deregulated system where quantitative measures to control credit are no longer available, then credit is not a sensible measure to use in controlling the money stock because it will be either too costly or too ineffective.

Quantitative controls over monetary aggregates by the Central Bank, therefore, can only be carried out on base money which constitutes currency in circulation and reserves held by the commercial banks. As mentioned earlier, currency is demand determined, therefore, controlling reserve money or base money with such a direct monetary instrument can only be implemented on reserves held by commercial banks. A

quantitative measure to control base money i.e. reserves held by the commercial banks, can be carried out through imposing reserve requirement policy to achieve the desired level of reserve money which supports the objectives of monetary policy. If broader monetary aggregates are considered to be the main target of monetary policy, then reserve money might be used as a tool to control the broader monetary aggregates only in the presence of a stable relationship between reserve money and the other specified monetary aggregates, or in the case that the money multiplier is stable. Figure 8.1 displays the money multiplier for broad money which basically indicates it was not constant over the period under study, while the money multiplier for narrow money remains relatively constant. Performing stability tests on the basis of the residual confirms the instability of the money multipliers for broad money and modified narrow money in the sense that the null hypotheses which represents the lack of a stable relationship between nominal broad money/modified narrow money and reserve money cannot be rejected even at the 10% level. The money multiplier for narrow money, on the other hand, indicates that the null hypothesis can be rejected at 10% level which implies the existence of a stable long run relationship between nominal narrow money and reserve money (Table 8.1). This implies that econometrically controlling narrow money could be conducted through controlling reserve money.

Figure 8.1

The Money Multiplier



R1 denotes the ratio between nominal narrow money and reserve money (M1/RM), and R2 is the ratio between broad money and reserve money (M2/RM)

Table 8.1 Stability Test for the Money Multiplier[42]

Aggregates	Without Structural Breaks		With Structural Breaks
	DF	ADF	ADF+
M1	6.17**	5.81**	5.82*
M2	3.42	3.11	3.27
M1+	3.28	2.92	2.15

Note: Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively.

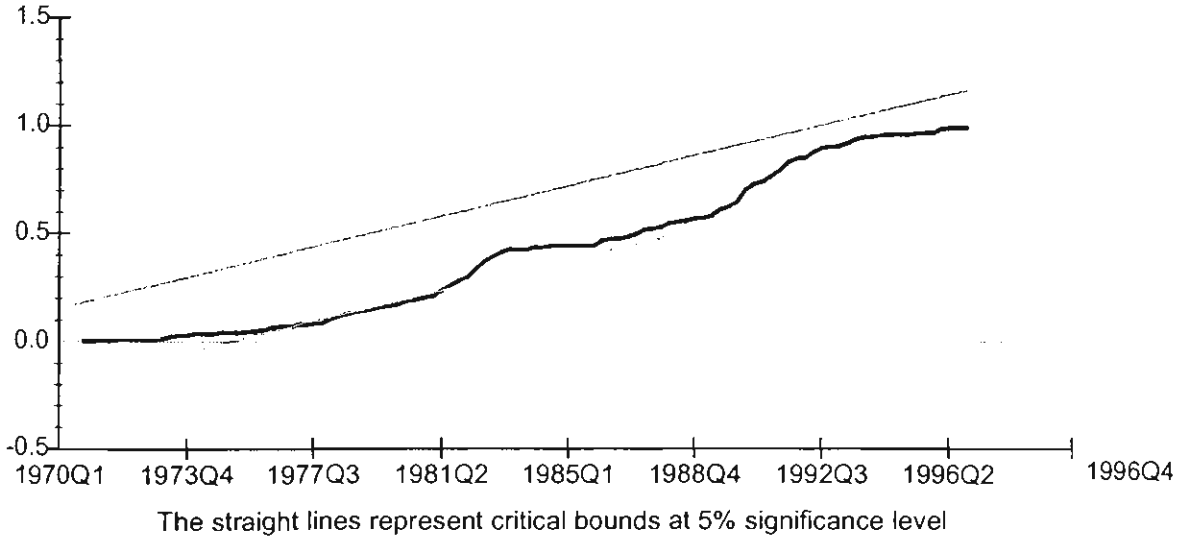
[42] The cointegration regression is expressed as follows:
M= a + b RM + e . Details of this procedures are presented in Chapter IV.

The CUSUMQ test for parameter stability also justifies the previous results that the money multiplier for narrow money is more stable than that for broad money (Figure 8.2). It suggests that if monetary aggregates are to be the feature of monetary policy then nominal narrow money performs better as it is a reflection of reserve money which is considered to be more controllable by the Central Bank.

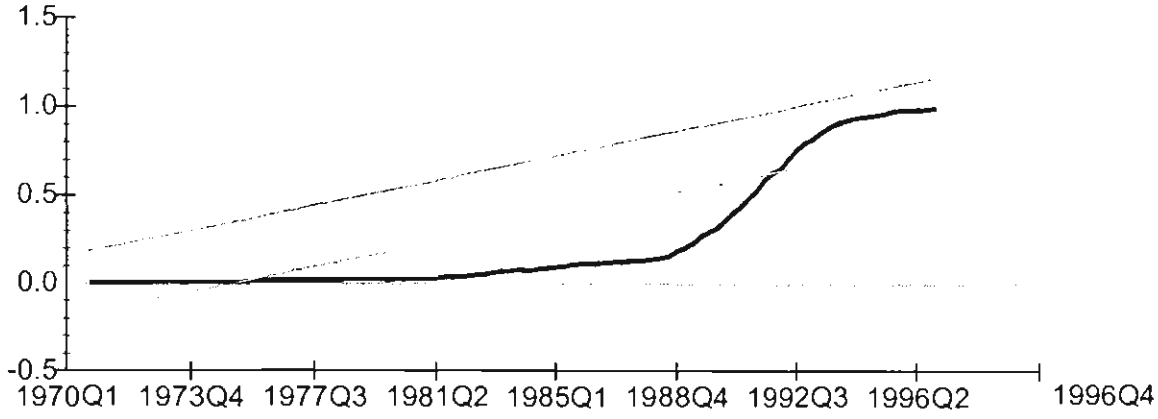
Figure 8.2

Cumulative Sum of Squares Recursive (CUSUMQ) Test

Nominal Narrow Money



Nominal Broad Money



The straight lines represent critical bounds at 5% significance

Even though nominal reserve money is regarded as a monetary aggregate which the Central Bank has the power to control quantitatively, and nominal narrow money has the more stable money multiplier, however, it does not necessarily mean that those monetary aggregates can perform well either as an intermediate target or a leading indicator of monetary policy. To perform as a reliable leading indicator, the existence of a stable relationship between monetary aggregates and the variables specified as objectives of monetary policy is required. In other words, the monetary aggregate which is proposed as a leading indicator should perform well in predicting the future course of variables which are designed as the objectives of monetary policy.

Monetary/Banking Aggregates and Intermediate Targets

Technically, monetary policy is conducted through employing policy instruments controlled by the Central Bank to obtain the desired growth of variables designed as intermediate targets or directly to support the achievement of monetary policy objectives. The distinction between monetary and credit aggregates as instruments and intermediate

targets arises when those variables cannot be set exactly at levels desired for achieving monetary policy objectives. Therefore, if the Central Bank does not have power to control directly and to set monetary and credit aggregates exactly at the desired level, it is suggested that those aggregates be regarded as intermediate policy targets rather than as policy instruments. The need for intermediate targets, however, is cast in doubt particularly since the breakdown of the relationship between variables used as intermediate targets and variables regarded as objectives of monetary policy which is widely believed to have occurred as a result of financial deregulation and innovation undertaken by most developing countries in 1980's (Milbourne 1990).

In line with setting the variables which are to be regarded as intermediate targets, issues such as observability which reflects the ability of the Central Bank to collect the data in the short time lag, its controllability with policy instruments, and its predictability[43] should be considered (Milbourne 1990). With regard to the possibility of any monetary or credit aggregates being used as intermediate targets, this will need to be evaluated based upon those properties, particularly with respect to controllability. With respect to the property of observability of credit and monetary aggregates, basically the Central Bank does not have any problems in observing data with short time lags, since data for those aggregates are collected from the regular bank reports to the Central Bank. Along with the existence of strict rules which put the obligation for the banks to submit

[43] Predictability refers to the existence of stable and predictable relationship with variables regarded as the ultimate objectives of monetary policy in terms of timing and magnitude.

timely and accurately periodical reports to the Central Bank,[44] the observability of those aggregates is also supported by the continuous implementation of technological innovations in banking activities such as processing and transfering data etc. The on line system has been developed both within bank offices in the particular bank as well as between commercial banks and the Central Bank. An evaluation of predictability of those aggregates will be made in the next section.

a. Currency

Nominal currency is regarded as the narrowest definition of monetary aggregates and is mainly needed to support transactions. Currency in circulation is defined as the liability of the monetary system to residents excluding cash in the Treasury and commercial banks. It consists of legal bank notes and coins issued by the monetary authority excluding cash in the Treasury and commercial banks. Financial deregulation and innovation might have two different impacts which work in opposite directions in affecting currency. On the one hand, it facilitates the process toward financial deepening where it enhances economic transactions involving money, particularly currency. On the other hand, banking deregulation which enhances creation and innovation of financial instruments[45] that have similar functions to currency in terms of their ability as a medium

[44] Some of the periodical reports are the liquidity reports (weekly), the balance sheet report (monthly), credit information system (monthly). Penalties will be imposed if a bank fails to comply that obligation timely and accurately which could be in the form of imposing fines (certain amount of money) and/or downgrading an aspect which is considered as a factor in determining the soundness of that particular bank.

