THE RELATIONSHIP BETWEEN MONETARY BASE AND MONETARY AGGREGATES IN ASEAN-5

Ng Chai Chet

Bachelor of Economics with Honours
(Economics Industrial and Organisations)
2007
THE RELATIONSHIP BETWEEN MONETARY BASE AND MONETARY AGGREGATES IN ASEAN-5

NG CHAI CHET

This project is submitted in partial fulfillment of the requirements for the degree of Bachelor of Economics with Honours (Economics Industrial and Organisations)

Faculty of Economics and Business
UNIVERSITI MALAYSIA SARAWAK
2007
Statement of Originality

The work described in this Final Year Project, entitled “The Relationship between Monetary Base and Monetary Aggregates in ASEAN-5” is to the best of the author’s knowledge that of the author except where due reference is made.

26 March 2007
Date

Ng Chai Chet
12498
ABSTRACT

THE RELATIONSHIP BETWEEN MONETARY BASE AND MONETARY AGGREGATES IN ASEAN-5

by

Ng Chai Chet

The purpose of this study is attempted to investigate the existence of causal relationship between monetary base and monetary aggregates (M1 and M2) for ASEAN-5 using the time series data from 1990:Q1 to 2005:Q4. This study is conducted by employing three methods, which are Augmented Dickey-Fuller (1979) unit root test, Johansen-Juselius (1990) cointegration test and Granger causality test. Only Singapore and Thailand show a significant long-run cointegrating vector between monetary base and monetary variables, which are M1 and M2 respectively. The rest of the ASEAN-5 countries fail to show a long-run relationship between the variables. The causality test results show that in general there is not uni-directional with causality running from monetary base to monetary aggregates in ASEAN-5. Thus, monetary targeting is inappropriate used as a monetary policy in ASEAN-5. In particular, policy should be designed to improve and strengthen the monetary and financial market in order to get better controlling in money supply process. Each ASEAN-5 country has to ensure the selected intermediate target must be measurable, controllable and predictable.
ABSTRAK

HUBUNGAN DI ANTARA ASAS KEWANGAN DAN AGREGAT MONETARI DI ASEAN-5

oleh

Ng Chai Chet

ACKNOWLEDGEMENT

The author would like to express her sincere thanks and deepest appreciation to several persons who have provided essential comments with valuable suggestions to the success towards this study.

First of all, the author would like to dedicate her most sincere thanks for her supervisor. Special thanks to the author’s supervisor for his excellent supervision, clear guidance, constructive advises and patience in completing the study. Besides that, the author also grateful to her supervisor for taking the time to help her in collecting the secondary data as well as guide her in the usage of EViews software.

The author also wishes to express appreciation to the author’s family for their everlasting love and support from the beginning of the research until the end of the study.

Finally, the author would like to say thank you to all the lectures and staffs of the Faculty of Economics and Business (FEB), UNIMAS, in helping to complete this study.
# TABLE OF CONTENTS

LIST OF FIGURES x

LIST OF TABLES xi

CHAPTER ONE: INTRODUCTION

1.0 Introduction 1-2

1.1 Definition of Terms 2

1.1.1 Monetary Base 2-3

1.1.2 Monetary Aggregates 3

1.1.3 Money Multiplier 3

1.2 Monetary Policy Transition in ASEAN-5 since 1970s 4

1.2.1 Indonesia 4-6

1.2.2 Malaysia 6-8

1.2.3 The Philippines 9-10

1.2.4 Singapore 10-12

1.2.5 Thailand 12-13

1.3 Problem Statement 17-19

1.4 Research Objective 19

1.4.1 General Objective 19-20

1.4.2 Specific Objective 20

1.5 Rational of Research 20

1.6 Significance of the Study 21

1.7 Scope of the Study 21
CHAPTER TWO: LITERATURE REVIEW

2.0 Overview 22
2.1 Reviews on the Relationship 22-34
2.2 Summary of Related Studies 35-39

CHAPTER THREE: METHODOLOGY

3.0 Introduction 40
3.1 Research Design 40-41
  3.1.1 Data Collection 41
  3.1.2 Theoretical Framework 41-43
  3.1.3 Variables 43
    3.1.3.1 Dependent Variable 43
    3.1.3.2 Independent Variable 44
  3.1.4 Data Analysis 44
3.2 Unit Root Test 44-45
  3.2.1 Augmented Dickey-Fuller (ADF) Test 45-46
3.3 Cointegration Test 46
  3.3.1 Johansen and Juselius Test 46-47
3.4 Granger Causality Test 47-49
3.5 Research Hypotheses 49
  3.5.1 The Monetary Base Leads Monetary Aggregates Hypothesis 49-50
  3.5.2 The Monetary Aggregates Lead Monetary Base Hypothesis 50
CHAPTER FOUR: EMPIRICAL RESULTS AND DISCUSSION