[45] Along with the abolition of interest rate controls and entry barriers, banking deregulation also allows and enhances commercial banks ability to create banking services particularly saving account which are more suitable for consumer needs. Prior to the 1988 banking deregulation, commercial banks were only allowed to offer savings accounts which were designed by the Central Bank.

of exchange will reduce the need to hold cash for transactions. As presented in chapter IV, the empirical results suggest that the ratio of nominal currency and nominal income is relatively stable at around 4%. In terms of controllability, nominal currency as derived from the liability side of the balance sheet of the monetary authority is definitely demand determined and becomes less controllable in the presence of a deregulated system. Under such circumstances no direct measure is available which enables the Central Bank to set an exact desired level for nominal currency. It implies that to achieve the desired level for this particular monetary aggregate, the Central Bank should employ policy instruments designed to influence nominal currency indirectly; for instance to influence the opportunity cost of holding non interest bearing money or cash in particular. The effectiveness of such a policy and its ability to achieve the desired level of currency, therefore, depends on the responsiveness of this aggregate in respect to changes in instrument variables or variables which are expected to be highly correlated with the instrument variables. In the previous chapter, nominal currency is found to be statistically insignificant in response to changes in interest rates both in the short run and long run, suggesting that currency is not fully controllable by the Central Bank despite the available option of indirect instruments of monetary policy. Moral suasion policy which is sometime considered effective, particularly in developing countries, cannot be implemented because this policy works through banking system, while currency is practically demand determined and owned by individuals or institutions excluding currency in the vaults of commercial banks.[46]

[46] Moral suasion is a sort of monetary policy where the Central Bank persuades or urges commercial banks to follow its guidance or advice in supporting the achievement of desired targets.

b. Reserve Money

The argument in favour of using reserve money or base money as an intermediate target is based upon the assumption that it is relatively more easily controlled by the Central Bank, and is less affected by financial deregulation and innovation. Financial deregulation or innovation is presumed to change the behaviour of individuals holding monetary assets in a portfolio towards interest bearing monetary assets such as quasi money. As mentioned above, the willingness to hold currency is not significantly affected by deregulation policy and the other component of base money, reserves held by commercial banks largely depends on the reserve requirements set by the Central Bank. Therefore, it is sensible to presume that base money will be relatively less significantly affected by banking deregulation. The implementation of instruments to set base money at the desired levels to support the achievement of monetary policy objectives is subject to some constraints. To employ a reserve requirement policy as a direct instrument might be effective in controlling base money particularly if the reserves are held by commercial banks. However, setting reserve requirements in order to maintain the desired level of base money is impractical, since it tends to complicate commercial banks dealing with adjustments to some aspects of financial management, for instance, in determining cost of loanable funds etc (Macfarlane 1991). Introducing interest rates on commercial bank accounts in the Central Bank, which are required as part of the fulfillment of reserve requirements is another option to influence base money. However, it is considered less effective since this instrument does not have any direct impact on reserve money or reserves held by commercial banks in particular. The other options available for the Central Bank to control base money is to use open market operation and moral suasion.

This monetary policy instrument is directed to persuading commercial banks to support the achievement of the desired level of base money. Again, this instrument does not have any direct impact on base money. Under such circumstances, it is sensible to presume that despite the availability of direct and indirect monetary instruments to control base money or reserve money, this policy instrument is not easily used to set reserve money at the desired levels. Briefly, it is not plausible to assume that reserve money is completely controllable by the Central Bank.

c. Narrow Money

Similar to currency, the main reason for holding demand deposits is to facilitate transactions. Technically, narrow money is derived from the liability side of the balance sheet of the monetary system which represents the liabilities of the monetary system to the private sector (residents).[47] It implies that narrow money is obviously determined by the demand side rather than the supply side. In a deregulated environment the Central Bank does not have the instruments to influence this aggregate directly. In this regard as the money multiplier for narrow money is more stable than that for broad money, then controlling narrow money might be conducted via controlling the base money supply. However, despite the availability of a direct instrument to control reserve money, it is not easily implemented. Clearly, narrow money is controllable in a deregulated environment only if its money multiplier is stable and at the same time the Central Bank is able to control reserve money effectively.

[47] The balance sheet of the monetary system is the consolidation of the balance sheets disclosed by the Central Bank , the Treasury and commercial banks.

d. Modified Narrow Money

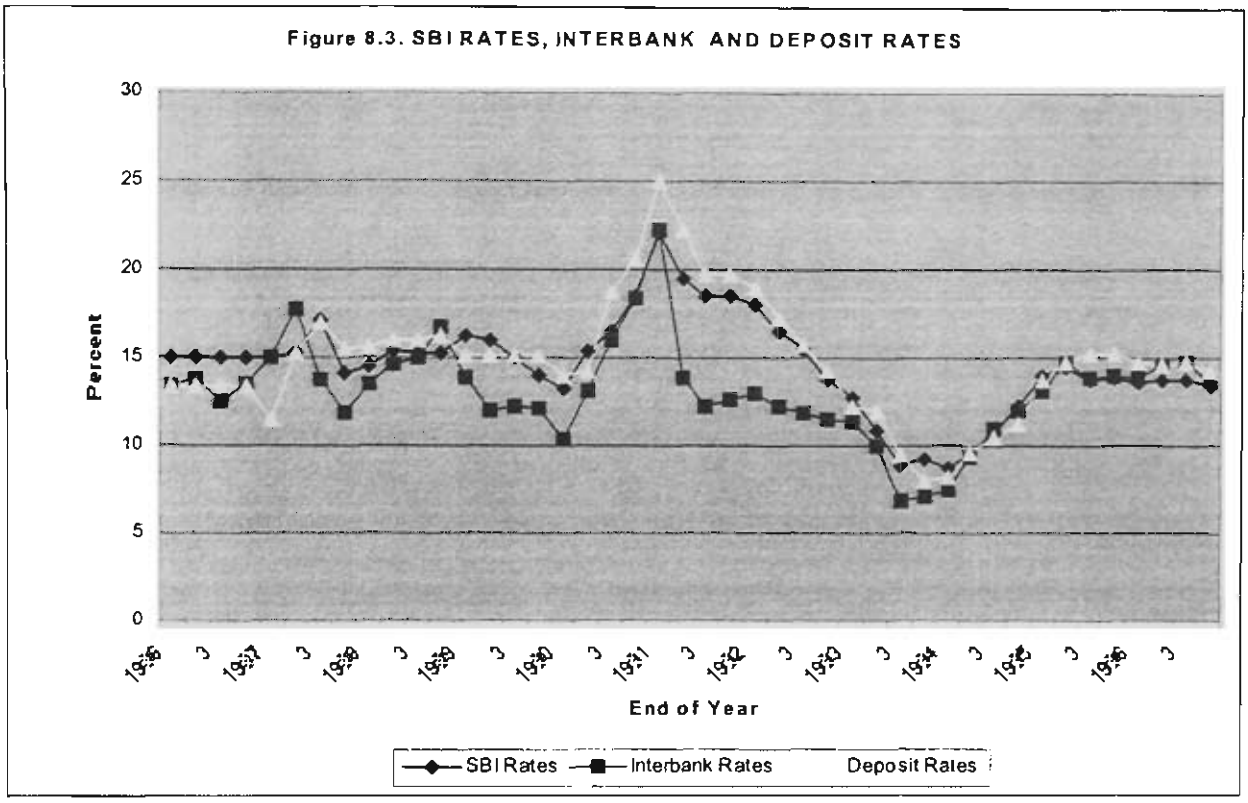
The inclusion of saving accounts in the definition of modified narrow money is designed to accommodate the emergence of savings accounts which can facilitate transactions. As mentioned in the previous chapter, this type of account has been designed to have similar functions in facilitating transactions as demand deposits (checking accounts). This is reflected in greater flexibility in terms of withdrawals, etc. It implies the demand for money with respect to transaction purposes is not only represented by non interest bearing money (currency and demand deposits) but also facilitated by some type of interest bearing money (saving accounts). However, similarly to narrow money, the Central Bank does not possess such direct instruments as to set the monetary aggregate at the desired level in the deregulated system. Banking deregulation has eliminated not only interest rate controls but also credit ceilings which used to be operated as a direct instrument to control the money supply. Furthermore, monetary aggregates including modified narrow money are demand side determined where the controllability of those aggregates depend on their responsiveness to changes in policy. Controlling modified narrow money through reserve money is constrained by instability in the money multiplier. Since the money multiplier for modified narrow money is not stable, it implies that to achieve the desired level, the Central Bank cannot simply control base money through setting reserve requirements as a direct instrument. The available options for the Central Bank to control this aggregate, therefore, are to employ indirect monetary instruments which work through affecting interest rates. Empirical evidence presented in the previous chapter, however, suggests that modified narrow money is not significantly related to changes in interest rates particularly in the short run.

It means that the modified narrow money is not controllable with the available instruments and it would require a substantial change in interest rates to achieve a given desired level for the particular monetary aggregate.

e. Broad Money (M_2)

Broad money by definition comprises narrow money and quasi money where the latter is definitely considered as an interest bearing type of money. In the deregulated system where interest rates are freely determined through the market mechanism to reach their market clearing levels, quasi money tends to play a more important role in the definition of broad money, in which the willingness to hold such money is mostly considered as part of investment in monetary assets. As discussed before, monetary aggregates including broad money are derived from the liability side of the balance sheet of the monetary system. It suggests that broad money is also determined by the demand side rather than the supply side. In the deregulated environment the available option for the Central Bank in conducting monetary policy is to employ indirect instruments which are designed to achieve at the desired level of broad money indirectly (e.g. open market operations). To control broad money by employing this type of monetary instrument means influencing the demand for this monetary aggregate through its price (deposit rates). Figure 8.3. displays the discount rate on the Certificates of Bank Indonesia,[48] cash rates and deposit rates.

[48] Certificate of Bank Indonesia is a marketable security issued by the Bank Indonesia which is used as an instrument in conducting open market operations.



Since the Central Bank introduced SBI as an instrument in conducting open market operations, deposit rates have tended to move together with cash rates and the SBI rate suggesting that the SBI can influence variations in deposit rates. However, the controllability of broad money through the open market depends upon the sensitivity of money demand in response to changes in the deposit rate. As presented in the previous chapter, empirical evidence shows demand for money particularly in the short run is not sensitive to changes in deposit rates. This implies that monetary policy conducted through open market operations might be effective in affecting interest rates particularly

deposit rates but in the short run it might not significantly influence changes in demand for broad money.

f. Credit

As mentioned earlier, under a regulated banking system, control over monetary aggregates was conducted through imposing credit ceilings over domestic credit which is presumed to be one of the sources affecting the money supply under control of the Central Bank. The abolition of credit ceilings meant the Central Bank had to abandon direct instruments quantitatively restricting credit expansion, and replace them with indirect instruments to influence domestic credit qualitatively through affecting its price. In this regard, the controllability of credit aggregates depends on the elasticity of credit with respect to changes in interest rates. Meanwhile, the greater ability of the domestic economy to access credit financing from overseas financial institutions, means that the exchange rate acts as an indicator for comparing available financing options between domestic credit financing and overseas sources. Empirical evidence presented in the previous chapter indicates that domestic credit is not sensitive enough in response to changes in interest and exchange rates particularly in the short run. In terms of controllability of credit aggregates, therefore, monetary policy or open market operations in particular might have a significant impact on interest rates and exchange rates but it has only a limited impact on credit aggregates particularly in the short run.

8.4. Monetary Aggregates, Banking Aggregates and Monetary Objectives

Along with the existence of stable money demand, the choice of intermediate targets is based on the predictability of the relationship between intermediate targets and the ultimate objectives. Given the ambiguity of the stability of the relationship between

monetary aggregates and the specified determinants of money demand particularly in the short run, it is useful to investigate whether those aggregates provide valuable information in predicting variables which are considered to be the ultimate goal of monetary policy such as future inflation, income, etc. both in magnitude and timing (Milbourne 1990). In other words, it is important to explore whether monetary aggregates and credit aggregates are still reliable as leading indicators in conducting monetary policy. With regard to employing variables as leading indicators, leading indicators should be statistically significant in explaining the forecast variables, their variations should precede the variations of objective variables, and be theoretically justified. In assessing the validity of monetary aggregates as well as credit aggregates as leading indicators, we will employ a vector auto-regression (VAR) approach. The VAR equation can be expressed in the following form.

$$\Delta \hat{y} = a_0 + \sum_{i=1}^{n} ai\, \Delta y_{t-i} + \sum_{i=1}^{n} bi\, x_{t-i} + e_t \qquad 8.1$$

where y represents variables chosen as the objectives of monetary policy, and x stands for variables used as leading indicators (monetary and banking aggregates).

Tables 8.2 to 8.4 present empirical results of VAR tests to examine the reliability of monetary and credit aggregates in predicting the future course of inflation rates. In the full sample period (Table 8.2) the results suggest that all aggregates with the exception the quarterly growth of nominal reserve money and broad money, reserve money and narrow money perform well as a guide to the conduct of monetary policy when the inflation rate is considered as the objective of monetary policy. It does not necessarily mean that other monetary and banking aggregates lack a relationship with inflation rates

but the relationship might be lagged or contemporaneous rather than leading the inflation rate. However, since monetary policy normally operates with a lag, therefore the quarterly growth of those aggregates are considered to be better indicators in predicting future inflation rates. Splitting the samples into two sample periods (before and after deregulation) produces slightly different results. The growth of nominal currency, and credit are significant as leading indicators only in both sub samples (before and after banking deregulation see Table 8.3 and 8.4). With regard to credit, this seems reasonable since under the regulated system the Central Bank had a direct instrument to control the money supply quantitatively through imposing credit ceilings. Clearly, the Central Bank had a direct instrument to control growth of domestic credit to achieve the desired level of money supply which supported the objectives of monetary policy. After banking deregulation was introduced, the Central Bank lost direct control over domestic credit as well as the money supply, however, the role of credit aggregates as leading indicators in predicting the inflation rate is still reliable.

Even though most monetary and banking aggregates are econometrically eligible as an indicator for monetary policy, however, in fact some of them are less applicable in the sense that they are less controllable by the available monetary instruments. By definition, currency covers all legal bank notes and coins issued by the Central Bank outside the banking system and the Treasury. In this case, currency is demand determined and since monetary policy works through affecting the price i.e. interest rates, the empirical results presented in the previous chapter indicate that this type of monetary aggregate is not sensitive to changes in interest rates particularly in the short run. Therefore, the growth of nominal narrow money, modified narrow money and savings

emerge as the more eligible indicators for conducting monetary policy. Econometrically, those aggregates are significant in explaining the variations of the inflation rate which is regarded as the objective of monetary policy. In case of nominal narrow money, the existence of a stable money multiplier implies that technically the growth of nominal narrow money could be controlled by the Central Bank through controlling the growth of reserve money. However, employing a direct instrument to control reserve money by setting reserve requirement is regarded as impractical (Macfarlane 1991). Therefore, the Central Bank needs to introduce indirect instruments to influence reserves held by the commercial banks such as providing an incentive or disincentive for extra reserves placed in the Central Bank, moral suasion, etc. However, since in a deregulated system monetary policy works through affecting prices i.e. interest rates, modified narrow money and savings to some extent are more controllable than nominal currency or narrow money. More specifically, modified narrow money and savings are more responsive to changes in interest rates than nominal currency or narrow money simply because the former contain interest bearing aggregates.[49]

In this study, the other variable presumed as the objective of monetary policy is the growth of real income. Table 8.5 shows that in the full sample, neither monetary nor banking aggregates are reliable as leading indicators to predict future growth of real income. Splitting the sample into two sub samples representing pre and post banking deregulation period, does not produce significantly different results (Table 8.6 and 8.7). The empirical evidence does not confirm that banking deregulation downgraded banking

[49] Saving deposits is included in the modified narrow money, meanwhile saving deposits and time deposits are included in definition of savings mobilized through the banking system.

and monetary aggregates as leading indicators when the growth of real income is considered as the objective of monetary policy, since those aggregates never perform well as leading indicators in the pre banking deregulation sub sample period.

Table 8.2. VAR test of Inflation Rates and Monetary/Banking Indicators

Full Sample: 1970q1-1996q4

Constant	1.312	-2.123	0.681	0.303	0.098	0.250	1.050	0.821
GP	0.563	0.281	0.393	0.339	0.431	0.424	0.530	0.478
GC		0.465						
GRm			0.216					
GM_1				0.302				
GM_2					0.238			
GM_1^+						0.237		
GCr							0.047	
G S								0.091
R^2	0.31	0.39	0.30	0.34	0.28	0.31	0.33	0.35
χ^2	35.80***	21.39***	9.39	14.80**	6.80	10.67*	13.42**	15.16**

Note: The VAR equation is expressed in the following form.

$$\Delta \hat{y} = a_0 + \sum_{i=1}^{n} ai\, \Delta y_{t-i} + \sum_{i=1}^{n} bi\, x_{t-i} + e_t$$

where y represents variables chosen as the objectives of monetary policy, and x stands for variables used as leading indicators (monetary and credit aggregates).

All variables are expressed in the percentage growth rate
Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively.

Table 8.3. VAR test of Inflation Rates and Monetary/Banking Indicators

Sub Sample: 1970q1-1983q2

Constant	2.653	-0.252	1.980	0.713	1.625	0.099	2.810	2.081
GP	0.363	0.165	0.276	0.228	0.357	0.196	0.209	0.334
GC		0.589						
GRM			0.167					
GM_1				0.346				
GM_2					0.172			
GM_1^+						0.436		
GCr							0.069	
GS								0.068
R^2	0.26	0.40	0.24	0.23	0.12	0.24	0.41	0.24
χ^2	17.20***	16.83***	8.97	8.88	3.26	9.15	17.50***	9.07

Note: The VAR equation is expressed in the following form.

$$\Delta \hat{y} = a_0 + \sum_{i=1}^{n} ai \, \Delta y_{t-i} + \sum_{i=1}^{n} bi \, x_{t-i} + e_t$$

where y represents variables chosen as the objectives of monetary policy, and x stands for variables used as leading indicators (monetary and credit aggregates).

All variables are expressed in the percentage growth rate
Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively.

Table 8.4 . VAR test of Inflation rates and Monetary/Banking Indicators

Sub Sample: 1983q3-1996q4

Constant	2.047	1.269	2.051	2.044	2.321	1.212	2.189	2.296
GP	-0.062	-0.185	-0.059	-0.077	-0.242	0.407	0.053	-0.002
GC		0.255						
GRM			-0.002					
GM_1				0.007				
GM_2					0.016			
GM_1^+						0.020		
GCr							-0.061	
GS								0.016
R^2	0.02	0.14	0.09	0.11	0.05	0.07	0.14	0.01
χ^2	5.10	13.99**	0.18	1.26	0.06	2.02	13.46**	0.95

Note: The VAR equation is expressed in the following form.

$$\Delta \hat{y} = a_0 + \sum_{i=1}^{n} ai\ \Delta y_{t-i} + \sum_{i=1}^{n} bi\ x_{t-i} + e_t$$

where y represents variables chosen as the objectives of monetary policy, and x stands for variables used as leading indicators (monetary and credit aggregates).

All variables are expressed in the percentage growth rate
Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively.

Table 8.5. VAR test of Real Income and Monetary/Banking Indicators

Full Sample: 1970q1-1996q4

Constant	1.973	1.704	2.401	1.884	2.529	1.763	2.249	1.787
GY	0.074	0.015	0.089	0.114	0.095	0.047	0.137	0.077
GC		0.077						
GRm			-0.088					
GM_1				0.001				
GM_2					-0.086			
GM_1^*						0.043		
GCr							-0.064	
GS								0.021
R^2	0.09	0.08	0.06	0.07	0.06	0.06	0.15	0.10
χ^2	14.61**	5.19	2.99	4.50	3.24	3.59	12.42	7.89

Note: The VAR equation is expressed in the following form.

$$\Delta \hat{y} = a_0 + \sum_{i=1}^{n} ai\, \Delta y_{t-i} + \sum_{i=1}^{n} bi\, x_{t-i} + e_t$$

where y represents variables chosen as the objectives of monetary policy, and x stands for variables used as leading indicators (monetary and credit aggregates).