4.0 Introduction 51
4.1 Augmented Dickey-Fuller (ADF) Unit Root Test Results 51-53
4.2 Johansen and Juselius Cointegration Test Results 53-54
4.3 Granger Causality Test Results 55-57

CHAPTER FIVE: CONCLUSION AND POLICY IMPLEMENTATIONS

5.0 Conclusion 58-59
5.1 Policy Implications 60-62
5.2 Limitations 62-63

REFERENCES
LIST OF FIGURES

Figure 1: The Relationship between Monetary and Economic Variables 17
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 1: Summary of the Monetary Policy Transition in ASEAN-5</td>
<td>14-16</td>
</tr>
<tr>
<td>Table 2: Summary of Related Studies</td>
<td>35-39</td>
</tr>
<tr>
<td>Table 3: Unit Root Test Results for Series in Level and First Difference</td>
<td>52</td>
</tr>
<tr>
<td>Table 4(A): Johansen and Juselius Cointegration Test Results</td>
<td>53</td>
</tr>
<tr>
<td>Table 4(B): Johansen and Juselius Cointegration Test Results</td>
<td>54</td>
</tr>
<tr>
<td>Table 5(A): Granger Causality Test Results</td>
<td>55</td>
</tr>
<tr>
<td>Table 5(B): Granger Causality Test Results</td>
<td>56</td>
</tr>
</tbody>
</table>
1.0 Introduction

Money supply has become an important intermediate target since the financial deregulation in the late 1980s (Hassan et al., 2003). In order to achieve the objective of monetary policy, controlling of monetary growth is essential. To achieve effective control of monetary aggregates, it is important that the monetary authorities have to predict the movement of money multiplier with some level of accuracy. Error in predicting money multiplier can affect the desired monetary growth.

Central bank does not directly influence the goals. Rather, central bank employs a set of policy tool such as open market operation, changes in the reserve requirement and changes in discount rate to affect the goals indirectly. The most common used policy tool is open market operation because its effectiveness on controlling money supply. However, this policy does not perform well in ASEAN countries (Bando, 1998).

From the middle of 1997, financial storm was raging in ASEAN countries. Financial crisis has been badly affected the ASEAN economies. Bando (1998, pp.1) suggests that one of the main factors causes the crisis is domestic money supply and its control in ASEAN countries. There was excessive liquidity around 1995 in response to large inflow of foreign capital. The massive capital inflow had lead
inflation pressure since ASEAN economies could not sterilize the expansion of money supply.

Before currency crisis, the multipliers were constant in ASEAN economies except the Philippines (Bando 2000, pp1). This implies that the increased monetary base caused the money supply to grow in proportion to the money multiplier. However, the money multipliers were not longer constant after the currency crisis. Banks confronted with non-performing loans and other problems. The money multipliers were pushed down because of banks’ lending stances. Instability of money multipliers caused fluctuations in money supply.

Therefore, in this study, we would like to see how central banks control the monetary aggregate by controlling the monetary base in ASEAN-5 (Indonesia, Malaysia, Singapore, the Philippines and Thailand). It is important to understand whether this relationship will last in short- or long-run.

1.1 Definition of Terms

1.1.1 Monetary Base

The monetary base (or high-powered money) comprises all reserves held by bank and all currency in circulation (Mishkin and Eakins, 2003). Currency in circulation and reserve are also referred as the liabilities on the balance sheet. They play a crucial role in money supply story. For instance, increase in either or both will
lead to an increase in monetary base, and hence increase the money supply. Therefore, central bank can alter the monetary base to control the changes in money supply.

1.1.2 Monetary Aggregates

The monetary aggregates are denoted by M1, M2 or M3. Policymakers in most countries use various measures of money stock. The two main official measures of money stock today are known as M1 and M2 (Parkin, 2005). M1 consists of currency and traveler’s checks held by the public, demand deposits are owned by individuals and businesses. M2 consists of M1 plus saving deposits and small-denomination time deposits. The M3, which contains M2 plus other assets, such as large-denomination time deposits, repurchase (RP) agreements and Eurodollar.