All variables are expressed in the percentage growth rate
Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively.

Table 8.6. VAR test of Real Income and Monetary/Banking Indicators

Sub Sample: 1970q1-1983q2

Constant	2.064	1.822	4.284	4.550	4.130	3.901	2.444	1.727
GY	0.119	0.185	0.175	0.229	0.121	0.174	0.243	0.162
GC		0.001						
GRM			-0.335					
GM_1				-0.356				
GM_2					-0.249			
GM_1^+						-0.248		
GCr							-0.099	
GS								0.020
R^2	0.09	0.01	0.02	0.09	0.08	0.08	0.21	0.07
χ^2	9.94	3.17	3.94	6.77	6.39	6.33	12.24*	5.87

Note: The VAR equation is expressed in the following form.

$$\Delta\ \hat{y} = a_0 + \sum_{i=1}^{n} ai\ \Delta y_{t-i} + \sum_{i=1}^{n} bi\ x_{t-i} + e_t$$

where y represents variables chosen as the objectives of monetary policy, and x stands for variables used as leading indicators (monetary and credit aggregates).

All variables are expressed in the percentage growth rate
Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively.

Table 8.7. VAR test of Real Income and Monetary/Banking Indicators

Sub Sample: 1983q3-1996q4

Constant	2.052	2.072	2.175	2.014	2.893	1.955	2.168	2.794
GYP	-0.064	-0.072	-0.098	-0.058	-0.015	-0.210	0.005	0.023
GC		0.002						
GRM			-0.025					
gM_1				0.008				
gM_2					-0.162			
gM_1^+						0.073		
GCr							-0.045	
GS								-0.151
R^2	0.04	0.12	0.12	0.08	0.12	0.10	0.17	0.18
χ^2	2.28	6.84	4.83	1.92	4.51	3.25	7.54	1.87

Note: The VAR equation is expressed in the following form.

$$\Delta \hat{y} = a_0 + \sum_{i=1}^{n} ai\, \Delta y_{t-i} + \sum_{i=1}^{n} bi\, x_{t-i} + e_t$$

where y represents variables chosen as the objectives of monetary policy, and x stands for variables used as leading indicators (monetary and credit aggregates).

All variables are expressed in the percentage growth rate
Sign *, **, and *** indicate significant at 10%, 5%, and 1% level respectively.

8.5. Concluding Remarks

With regard to evaluating the reliability of banking and monetary aggregates as leading indicators, two variables are presumed to be the objective of monetary policy namely the growth of real income and the rate of inflation. The major contributions in this chapter are not only limited in determining the aggregates which are econometrically more appropriate as indicators for conducting monetary policy but also identifying which aggregates are practically more applicable.

The empirical results suggest that the growth of all monetary and banking aggregates with the exception of the growth of nominal reserve money and broad money perform well as leading indicators if the inflation rate is considered as the objective of monetary policy. However, performing the same test on the sub sample after banking deregulation the results suggest that only the growth of nominal currency and modified narrow money which are reliable as indicators for the conduct of monetary policy. Meanwhile, none of the banking aggregates perform well enough as leading indicators to predict future real income, suggesting that banking and monetary aggregates are more likely lagging rather than leading real income. Under such circumstances, the inflation rate is more sensible as the objective of monetary policy than real income growth.

Even though the growth of nominal currency is econometrically reliable as a leading indicator, it not sensible in practice. In fact, the growth of nominal currency is less controllable with the available monetary instruments, since it is demand determined and insensitive to changes in interest rates. Therefore, the growth of other aggregates such as narrow money or modified narrow money could be more eligible to be a candidate as a leading indicator, provided that they could perform better in explaining the future course

of inflation. The money multiplier for nominal narrow money is stable, therefore, controlling narrow money could be conducted through affecting reserve money. In this regard, since controlling reserve money through directly setting reserve requirements is considered impractical, it requires to introduce indirect instruments which could be employed to influence reserve held by the banks.

Briefly, in a deregulated environment, some monetary and banking aggregates still contain such valuable information for the conduct of monetary policy. In practice, however, the effectiveness of those aggregates to guide for conducting monetary policy will depend upon the availability of policy instruments for controlling the aggregates at a desired level which support the achievement of the monetary policy objective. The other major finding of this study is to justify that inflation rates will be more sensible as the objective of monetary policy as long as banking or monetary aggregates are concerned as a guide for the policy implementation.

CHAPTER 9

CONCLUSION

9.1 Opening Remarks

Monetary and banking aggregates are evaluated mainly regarding the reliability of those aggregates as a guide for conducting monetary policy. In this regard, monetary aggregates are presented in various definitions from the narrowest definitions of money i.e. nominal currency to nominal broad money in order to provide more comprehensive method for searching out the most reliable and applicable aggregates to facilitate monetary policy in Indonesia. Along with monetary aggregates, savings mobilized and credits extended by the banking system are amongst the banking aggregates which are also evaluated as alternative variables. In this study, the impact of banking deregulation is considered since the appropriate identification the property of the data is considered essential so that the estimated functions will be more appropriately specified and policy recommendations could be more accurately derived.

The objective of this final chapter is to summarize the major findings as well as the policy implications, and to discuss some suggestions for further research in the future.

9.2 Banking Deregulation, Monetary/Banking Aggregates and Monetary Policy

Banking deregulation in Indonesia was initially more focused on stimulating savings mobilization in response to the substantial decrease in the oil prices and was not preceded or immediately followed by the introduction of adequate prudential regulation. With regard to promoting mobilization of savings through the banking system, the

empirical results indicate two important findings. First, the interest rate is statistically significant in explaining the variations of savings both in the long run and short run, but its magnitude is still considered low and is not sufficiently robust to warrant a policy recommendation. The same conclusion was drawn by Juoro (1993). Second, in the short run the nominal exchange rate is not significant in determining savings even in the deregulated environment[50] (the post banking deregulation sub sample period). This is mainly because under deregulated system the banks are allowed to provide banking services in foreign currency denominations. Therefore, this study provides empirical evidence that to some extent banking deregulation provided a self adjusting mechanism to protect or neutralize savings from the impact of exchange rate fluctuations at least in the short run, by allowing the banks to provide wide a range of banking services in foreign currency denominations. However, that mechanism might work well only under the assumption that the banks can continuously maintain public confidence, or more specifically if they can improve their soundness and efficiency as promoted by the banking deregulation itself. The policy implication arising from these findings, therefore, is the need to implement prudential regulation as a measure to promote banks' soundness and efficiency which is regarded as the important aspect for achieving sustained growth of savings mobilized through the banking system.

Despite the substantial impact of banking deregulation on the banking sector, however, in dealing with this particular issue most of the previous studies regarding the reliability of monetary aggregates to facilitate monetary policy did so simply by the inclusion of dummy variables in their demand for money functions. None of the previous

[50] Up to November 1978, the domestic currency was set at a fixed rate to the U.S. dollar.

studies considered the impact of banking deregulation in examining the properties of the data which is important before undertaking any further econometric tests, since the accurate identification of the properties of the data would facilitate the correct specification. The previous studies also did not take into account the impact of banking deregulation when carrying out a cointegration test to evaluate the existence of a stable long run relationship between variables in the cointegration system.

In line with anticipating the impact of banking deregulation on the validity of banking and monetary aggregates as a guide to monetary policy, this study employs econometric procedures which enable us to cope with the change in the behaviour of those aggregates which lead to presence of a structural break. The adoption of the I-O procedure along with the standard DF and ADF procedures for examining the property of data is a fruitful exercise to anticipate the possible presence of a structural break so that the property of the data would be more accurately identified. Since this procedure could facilitate a better examination of the properties of the data, particularly in preventing any biased results towards non rejection of the null hypothesis, then it would provide important information for determining the appropriate specification of functions introduced in this study. The empirical results suggest that all variables are not stationary at their level with the exception of the price index which is integrated at order zero or stationary at level. Since the basic idea for introducing the I-O procedure is based upon the presumption that the standard test is biased towards non rejection of the null hypothesis, then it is not relevant to apply for the first difference of the data when under the standard DF and ADF procedures, the null hypotheses are rejected at the 5% significance level. Clearly, at the first difference all variables employed in this study are

stationary. Along with examining the properties of the data, the I-O test procedure also provided information regarding when the possible structural break occurred. The empirical results indicate that the possible presence of structural breaks for all variables, with the exception of the price level, correspond to the introduction of government policies. With regard to banking and monetary aggregates, the possible presence of structural breaks occurred immediately following the second phase of banking deregulation unveiled in October 1988. It implies that the second phase of banking deregulation had a more substantial impact on banking and monetary aggregates than the first one.

In line with examining the stability of long run relationships between banking and monetary aggregates with the specified variables in the cointegration system, this study is also concerned with the impact of banking deregulation on the behaviour of banking and monetary aggregates. The residual base test procedure for cointegration (the Gregory-Hansen) to accommodate the possible presence of a structural break is preferred. Similar to the I-O procedure for unit root testing, this procedure also has the advantage of preventing any biased results towards non rejection of the null hypothesis, so that the long run relationship between variables in the cointegration system could be more accurately evaluated. The empirical results indicate two different features. Non interest bearing aggregates i.e. nominal currency and nominal narrow money still confirm the existence of a stable long run relationship with the specified variables in the cointegation system. This results are in line with other studies particularly for nominal narrow money which employed the standard residual base test procedure such as Gupta (1987) and Tseng (1991). With regard to interest bearing aggregates, the standard residual base test

for cointegration cannot reject the null hypotheses which represents the absence of a stable long run relationship between those particular aggregates and the specified variables in the cointegration system. However, when the residual base test procedures for cointegration which allows for the presence of a structural break was adpoted, the results confirm the existence of a stable long run equilibrium. Therefore, it justifies the view that in the presence of a structural break, the conventional residual base test procedure for cointegration is not relevant and biased towards non rejection of the null hypothesis (Gregory and Hansen: 1996).

Based upon empirical tests on the property of the data which confirm the presence of unit root problem even when the possible presence of structural break is considered, and the existence of a stable long run relationship between banking/monetary aggregates in the cointegrated system,. These suggest that an error correction model (ECM) is the most appropriate to use in this study. The previous studies which employed the ECM procedure for evaluating the reliability of monetary aggregates as a guide to monetary policy or for estimating demand for money in particular for the Indonesian case, only dealt with some definitions of monetary aggregates mostly narrow and broad money and were limited in constructing demand for money to specify the short run and the long run parameters. This study carried out the ECM test procedure more comprehensively including the evaluation of temporal causality between banking/monetary aggregates and their determinants so that it could provide more information for deriving policy recommendations.

The major contribution of this study in this particular aspect, therefore, is to provide a more comprehensive evaluation regarding the reliability of banking and

monetary aggregates in various definitions from the narrowest definitions of money i.e. nominal currency to the broader ones which involve quasi money as a guide for the implementation of monetary policy. Unlike the previous studies which had limited data particularly in the post banking period, this study is supported by data which enables us to undertake econometric tests for both periods equally. The results are summarized as follows. As noted earlier, a stable long run equilibrium for money demand still exist after considering the impact of banking deregulation policy on the cointegration test procedure.[51] However, the short run relationship displays some doubtful results which are hard to interpret particularly in relation to the sign and magnitude of the parameters. Splitting the sample into two sub sample periods which represent before and after banking deregulation allows some interesting findings to emerge. First, in the long run perspective, the interest rate elasticity of the interest bearing aggregates tends to be higher in the post banking deregulation sub sample period. Second, in the short run perspective, the magnitude of the interest rate parameter tends to be higher in the post banking deregulation sub sample period (1983q3-1996q4). It suggests that interest bearing aggregates particularly interest bearing monetary aggregates tend to be more responsive to changes in interest rates. The policy implication arising from this finding is that in the deregulated environment, monetary policy which works through prices i.e. interest rates to some extent could be more effective in affecting money demand compared to the before banking deregulation period.

[51] Stable demand for nominal reserve money, modified narrow money and broad money are achieved by applying the test procedures which allow for the presence of a possible structural break.

The temporal causality test as suggested by Granger (1981), shows some interesting results. First, neither banking nor monetary aggregates Granger cause real income, and only nominal currency and narrow money Granger cause the price level. Meanwhile, in the short run a bi-directional relationship only occurred between changes of price levels and changes of exchange rates. Second, in the presence of economic disequilibrium, banking deregulation has prompted financial markets to play a more important role in restoring equilibrium levels. In contrast, during the period prior to banking deregulation the adjustment toward equilibrium occurred mainly in the goods and services market.

Given that monetary and credit aggregates are not sufficiently robust to be set as intermediate targets, it is worth investigating further whether those aggregates still contain valuable information to guide policy implementation. When many countries started abandoning monetary or banking aggregates as intermediate targets, some views emerged suggesting that monetary policy should operate directly with the variables perceived as the ultimate objectives. Direct achievement toward monetary objectives such as the inflation rate and real income bypasses the need for intermediate targets. However, it requires the Central Bank to identify the variables needed to be used as indicators in guiding policy implementation. In this regard, banking aggregates are examined to see whether those variables still contain useful information in predicting variables which are designed as ultimate objectives of monetary policy. Along with the temporary causality test proposed by Granger, vector autoregression (VAR) is designed to evaluate the appropriateness of banking and monetary aggregates as leading indicators to provide information to guide monetary policy. The empirical results suggest that banking and

monetary aggregates are not statistically significant in predicting the future inflation rate with the exception of the growth of nominal currency, reserve money and nominal narrow money which show a significant relationship with the future inflation rate. Meanwhile, none of banking or monetary aggregates are significant in estimating future real income. Therefore, if real income is considered to be the objective of monetary policy, neither banking nor monetary aggregates are suitable as leading indicators. This study found that banking deregulation does not have a significant impact on the reliability of banking and monetary aggregates, with the exception of the growth of credit aggregates, as indicators. The aggregates which do not perform well as leading indicators in the post banking deregulation period also perform in the same way in the pre banking deregulation sub sample period, vice versa. Clearly, there is no strong evidence that banking deregulation downgraded the banking and monetary aggregates as leading indicators for conducting monetary policy.

The policy implications arising from these findings are summarized as follows. In the long run perspective, all monetary and banking aggregates are still robust enough as a guide to monetary policy since the stable demand for those aggregates or demand for money functions in particular still exist after considering the impact of banking deregulation. In the short run perspective, however, the sign and magnitude of the parameters do not warrant any policy recommendation with the exception of those for nominal currency and narrow money which are still considered eligible as a guide to monetary policy if the price level is presumed to be the objective of monetary policy. In the deregulated environment, however, the direct instruments to control monetary aggregates particularly credit ceilings were lifted. Therefore in terms of controllability,

nominal narrow money is more applicable as a candidate for facilitating monetary policy than nominal currency, since the former could also be controlled through controlling nominal reserve money because its multiplier is stable. Briefly, in the long run perspective the Central Bank could employ all monetary and banking aggregates as its guide in conducting monetary policy, but in the short run, nominal reserve money and narrow money emerge as the most eligible and applicable aggregates for guiding monetary policy. Accordingly, the price level is more sensible as the objective of monetary policy compared to the growth of real income as long as monetary and banking aggregates are concerned.

9.3 Suggestions for Further Research

Banking deregulation of the type which is associated with elimination of entry restrictions and relaxation of requirements in establishing branch offices has led to a substantial increase in the number of banks and bank offices in Indonesia, and sharpened competition. Under such circumstances, therefore, the availability of adequate bank supervisors both in terms of quantitative and qualitative aspects is required along with the availability of prudential regulation to facilitate the achievement of sound and efficient banks. With regard to the issue of achieving a sound and efficient banking system, further research is required to investigate: (i) the ideal ratio between the number of banking supervisors and the number of banks and bank offices, (ii) the power of the Central Bank to enforce the banks to comply with prudential regulations, particularly related to the independence of the Central Bank from external pressure by either government or non government agencies.

In line with the behaviour of banking aggregates which are downgraded as an intermediate targets or leading indicators, further research is required in order to identify other variables which are more sensible as intermediate targets or leading indicators in conducting monetary policy. It is worth noting that monetary policy plays an important role in restoring any economic disequilbrium as reflected in the significant parameters for the error term for money and exchange rate variables in the Granger causality test. However, the fact that monetary and credit aggregates have limited power in predicting the future course of variables perceived as ultimate objectives of monetary policy particularly real income, suggests that to some extent monetary policy is pursued beyond its capability where the cause of economic disequilibrium is not predominantly a monetary phenomenon. Given that fiscal policy is still focused on a balanced budget strategy which had the potential to put pressure on the inflation rate because foreign sources of funds is used to cover the shortage of domestic funds, therefore if monetary policy is pursued to enhance economic growth and control inflation, the possibility of introducing alternative monetary policy instruments for conducting open market operations is needed to enable the monetary authority to influence monetary aggregates more effectively. So far Bank Indonesia certificates which are used as an instrument for conducting open market operation are only traded within banking system, therefore open market operations might be only effective in changing commercial bank assets portfolios but have limited impact on monetary aggregates, because technically those aggregates are derived from the liability side of the consolidated balance sheet of the banking system including the balance sheet of commercial banks.

BIBLIOGRAPHY

Agevli, Bijan B. (1976) "A Model of The Monetary Sector for Indonesia", 1968-1973", *Bulletin of Indonesian Economic Studies*, 12 (3) pp. 50-60.

Arize, A.C. (1994), "Has M2 Demand in the USA Become Unstable?,: Evidence from an Error – Correction Model", *Applied Economics*, 26, pp. 957-967.

Arndt, H.W. (1979), "Monetary policy Instrument in Indonesia", *Bulletin of Indonesian Economic Studies,* XV (3).

Arrau P., Gregorio, J. , Reinhart, C.M. and P. Wickham, (1995), "The Demand for Money in Developing Countries: Assessing the Role of Financial Innovation", *Journal of Development Economics*", Vol. 46, pp. 317-340.

Athukorala, P.C. (1996), "Interest Rates, Saving and Investment: India", Australian National University, February 1996.

Banerjee, A. and R.L. Lumsdaine and J.H. Stock, (1992), "Recursive and Sequential Test of the Unit Root and Trend-Break Hypotheses: Theory and International Evidence", *Journal of Business and Statistics,* pp. 271-286.

Banerjee, A., J.J. Donaldo, D.F. Hendry and G.W. Smith (1986), Exploring Equilibrium Relationships in Econometrics through Static Models: Some Monte Carlo Evidence, Oxford Bulletin of Economics and Statistics, 48, pp. 253-277.

Bank Indonesia, "*Annual Report*", Various Issues

Bank Indonesia, "*Indonesian financial Statistics- Monthly Report* ", Various Issues.

Bank Indonesia, "*Weekly Report*", Various Issues

Bencivenga, Valeri and B. D. Smith (1991), "Financial Intermediation and Endogenous Growth", *The Review of Economic Studies"*, Vol.58, No.2, pp.195-209.

Benston and Kaufman (1995), "Is the Banking and Payment System Fragile?", *Journal of Financial services Research,9*, pp.209-240.

Benston, G.J. (1991), "Does Bank Regulation Produce Stability?: *Lesson from the United States. In Unregulated Banking: Chaos or order?* ", New York, St. Martin's Press.

Binhadi and P. Meek. (1992), "Implementing Monetary Policy", New York, Oxford University Press.

Biro Pusat Statistik (BPS), "*Indonesian Statistics*", Various Issues.

Boediono, (1985), "Demand for Money in Indonesia, 1975-1984", *Bulletin of Indonesian Studies*, pp. 74-94.

Boschen, John F. and Leonard O. Mill(1995), " The Relation Between Narrative and Money Market Indicators of Monetary Policy", *Economic Inquiry*, Vol. XXXIII, pp.24-44.