1.1.3 Money Multiplier

Money multiplier defined ratio of monetary aggregates to monetary base. For example, M1 money multiplier means that the ratio M1 monetary aggregate to the monetary base (Auerbach and Kotlikoff, 1995). Money multiplier depends on two things: how much reserves banks keep in proportion to their deposits, and what proportion of money that people hold as currency. Money multiplier determines the increase (decrease) in the money supply resulting from a one-dollar increase (decrease) in central bank money. For example, in year 1995, the monetary base for Indonesia equaled Rp 25852 billions, M1 equaled Rp 52677 billions, therefore money multiplier equaled to 2.04. This implies that M1 equals to 2.04 times of the monetary base.
1.2 Monetary Policy Transition in ASEAN-5 since 1970s

In the last decade, ASEAN-5 countries have experienced a quite change in their monetary policy operation through the varied in monetary framework due to global developments and financial liberalization. During 1970s, the monetary policies in ASEAN-5 countries were conducted in an underdeveloped financial markets, limited international capital inflow and outflow, fixed exchange rate regimes, and high reserve requirement environment.

Since 1980s, financial liberalization brought a significant change in financial structures in ASEAN-5. The liberalization of domestic financial systems was accompanied by a relaxation of capital controls and credit control and movement toward more flexible exchange rate arrangement. Monetary targeting became an important intermediate to achieve final goal of price stability or economic growth since 1970s. Monetary targeting has widely used compare to interest targeting and exchange rate targeting in ASEAN-5. However, some of the ASEAN-5 countries have switched to other targets in response to financial liberalization, technological advances and financial crisis. The following describes in detail about the monetary policy transition in each ASEAN-5 countries since 1970s.

1.2.1 Indonesia

The objective of Bank Indonesia (BI) is to managing, safeguarding and maintaining the stability of the rupiah value. Before financial reforms, money supply

\[\text{The discussion in this section is adapted from Tseng and Corker (1991), Soekarni (1995) and Song (2003).}\]
(M1 and M2) through credits has been used as transmission channel. Before the major financial reforms of 1974 to 1983, the Government used direct monetary instruments (ceilings on bank credits, the determination of interest rate of state banks and the provision of liquidity credits) to conduct a direct monetary policy. Credit ceilings were the most important instrument.

Indonesia adopted interest rate targeting after the major financial reforms in 1983. Monetary aggregates targeting caused large portfolio shifted would result instability of interest rates. BI moved away from direct instruments monetary control through credit ceilings. New indirect instruments called open market operation were introduced at the same time. Auctions of Central bank bills (SBIs) were introduced in 1984. In 1985, issuance of money of Money Market Securities began. At the same time, investment house (FOCORINVEST) created to intermediate in money market. When the rupiah came under speculative pressures in mid-1987, the policy moved to protect international reserve and interest rate became more flexible. In 1988, the Government took it’s the most important deregulation package by changing the face of Indonesia banking. The package included a lowering of reserve requirement from 15% to 2% to reduce the bank’s cost. In 1996, Indonesia targeted monetary aggregates. BI enhanced its open market operation by increasing the interest of money market instruments. BI also implemented moral suasion besides increased the reserve requirement from 2% to 3%. In 1997, BI increased the reserve requirement to 5% effective from April 1997.

After financial crisis, the bank interest rates response to the policy rate became weaker than pre-crisis period. On the other hand, transmission of interest rates to
investment and consumption were strong compared to the pre-crisis. These evidences showed that stronger cost of capital and substitution effects in the post crisis period. The use of interest rate as the operational target was recommended for conducting monetary policy.

At the May 1999, new Central bank law was enacted, BI started to adopt inflation targeting for monetary policy making. Under the new framework, BI uses base money as operational target through open market operation. Nevertheless, BI is preparing to move toward interest rate as its operational target in conducting monetary policy. The actual CPI increased 9.3% between December 1999 and December 2000. In the ending of December 2001, the inflation rate increase to 12.5%. The actual CPI increase between December 2001 and December 2002 was 9.9%. In September 2004, the governor of BI announced ‘low and stable inflation’ policy for the period 2005 to 2008.

1.2.2 Malaysia

The primary objective of monetary policy in Malaysia is to accomplish price stability. Malaysia has faced a change experience in its monetary policy operation with the changed in the monetary framework which mainly in response to global development and financial liberalization. To ensure the monetary policy remains relevant amid the dynamic change in financial system and the Central bank developments in economy, Bank Negara Malaysia (BNM) plays important role in reviewing the monetary framework constantly.
In 1971, the interest rates were deregulated. Interest rate ceilings for all commercial bank deposits which maturity exceeding one year were abandoned in January 1972. Interest rate for deposits placed with finance companies were freed started 1 August 1973. From 20 August 1973, the open tender in money market determined the discount rates for Treasury bills. BNM allowed the commercial banks to determine deposit and lending rate in October 1978. Reserve requirement was lowered from 10% to 5% in 1979.