Bryant, Ralph, C. (1980) " Money and Monetary Policy in Independent Nations", Washington D.C The Brooking Institution.

Bullock, M., D. Morris and G. Steven (1989), "The Relationship Between Financial Indicators and Economic Activity: 1968-1987", pp. 53-85.

Bullock, M.d., G. Steven and S. Throp (1988), "Do Financial Aggregates Lead Activity", *Discussion Paper RBA Research,* No.883.

Butkiewicz, James L. (1995), " The Stability of the Demand for Money and M_1 Velocity Evidence from the Sectoral Data", *The Quarterly Review of Economics and Finance*, vol. 35, No.3, pp. 233-243.

Cagan, P (1956), "The monetary Dynamics of Hyperinflation, In studies in The Quantitative Theory, Friedman, M. (ed), University of Chicago Press, Chicago, IL, pp. 25-117.

Cambell J. Y. and N.G. Mankiw (1987), "Permanent and Transitory Components in Macroeconomic Fluctuations", *American Economic Review*, 77, pp. 111-117.

Cambell J.Y. and N.G. Mankiw (1988), "Are Output Fluctuations Transitory?" *Quarterly Journal of Economics*, 102, 875-880.

Campos, J., N. R. Ericsson, and D.F. Hendry (1996), Cointegration Test in The Presence of Structural Breaks", *Journal of Econometrics*, 70, pp.187-220.

Chan, A. and Chen, C. R. (1992) "Money Demand: Aggregation Bias and The Dispersion of Income", *Quarterly Review of Economics and Finance*, 32 (2) pp.3- 29.

Charemza, W.W and D.F Deadman, (1993), "New Direction in Econometric Practice", Vermont, Edward Elgar Publishing Ltd.

Cho, Yoon J. and D. Khakhate (1989), "Lessons of Financial Liberalization in Asia: A Comparative Study" *World Bank Discussion Papers*, 50, World Bank, Washington D.C.

Chocrane, J.H. (1988), "How Big Is the Random Walk in GNP?", *Journal of Political Economy*, 96, pp.893-920.

Choudry, T. (1995), " Long-run money demand function in Argentina during 1935-1962: evidence from coitegration and error correction models, *Applied Economics*",27, pp. 661-667.

Chowdhury, A.R.(1992), " The Functional Form of the Money Demand Equation: Evidence from Selected OECD Countries", *Quarterly Review of Economics and Finance*" Vol.32, No.3, pp. 16-30.

Coggins, Bruce (1998), "Does *Financial Deregulation Work?: A Critique of Free Market Approaches*" Edward Elgar, UK.

Coghlan, Richard (1980) "The Theory of Money and Finance", London, The Macmillan Press Ltd.

Cole, David. C. and B.F. Slade (1995), "*Building a Modern Financial System*", Cambridge University Press.

Cutler, Harvey, Davies, S., Rhodd J., and Schwarm, W. (1997), "The Demand for M1 in Large Macroeconomic System: Evidence from Co-integration Analysis", *Journal of Macroeconomics*, Vol.19, No.1, pp. 53-78.

De Melo, J, Ricardo Pascale and J.R. Tybout (1985), "Uruguay 1973-81; The Interplay of Real and financial Shocks", *World Bank Staff Paper*, No.696.

Deaton, A. (1990), "Saving in Developing Countries: Theory and Review", *Proceedings of the World Bank Annual Conference on Development Economics 1989,* Washington, D.C., The World bank.

Deme, Mamit and Bichaka Fayissa (1995), "Inflation, Money, Interest Rate, Exchange Rate, and causality: the case of Egypt, Morocco, and Tunisia", *Applied Economics*, 27, pp. 1219-1224.

Diaz-Alejandro, Carlos F. (1985), "Good Bye Financial Repression, Hello Financial Crash", *Journal of Development Economics, Vol.19, pp. 1-24.*

Dickey , D.A. and S. S. Pantula (1987), "Determining the Order of Differencing in Autoregressive Process", *Journal of Business and Statistics*, 5, pp.455-461.

Dickey,D.A. and W.A. Fuller, (1979), "Distribution of The Estimators for Autoregressive Time Series with a unit Root, *Journal of The American Statistical Association,*84, pp. 427-431.

Dickey,D.A. and W.A. Fuller, (1981),"Likelihood Ratio Statistics for Autoregressive Time Series with Unit Root", *Econometrica*, 49, pp.1057-1072.

Dow, Sheila C. (1996), "Why the Banking System Should be Regulated", *Economic Journal,* vol. 106 (May) pp.698-707.

Dowd, K. (1992), "*The Experience of Free Banking*", Macmillan, London.

Dowd, K. (1993), "*Laissez-Faire Banking*", London: Routldge.

Dowd, K(1996), "Laissez-Faire Banking", *Economic Journal,* vol. 106 (May) pp.708-714.

Edwards, Sebastian (1984) "The Order of Liberalization of the External Sector in Developing countries", New Jersey, Princeton University Press.

Engle, R.F. and C.W.J. Granger (1987), "Co-integration and Error- Correction Representation, Estimation and Testing", *Econemetrica*, 55, pp. 251-276.

Evans, Lyne J. (1995), "The Demand for Money: Hyperinflation or High Inflation Trap", *The Manhester School Supplement Supplement*, pp. 40-56.

Evans, Lynne J. (1991), "Positive Economic and the Role of Econometrics", *Methodus*, Vol.3 No. 2, pp. 48-55.

Fane, A (1994), "The Sequencing of Economic Deregulation in Indonesia in *Indonesia Assessment 1994*", ISEAS and Australian National University.

Ferber, R. (1953), "A Study of Aggregate Savings Functions, NBER Technical Paper, 8, *NBER*, New York.

Ferber, R. (1956), "Are Correlations Any Guide to Predictive Value", *Applied Statistics*, pp. 113-131.

Fernando, D.J.G. (1991), "Financial Reforms in Sri Lanka: 19877 - 1987", Sri Lanka, The Central Bank Printing Press.

Fiege, E.L. and Pearce D.K (1977), "The Substitutability of Money and Near Money: A Survey of Time Series Evidence", *Journal of Economic Literature*", 15 (2), pp.439-468.

Fisher, Andreas M. and Nicoletti, Giuseppe, (1993) " Regression Direction and Weak Exogenity: Determining the Conditioning properties of US Money Demand Functions", *Journal of Monetary Economics*, 32, pp. 213- 235.

Flood, Robert P. and Isard Peter (1989) " Monetary Policy Strategies ", *IMF Staff Papers*, 36 (3).

Foster, John (1994), " An Evolutionary Macroeconomic Model of Australian Dollar M3 Determination: 1967-93", *Applied Economics* 26, pp. 1109-1120.

Friedman, Milton (1969), " The Demand for Money - Some Theoretical and Empirical Results", *Journal of Political Economy*, 67, pp. 327- 359.

Friedman, Milton (1956), "The Demand for Money: Some Theoretical and Practical Results", *Journal of Political Economy*", 67(4), pp. 327-351.

Friedman, Milton (1968) " The Role of Monetary Policy", *The American Economic Review*, 58 (1), pp. 1-17.

Fry, Maxwell J. (1978), "Deposits and deposit Rates of Interest", *Ekonomi*, 6, pp.19-27.

Fry, Maxwell J. (1982), "Analyzing Disequilibrium Interest Rate Systems in Developing Countries", *World Development*, 10(2), pp. 1049-1057.

Fry, Maxwell J. (1987), "Foreign Debt Instability: An Analysis of National Saving and Domestic Investment Responses to Foreign Debt Accumulation in Some Developing Countries", University of California.

Fry, Maxwell J. (1988), "Money, Interest, and Banking in Economic Development", London, The John Hopkins University Perss.

Fry, Maxwell J. (1994), "*Money, Interest, and Banking in Economic Development*", London, The John Hopkins University Perss.

Fufrer, Jeffrey, C. and George R. Moore (1995), " Monetary Policy Trade-off and the Correlation between Nominal Interest Rates and Real output", *The American Economic Review*, Vol. 85, No.1, pp. 219-239.

Galbis, Vicente (1982), "Analytical Aspects of Interest Rate Policies in Less Developed Countries ", *Savings and Developments*, 6(2), pp.111-165.

Galbis, Vicente (1977), "*Financial Intermediation and Economic Growth in Less-Developed Countries: A Theoretical Approach*", London, Frank Cass & Co. Ltd.

Galbis, Vicente (1981), "Interest Rate Management:the Latin American Experience", *Savings and Development,* V (1), pp. 5-44.

Gart, Alan, (1994), " Regulation, Deregulation, Reregulation: The Future of the Banking, Insurance, and Securities Industries", John Wiley & Sons, Inc., New York.

Gavin, M., Hausmann, R., and Talvi, E. (1997) "Promoting Savings in latin America, Saving Behaviour in Latin America: Overview and Policy Issues", *Inter-Amerian Development Bank, Development Center of the Organization for Economic co-operation and Development*, February.

Ghatak, Subrata. (1981) " Monetary Economics in Developing Countries", London, Macmillan.

Gie, K.K. (1977), "Bad Debt: The Current Dilematic Issues", in Economics, Monetary and Banking, Chapter 12, BPFE, Yogyakarta.

Gie, K.K. (1995), "*An Analysis of Indonesian Political Economy*", Gramedia Pustaka Utama Ltd. And STIE IBII, Jakarta.

Giovanini, Alberto (1983), "The Interest Rate Elasticity of Savings in Developing Countries: The Existing Evidence", *World Development*, 11(7), pp. 601-607.

Giovanini, Alberto (1985), "Saving and Real Interest Rate in LDCs", *Journal of Development Economics*, 18, pp. 197-217.

Goeltom, Miranda S.(1995), "*Indonesia's Financial Liberalization: An Empirical Analysis of 1981-88 Panel Data*", ISEAS.

Goldfeld, S.M. (1973), "The Demand For Money Revisited", *Brookings Papers on Economic Activity,* 3, pp. 577-638.

Goldsmith, Raymond W. (1969), "*Financial Structure and Development",* New Haven, Yale University Press.