Prior to the mid-1990s, the BNM used monetary targeting as intermediate target to influence major macroeconomic variables. Monetary aggregate, M1 was the main policy target until 1987 since M1 had a stable and consistent relationship with aggregate income. Nevertheless, BNM shifted to monetary aggregate M2 in response to changed in public liquidity preferences and consistently high interest rate in the 1980s. M3 was found less affected by interest-induced fluctuations. Thus, BNM subsequently placed greater important on M3. Since the conditions in the money market were very tight\(^2\), BNM moved to an expansionary monetary policy from 1983 to 1986. BNM faced with the conflicting objective of maintaining stability of exchange rate and reducing interest rate. Measures such as open market operations, foreign exchange swap facilities, recycling of Government deposits and reduction of the Statutory Reserve Ratio (SRR) were implemented in 1986. For the period 1987 to 1988, monetary policy in Malaysia became rather neutral because the liquidity condition in the system could maintain price stability. During the 1980 to 1992, monetary targeting was seen as appropriate target for policy. BNM carefully

\(^2\) For more information, refer to Bank Negare Malaysia, Annual Report, 1993, pp.87-90.
controlled the day-to-day volume of liquidity in the money market, consistent with the monetary growth target.

Nevertheless, subsequent dynamic changed in the economic and financial environment during the early 1990s caused the relationship between monetary aggregates and output as well as price stability became weak. The large capital inflow in 1992 to 1993 created the instability of monetary aggregates as intermediate target. M3 extremely volatile during the period and viability of M3 as target reduced. The task for forecasting the supply of and demand for bank liquidity in the banking system became difficult caused by the volatility of capital flows.

Therefore, BNM shifted the monetary policy strategy from monetary targeting to interest rate towards the mid-1990s. However, BNM still monitors other instruments such as monetary aggregates and credit growth. After financial crisis, Malaysia is focusing on the interest targeting likes Myanmar. Over time, interest targeting in Malaysia can be more effective when working together with other complementary policies.

On April 2004, new interest framework was implemented. Under the new framework, a new policy rate was introduced. Besides, the framework also involved introduction improvements to the conduct of monetary operations as well as the elimination of the ceiling on base lending rates (BLRs) and prescribed lending spreads.
1.2.3 The Philippines

Interest rates in the Philippines are market determined, not regulated by the Bangko Sentral ng Pilipinas (BSP). Interest rate ceilings were existed in the 1970s. The interest rate ceilings served as the complement to the selective credit as well as guided lending programmes of the Government. The interest rate ceilings were lifted by the early 1980s, and in the January 1983, the interest rates were completely deregulated. Since the framework reforms in 1984, open market operations mainly through sales of Central bank securities became an important instrument used to influence monetary aggregates in the Philippines. BSP operated a single rediscounting facility for different purposes. Rediscount rate is related to market interest rate. Toward the end of 1986, Central bank securities were replaced by auctions of treasury securities, with proceeds deposited at the Central bank.

In the early 1990s, BSP conducted monetary policy through targeting of monetary aggregates to maintain price stability. There were stable and predictable relationship between money supply and high-powered money. Besides, money supply also showed relationships with inflation and output level. Reserve requirements were relatively high in the early 1990s due to the stabilization measures were often pursued. M3 was the intermediate target of monetary policy while operating target was the reserve money. Financial liberalization through the years caused the relationships between monetary aggregates and the ultimate economic goals became weak. Therefore, in 1995, BSP adopted ‘modified framework’ that attempted to complement monetary aggregates targeting with same form of inflation targeting to confront these problems. BSP place greater emphasis on price stability in lieu of rigidly
observing the monetary targets. Under the new frameworks, base money was allowed to exceed target as long as actual inflation rate met within programme levels. However, the shortcomings still existed in the new framework. This framework did not considerate for long and variable lags in the effects of monetary policy on the economy. In 1996, the Philippines targeted monetary aggregates. The Philippines targeted base money by setting a floor for foreign reserve and a ceiling for net domestic assets.

The Philippines has adopted inflation targeting aftermath of the financial crisis. On 24 January 2000, BSP’s policy-making body, the Monetary Board, adopted in principle the shift to inflation targeting framework, formally employing it two year later. Since January 2002, inflation targeting as a monetary framework help the BSP builds its credibility to achieve the price stability objective. Government targeted to achieve annual inflation on 4.5% to 5.5% at 2002 and 4.0% to 5.0% at 2003. However, the actual inflation rate was achieved at 3.1% in 2002, which was below the target range of 4.5% to 5.5%. In March 2003, liquidity reserve for commercial bank was increased from 7% to 8%. The Government of the Philippines targeted to achieve a lower inflation rate within the range of 3.0% to 3.5% in 2003, compared with previous targeted inflation rate of 4.5% to 5.5%.

1.2.4 Singapore

In the early 1970s, MAS (Monetary Authority of Singapore) heavily relied on changing the minimum reserve requirement of banks to conduct monetary policy. To manage the economy and curb inflation the minimum ratio reserve requirement was
reformed several times during 1970s. Singapore already had a relatively well-developed financial sector compared with other ASEAN-5 countries because Singapore largely liberalized financial sector in the mid-1970s. During the 1980s, Singapore focused on improving existing institutions and market.

Since the early 1980s, monetary policy in Singapore had been relied on the exchange rate rather than relied on interest rate or money supply to promote price stability and sustainable economic growth. The conduct of monetary policy in Singapore had been influenced by Singapore’s small size and the high degree of openness to trade and capital mobility, interest rate and money supply largely affected domestic demand, did not have significant influence on overall level of economics.

To launch exchange rate policy, the MAS conducted money market operation to ensure there was a sufficient level of liquidity in the banking system. Foreign exchange swaps and bank loans were used as main instruments. MAS also varied the net amount of Treasury bills auctioned weekly to control the liquidity and interest rate. In May 1987, Government securities issued at market rate and more active secondary market in Government securities were developed. Therefore, MAS had additional instrument to conduct monetary policy. Towards the end 1988, the minimum cash balance ratio was 6% of a bank’s liability base. However, the liquidity assets ratio was 18% of a bank’s liability base.

The controlling of domestic money supply was limited to narrow monetary aggregates such as M1 since the large portion of changed in domestic quantity money were conducted from flows of external sector net foreign assets. In additional,
Singapore’s economy is very open to capital flows. Little changes in the difference between domestic and foreign interest will cause the large and rapid movement of capital. Therefore, it made hard to target money supply in Singapore. After financial crisis, Singapore still undertakes exchange rate targeting.

To achieve a more open and communicative monetary policy, MAS has made a significant improvement in recent years. Since February 2001, MAS announces their exchange rate policy stance in a formal Monetary Policy Statement (MPS) every six months. In February 2001 and January 2003 respectively, MAS removed two monographs on Singapore’s exchange rate policy and monetary policy operations.

1.2.5 Thailand

Since 1970, to open new branches, commercial banks had been required to hold at least 16% of their deposits in form of Government bond. Nevertheless, they were permitted to sell part of the mandatory bond holdings above some threshold level in the repurchase market. Repurchase market was established by Bank of Thailand (BOT) in 1979. The most important window that used for liquidity management purpose in Thailand is the repurchase market for Government.

During 1980s, the period of economic difficulties, BOT chose to target on money supply, domestic credits and reserve money. The relationship between monetary variables and real variables was relatively stable and predictable. This was important to contribute effectiveness of monetary policy through the control of reserve money. Since 1986, BOT became active in the Government bond repurchase
market and started to issue Central bank bonds. In the late 1980s, the economy in Thailand became more stable, the need to control reserve money became less urgent. The selling volume of Government bond of the BOT has dropped in 1987 because the Royal Thai Government maintained surplus treasury cash balances. Because lacked of Government bonds, the required to hold deposits in form of Government bond for commercial banks reduced to 9.5% at 1990 and phased out at 1993.

The ceiling on lending growth rate was projected at 19% for 1995, and it was increased to 21% in 1996. The BOT targeted bank credit growth rather than targeted money supply growth as this was deemed to be the major reason of the current account deficit and the problem of rising rate of inflation. Following the adoption of floating exchange rate on 2 July 1997 and IMF programme, a monetary targeting regime was adopted. Monetary policy aimed to achieve sustainable growth and price stability through targeting domestic money supply. Under the regime, BOT had to set daily and quarterly targets for monetary base to ensure liquidity management in consistent with constituent economic policies. Nevertheless, this regime was considered inappropriate because of the instability relationship between monetary aggregates and macroeconomic objectives.

After the completion of IMF programme and careful consideration of the BOT, BOT decided to adopt inflation target in May 2000. Under the inflation targeting regime, the BOT selected to target core inflation within the range of 0% to 3.5% per year. So far, BOT has succeeded in achieving this goal. Until 2007, Thailand still undertakes inflation targeting regime.

---

3 Core inflation, which excludes volatile raw food and energy prices from the CPI, and calculating the year-on-year % raise of the resulting index on a monthly basis. The target range for core inflation uses to the average of the monthly figures of each quarter.