Goodhart, C.A.E. (1989), " The Conduct of Monetary Policy", *Economic Journal*, 99, pp.293-346.

Grahl, J. (1977), "Econometric Methods in Macroeconomics: a critical assessment", *British Review of Economic Issues*, 1, pp. 11-37.

Granger, C.W.J. " Some Properties of Time Series and Their Use in Econometric Model Specification, *Journal of Econometrics*, 1981, pp. 121-130.

Greenville, S (1994), "Comments on Professor Wardana's Paper in *Indonesia Assessment 1994",* ISEAS and Australian National University.

Greenville, S. (1977), "Commercial Banks and Money Creation", *Bulletin of Indonesian Economic Studies,* March, 1977.

Greenwood, J and B. Javanovic (1990), "Financial Development, Growth and the Distribution of Income", *journal of Political Economy*, 98(5).

Gregorio, J. and P.E. Guidotti, (1995), "Financial Development and Economic Growth", *World Development,* Vol.23. No.3, pp.433-448.

Gregory, A.W. and J.M. Nason and D. Watt, (1994), "Testing for Structural Breaks in Cointegrated Relationships", *Journal of Econometrics*, Forthcoming.

Gregory, Allan W. and B.E. Hansen, (1996), " Residual Based Test for Co-integration in Models with Regime Shifts", *Journal of Econometrics*, 70 pp. 99-126.

Gujarati, Damodar, N. (1995) " Basic Econometrics ", McGraw-Hill, Inc, New York.

Gupta, K.L and B. Moazzami, (1989), " Demand For Money In Asia ", *Economic Modeling*, pp.467-473.

Gupta, K.L. (1987), "Aggregate Savings, Financial Intermediation, and Interest Rate", *Review of economics and Statistics*", 69, pp. 303-311.

Hafer, R.W. and D.W. Jansen, (1991), "The Demand for Money in the United states: Evidence from Cointegration Test", *Journal of Money, Credit and Banking*, Vol.23 No.2 pp. 155-168.

Hagen, R.E. (1994), "Ockams Razor, Economics and Business Client", *Business Economics*, Vol.29, No.2, pp. 48-52

Harrigan, Frank (1996), "Saving Transitions in Southeast Asia", *Asian Development Bank: Economics and Development Resource Center*, EDRC Report Series, No.64.

Hawkins, R.G. & V.W. Fitzgerald (1981), " The Potential Contribution of Econometric Modeling", *Center for Applied Economic Research*, UNSW, Paper No.14.

Heller, R. (1988), "Implementing Monetary Policy", *Federal Reserve Bulletin*, 74, pp.419-429.

Hendrobudiyanto (1994), "Bank Soundness Requirements: A Central Bank Perspective", Singapore, *Institute of Southeast Asian Studies.*

Hendry , D.F. and J.F. Richard, (1983) "The Econometric Analysis of Economic Time Series", *International Statistical Review*, 51, pp. 111-163.

Hendry, D.F. (1980), "Predictive Failure and Econometric modeling in Macroeconomics: The transaction Demand for Money, in *Modeling The Macroeconomy, ed P Ormerod*, Heinmann, London.

Hendry, David F. and Ericsson, Neil R. (1991), "An Econometric Analysis of U.K. Money Demand in Monetary Trends the United States and the United Kingdom by Milton Friedman and Anna J. Schwartz", *The American Economic Review*, Vol.1 No.1.

Hill, H. (1988), "*Foreign Investment and Industrialization in Indonesia*", Oxford University Press, Singapore.

Hoffman, D.L. and R.H. Racshe, (1997), "*Aggregates Money Demand Functions: Emprical in Cointegrated System*", Boston/London/Dordrecht, Kluwer Academic Publishers.

Hoffman, Dennis L. and Rasche Robert H. (1996), " *Aggregate Money Demand Functions: Empirical Applications in Cointegrated Systems*", Boston, Kluwer Academic Publisher.

Horne, J. and Monadjemi, M. (1985) "Debt, Credit and monetary Targeting in Australia", *economic Record,* 61 pp. 522-534.

Huang, Guobo (1994), "Money Demand in China in the Reform Period: an error correction model", *Applied Economics*, 26, pp. 713-719.

International Financial Statistics (IFS), *Various Issues.*

Jacques, Kevin (1995) "Unit roots, interest rate spreads, and inflation forecasts", *Applied Economics*, 27, pp. 605-608.

Japelli, Tulio and M. Pagano, (1994), "Savings, growth and Liquidity Constraint", *Quarterly Journal of Economic*, Vol. 109, pp. 93-109.

Johansen, S. (1988), "Statistical Analysis of Cointegrating Vector", *Journal of Economic Dynamics and Control*, 12, pp. 231-254.

Johnson, H.D. (1952), "Some Cambridge Controversies in Monetary Theory", *Review of Economic Studies*, vol. 19, pp. 90-104

Johansen, S. and K. Julius, (1990), "Maximum Likelihood Estimation and Inference on Cointegration –With Application to Demand for money", *Oxford bulletin of Economics and Statistics*, 52, pp. 169-210.

Johnston, J. (1991) " *Econometric Methods*", Singapore, McGraw-Hill. Inc.

Joyce, Joseph P. (1993)," Money, Income and Prices under Fixed Exchange Rates: Evidence from Causality tests and Var's", *Journal of Macroeconomics*, Vol.15, No.4, pp. 747-768.

Juoro, Umar (1993)," Financial Liberalization in Indonesia: Interest Rates, Money Market Instruments, and Banking Supervision", *Asean Economic Bulletin*, Vol.9, No.3, pp. 323-337.

Kaufman, G.G. (1991), "Lender of Last Resort in The Contemporary Perspective", *Journal of Financial Services Research*, 5(2), pp. 95-110.

Kearney, A.A. (1995), " The Changing Influence of Money and Monetary Policy on Exchange Rates", *Economic Inquiry*, Vol.XXXIII pp. 203-216.

Keynes, John M. (1936), "*The general Theory of Employment, Interest and Money*" Macmillan, London.

Khatkhate, Deena (1997)., "Financial Liberalization: A Revisionist View", *Economic and Political Weekly*, June 28, pp. 1533-1538.

King, Robert G. and R. Levine (1993), "Finance and Growth: Schumpeter Might Be Right",*Quarterly Journal of Economics,* 108, pp. 717-737.

Koshaka, Akira (1984), "The High Interest Rate Policy Under Financial Repression", *Developing Economies*, 22(4), pp. 419-452.

Kuo, Shirley W.Y. (1990), "Liberalization of the Financial Market in Taiwan in the 1980" *Pacific Basin Capital Markets Research,* pp.7-26.

Leidler, D (1975), "*Essays on Money and inflation*", Chicago University Press, Chicago.

Leite, S.P. and V. Sundararajan (1990), "issues in Interest Rate Management and Liberalization", *IMF Staff Papers*, vol.37, No.4, pp. 735-752.

Levine, Ross (1994), "Financial Structure and Economic Development", *The World Bank.*

Lian, D. (1993), "Financial Development in Thailand", *Journal of Asian Business*, Vol.9, No.4, pp.110-137.

Lombra, Raymond E. (1994), " Modeling changes in Monetary Regimes", *IMF Staff Papers*, 1994.

Lovell, M. C. (1983), "Data Mining', *Review of Economics and Statistics*, 65, pp.1-12.

Lucas, Robert Jr. (1988), "On The Mechanic of Economic Development", *Journal of Monetary Economics*", XXII, pp. 3-42.

Macfarlane, Ian (1991), "The Lesson for Monetary Policy: in The Deregulation of Financial Intermediaries", *Proceeding of a conference, RBA*, Australia.

Mankiw, N.G. and L.H. Summers (1986), "Money Demand and The Effects of Fiscal Policies", *Journal of money Credit and Banking*, November, pp. 414-429.

Manning, N. and A.M. Mohammed, (1990) "Money, income and Prices in Singapore reconsidered", *Applied Economics*, 22, pp. 653-668.

Marlow, Michael L.(1991), " Money and Velocity in the 1980's, "*Quarterly Review of Economics and Business*" vol.31, No.4, pp.36-46.

Mayer, T. (1980), "Economics as a hard science: Realistic goal or wishful thinking?", *Economic Inquiry*, 18, pp. 165-178.

Mayer, T. (1993), "*Truth versus Precision in Economics*", Elgar.

McCallum, B.T. and Goodfriend M.S. (1987), "*Demand for Money: Theoretical studies, In The New Palgrave, A Dictionary of Economics*, Macmillan press, pp. 775-781.

McCallum, Bennett T (1989), "*Monetary Economics: Theory and Policy*", New York: Macmillan Inc. Ltd.

McKinnon, Ronald I. (1973), "*Money and Capital in Economic Development*", Washington D.C., Brooking Institution.

McKinnon, Ronald I (1981), "Financial Repression and the Liberalization Problem within Less Developed Countries, In S. Grassman and E. Lunberg, eds., *The Past and Prospect for the World Economic Order*, London: MacMillan.

McKinnon, Ronald I (1982), "The Order of economic Liberalization: Lesson From Chile and Argentina", *Carnegie-Rochester Conference Series on public Policy*, 17: 159-186.

McKinnon, Ronald I (1986), "Domestic Interest Rates and Foreign Capital Flows in a Liberalizing Economy", Stanford University.

McKinnon, Ronald, I. (1992), "The Order of Economic Liberalization: Financial Control in the transition to a Market Economy", London, The John Hopkins University Press.

Mehra Y.P. (1991), "An Error Correction Model of US M2 Demand", *Federal Reserve Bank of Richmond Economic Review,* 77, pp. 3-12.

Mehra Y.P. (1992), "Has M2 Demand Become Unstable?", *Federal Reserve Bank of Richmond Economic Review,*78, pp.27-35.

Melnick, Rafi (1990), "The Demand for Money in Argentina 1978-1987: before and after the Austral program, *Journal of Business and Economic Statistics,* 8(4).

Melnick, Rafi (1995) " Financial Services, Cointegration, and the Demand for Money in Israil ", *Journal of Money, Credit, and Banking*, 27 (1) February 1995 pp. 140-153.

Milbourne, Rose D, (1982) "The Demand for Money in Australia: The Partial Stock Adjustment Model " *Applied Economic Research*, 30 (1) pp 1-40.

Milbourne, Rose D, (1987) " Re- Examining The Buffer-Stock Model of Money ", *The Economic Journal*, 97 (Conference 1987), pp. 130-142.

Milburne, R. (1990), "Money and Finance", *Reserve Bank of Australia,* Proceedings of a Conference, pp.222-276.

Miller, Stephen, M. (1991) " Monetary Dynamic: An Application of Co-integration and Error-Correction Modeling", *Journal of Money, Credit and Banking*, Vol 23, No.2, pp. 139-154.

Moosa, Imad A. "Money, Output and Prices in India: some empirical tests", *Indian Journal of Economics*, pp. 439-461.

Morgan, Brian (1982) "*Monetarist and Keynesians: Their Contribution to Monetary Theory* ", London, The Macmillan Press Ltd.

Mundell, A.R. (1963), "Capital Mobility and Stabilization Policy Under Fixed and Flexible Exchange Rates", *Canadian Journal of Economics and Political sciences*, 29, pp. 475-785.

Nasution, A (1983), "Financial policies and Institutions in Indonesia", Jakarta, ISEAS.

Nasution, Anwar (1991), "Survey of Recent Development", *Bulletin of Indonesian Economic Studies,* No.27, pp. 3-43.

Nasution, Anwar (1994), " Banking Sector Reforms in Indonesia, 1983-1993", Singapore, Institute of Southeast Asian Studies.

Navile, J.W. (1981), "Economics, Economists and Policy Formulation", *Centre for Applied Economic Research*, UNSW, Paper No.13.

Nelson, C.R. and C.I. Plosser (1982), "Trends and Random Walks in Macroeconomic Time series", *Journal of Monetary Economics*, 10, 139-162.

Okun, A.M. (1975), "Uses of Models for Policy Formulation", *The Brookings Model-Perpective and Recent Developments*, Chapter 8, Holland.

Oskooee, M.B. and Margaret, Malixi (1991), " Exchange Rate Sensitivity of the Demand for Money in Developing Countries", *Applied Economics*, 23, pp. 1377-1384.

Oskooee, M.B. and Mohammad Pourheydarian (1990), " Exchange Rate sensitivity of Demand for Money and Effectiveness of Fiscal and Monetary Policies, *Applied Economics*, 22, pp. 917-925.

Parikh, Ashok (1997), "An Approach to Monetary Targeting in India" *The Indian Economic Journal,* Vol.45, No.1, pp. 1-18.

Pawley, Michael (1993), "Financial innovation and monetary policy", Routledge, London.

Perera, Nelson (1992), The Demand for Money in Sri Lanka", *Discussion Papers*, Wollongong University, Australia.

Perron, Pierre and Timothy J. Vogelsang, (1992), " Nonstationarity and Level Shifts with an Application to Purchasing Power Parity", *Journal of Business and Economic Statistics,* 10, pp. 301-320.

Perron, Pierre, " The Great Crash, The Oil Price Shock, and The Unit Root Hypothesis", *Econometrica*, Vol.57, No.6, November 1989, pp. 1361-1401.

Pesaran, M.H. and Pesaran B. (1997),"*Microfit 4.0*" Oxford University Press, London.

Phillips, P.C.B. and P. Perron (1988), "Testing for a Unit Root for Time Series Regression", *Biometrika*, 71, pp. 335-346.

Phillips, P.C.B. and S. Ouliaris (1990), "Asymptotic properties of Residual Based Test for Cointegration", *Econometrica*, 58, pp. 165-193.

Pitchford, J.D. (1996), Alternatives for Monetary Policy: An Appraisal", *The Australian Economic Review*, No. 113, pp 40-50.

Poole, W. (1970), " Optimal Choice of Monetary Policy Instrument in a Simple Stochastic Macro Model", *Quarterly Journal of Economics*, No. 84, pp. 197-216.

Poole, W. (1988), "Monetary Policy Lessons of Recent Inflation and Disinflation", *Journal of Economic Perpectives*,2, pp.73-100.

Price, S. and Insukindro (1994), "The Demand for Indonesian Narrow Money: Long run Equilibrium, Error Correction and Forward-Looking behaviour", *Journal of International Trade & Economic Development,* 3, pp.147-163.

Ramsey, J.B. (1969), "Test for Specification Errors in Classical Least Squares Regression Analysis", *Journal of The Royal Statistical Society,* 31(2), pp. 350-371.

Rana, Pradumna, B. (1995), "Reform Strategies in Transitional Economies: Lesson From Asia", *World Development*, Vol.23, No.7, pp. 1157-1169.

Rittnberg, L. (1988), "Financial Liberalization and Savings in Turkey, In: Nas and Odekon (eds.) Liberalization and the Turkish Economy, New York, Greenwood Press, Inc.

Robinson, Joan (1952), "The Generalization of General Theory", *In The Rate of Interest and Other Essay,* London: Macmillan.

Romer, David (1996), " *Advanced Macroeconomics*", New York, The McGraw-Hill Companies Inc.

Rose, Andrew K. (1985), " An Alternative Approach to the American Demand for Money", *Journal of Money, Credit and Banking*, 17 (4) November 1985, pp.439-455.

Rossiter, R.D. (1995) " Monetary Policy Indicators after Deregulation", *Quarterly Review of Economics and Finance*, 35 (2) pp. 207-223.

Sargan, J.D. (1964), "*Wages and Prices in The United Kingdom: A Study in Econometric Methodology*, in D.F. Hendry and K.F. Wall, eds. 1984, Econometrics and Quantitative Economics, Basil Blackwell, Oxford.

Sargent, T.J. (1989), " *Macroeconomic Theory* ",New York, Academic Press.

Schumpeter, Joseph A. (1911), "*The Theory of Economic Development*", Harvard University Press, Cambridge, MA.

Schupak M. (1962), "The Predictive Accuracy of Empirical Demand Analyses: *Economic Journal*, 72, pp.555-570.

Serletis, Apostolos and King Martin (1993), "The Role of Money in Canada", *Journal of Macroeconomics*, vol.15, No.1, pp. 91-107.

Shaw, Edward S. (1973), "*Financial Deepening in Economic Development*", New York, Oxford University Press.

Sikorski, Trevor, M. (1996), *"Financial Liberalization in Developing Countries"*, Brookfield, Vermont, Edward Elgar Publishing Limited.

Small, D.H. and R.D. Porter (1989), "Understanding the Behaviour of M2 and V2, *Federal Reserve Bulletin*, April, pp. 244-254.

Stiglitz, J. and Weiss, A. (1981), "Credit Rationing and Markets with Imperfect Information", *American Economic Review*, 71, pp. 393-410.

Stiglitz, Joseph E. (1993) "The Role of the State in Financial Markets", *The World Bank.*

Sundararajan, V. and Lazaros Molho. (1988), "Financial Reform in Indonesia: Lesson from Indonesia's attempt to transform the monetary system", *Finance & Development.*

Sundrarajan, V. and Lazaros Molho (1988), "Financial Reform and Monetary Control in Indonesia", *IMF Working Paper*, No.88/4.

Sundrum, R.M. (1973), "Money supply and Prices: Reinterpretation", *Bulletin of Indonesian Economic Studies*", Vol. IX, No. 3.

Swamy, P.A.V.B., and George S. Tavlas (1992), " Financial Deregulation, The Demand for Money, and Monetary Policy in Australia", *IMF Staff Papers.*

Swamy, P.A.V.B., and George S. Tavlas (1980), " Linear Prediction and Estimation Methods for Regression Models with Stationary Stochastic Coefficients", *Journal of Econometrics*, 12 (1980) pp. 103 142.

Taylor, Lance (1983), "*Structuralist Macroeconomics: Applicable Model foe the Third World*, New York: Basic Books

Thurow, L. (1983), "Econometrics: an icebreaker cought in the icea", *Dangerous Currents-the State of Economics*, Chapter 4, Oxford University Press.

Tseng, Wanda and R. Corker (1991), " Financial Liberalization, Money Demand, and Monetary Policy in Asian Countries", *Occasional Paper, IMF.*

Van Wijnbergen, S. (1982), "Stagflationary Effects of Monetary Stabilization Policies: A Quantitative Analysis of South Korea", *Journal of Development Economics*, 10(2), pp. 133-169.

Van Wijnbergen, S. (1983), "Credit Policy, Inflation and Growth in a Financial Repression, "*Journal of Development Economics*, Vol. 13, pp. 45-65.

Van Wijnbergen, S. (1983), "Interest Rate Management in Developing Countries: Theory and Simulation Results for Korea", *World Bank Staff Working Papers,* No. 593, Washington D.C.

Van Wijnbergen, S. (1985), "Macroeconomic Effects of Changes in Bank Interest Rates: Simulation Results for South Korea", *journal of Development Economics, 18, pp.541-554.*

Vazquez, J. (1994), " Was the Money Demand During the German Hyperinflation time varying?", *Applied Economics*, 26, pp. 169-174.

Villnueva D. and Mirakhor A. (1990), "Strategies for Financial Reforms: Interest Rate Stabilization, and Bank Supervision in Developing Countries", *IMF Staff Papers,* Vol. 37, No.3 pp. 509-536.

Wardana, Ali (1994), "*Financial Reform: Achievements, Problems, and Prospects*", Singapore, Institute of Southeast Asian Studies.

Wasserfallen, W. (1986), "Non Stationarities in Macroeconomic Time Series: Further Evidence and Implication", *Canadian Journal of Economics*, 19, pp. 498-510.

Zivot, E. and Andrew, K. (1992), "Further Evidence on The Great Crash, The Oil Price Shock, and The Unit Root Hypothesis", *Journal of Business and Economic Statistics*, Vol. 10, No. 10, pp. 251-270.