A P-STAR MODEL APPROACH ON INFLATION
IN SINGAPORE AND THE PHILIPPINES

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ABSTRACT

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By

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‘Inflation is always and everywhere a monetary phenomenon’, a famous phrase by Milton Friedman, has always been a hot topic. Thus, this subject regarding ‘monetarist’ view is still been questioned until now. A stable relationship between price level and monetary aggregate is crucial as this monetary aggregate would be a good predictor of inflation. Therefore, determining which monetary aggregate is better in monitoring to produce an effective monetary policy is crucial as well. Since 1980s, the increase of financial liberalization and innovation blurred the relationship between money and price. Therefore, the weaknesses of traditional Simple Sum monetary aggregates led to the introduction of Divisia monetary aggregates. By using P-Star model framework, the performances of Divisia monetary aggregates are investigated to predict the inflationary movement against their Simple sum counterparts. In this paper, Singapore and the Philippines are examined to ascertain an appropriate monetary aggregate in monitoring their monetary policy respectively. As a result, it was discovered that Simple sum M2 exhibited more information contents in predicting inflationary movement in Singapore whereas Simple sum M1 is superior in the Philippines. Lastly, P-Star model sought be a valid empirical model to predict inflation for Singapore and the Philippines.
ABSTRAK

KEPENGUNAAN MODEL P-STAR KE ATAS INFLASI BAGI
SINGAPURA DAN FILIPINA

Oleh
Lee Hui Zhi

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CHAPTER ONE
INTRODUCTION

1.0 Introduction

In general, inflation is a monetary phenomenon, which is commonly discussed in the context of the value of money rather than the value of goods. Inflation is relatively associated with the supply of money and occurs over time as most general level of prices tends to rise in macroeconomics. In other words, the value of money falls and price level rises as monetary expansion of supply occurs and in respect of inflation which could imply as ‘too much money chasing too few goods’. Hence, once the price level changes, inflation can always be analyzed within the framework of the supply of money (Floyd, 2009). Consequently, it also corresponds with the well-known aphorism of ‘Inflation is always and everywhere a monetary phenomenon’ by Milton Friedman who is a recipient of the Nobel Memorial Prize in Economic Sciences (Friedman, 1963, pp. 17). However, this common concept is still an ongoing hot topic to be debated as this aphorism provides some opposing views. Therefore, the study of money and macroeconomics activity has always been a popular subject in economic debates.

In principle, the famous aphorism, ‘Inflation is always and everywhere a monetary phenomenon’ was created based on the Quantity Theory of Money in a long tradition view (Grauwe and Polan, 2005). Quantity Theory of Money was first developed and discussed by the classical economist, David Hume and was further
advocated by the winner of Nobel Laureate, Milton Friedman. With the development and establishment of this Quantity theory, the question of how the level of prices can be determined and why it might change over time can be explained (Mankiw, 2007). The Quantity Theory of Money states that the overall adjustment of price levels is effective and will occur when the supply of money is changed, and in turn, a change in the Quantity of money demanded will occur as well in order to acquire equilibrium between them. Therefore, the determinants of money supply and money demand are considered by the development of the Quantity theory. Since the existence of the quantity of money determines the price level and hence, the growth rate of the quantity of money tends to influence the inflation rate. Hence, the general price level is indeed correlated with the supply of money and significantly or primarily contributes to inflation. The measurement of a standard money supply, however, is not an easy task.

In fact, the term ‘inflation’ in the earlier days had created a bad insight to the world as the price movements shifted which initiate that inflation stimulates a higher cost of living and lessens the standard of living as the income remains with the increase of the price levels which relatively correlates with the judgment of ‘too much money chasing too few goods’. In the mid and late 1970s, Americans named inflation as a number one public enemy when inflation surged twice to double-digit (Hellertein, 1997). According to Shiller (1996) who conducted a study based on a questionnaire, concluded that people mostly believe in sticky-wage model where wages do not respond to inflationary shocks. This point induces that people respond negatively towards the existence of inflation as their standard of living is affected. Therefore, appropriate monetary aggregates act as essential investigations in order to conduct a
suitable monetary policy since monetary aggregates could be applied as informative variable guides to reduce inflationary movements (Estrella and Mishkin, 1997).

Furthermore, an adjustment of a monetary policy will play both a growth-promoting and a stabilization role which will generally drive macroeconomic activity as well. Since monetary expansion in supply is mainly stimulated by the monetary policy implemented which, in turn will affect interest rate and simultaneously influence the demand of investment and consumption including output and eventually, influencing prices as well. Hence, this concern was correlated with the study by Friedman and Schwarz (1963) who noted that monetary policy was very powerful thereby it could explain the fluctuation of output. Consequently, empirical analysis and research are concurrently carried out to examine the significant role of money. Meanwhile, The Great Inflation of the seventies is an appropriate experience which is attributable by the ‘missing money’ phenomenon. Consistent with the 1970’s inflation, many debates arise concerning which monetary aggregates are better in monitoring monetary policy and thus, to produce an effective monetary policy (Fisher and Fleissig, 1995). Therefore, once again, it proved that investigations of appropriate monetary aggregates are key elements to form a better monetary policy.

Since the late sixties, the unstable degree of ‘moneyness’ or liquidity stimulated by the beginning of financial innovation and reform due to the formation of monetary assets such as transaction deposits and savings-type deposits. Moreover, the increasing bank sectors associated with the increasing use of the ‘near money’ deposit induced the distinction between money and ‘near money’ became increasingly blurred in the late sixties and escorted with an increase in monetization. Hence, a
standard measurement of the amount of money is sought by the International Monetary Fund (IMF). Since financial liberalization arose, it induced substantial changes and weakening in the structural relationship between the monetary aggregates and nominal GDP (Thornton, 2000). Thus, the usefulness of monetary aggregates will bust as a response to the financial innovation and the existence of the word 'moneyness' shall not ignore.

Moreover, throughout the years, the emergence of financial liberalization makes it slightly difficult to figure out a well monetary tool that is suitable to exercise in an uncertainty period and time frame required to operate (Fitzgerald, 1999). Therefore, there are numerous of empirical analyses or researches which are carried out to predict a precise monetary tool or monetary aggregates to avoid boosting of inflation. Moreover, since 1980s, numerous of interests are doing on the comparison of the traditional Simple sum money and new appearance of the monetary aggregates known as Barnett’s monetary services indices to retrieve the best way to predict the future inflationary movement.

Incessantly, the weaknesses of traditional monetary trigger the formation of Barnett’s monetary services. The development of the new monetary aggregate - Divisia monetary aggregate is pioneered by Barnett (1980) which proved that it is an appropriate measurement for monetary services. Consequently, many literature studies were undertaken to examine the robustness of the role of Divisia monetary aggregates and also to determine its contrast in different money aggregates. Besides that, many obstacles which were discovered were visualized by various approaches to observe the performance of the aggregates by statistical criterion based on the existing
theory. Throughout the literature studied, development of Divisia money is found and marked as a superior indicator to its counterpart of the conventional Simple sum aggregates (see for example Binner et al., 1999 for UK; Habibullah 1998 for Indonesia; Belongia, 1996 for the US). Therefore, the new outlay of the Divisia monetary aggregates can be attributed to the development of the monetary aggregation theory and Divisia monetary aggregates index (Barnett, 1980) which will be discussed further in this study.

In the rest of the study, further task will be taken to focus particularly on comparing the performance of Divisia monetary aggregates and traditional Simple sum money aggregates as to obtain precise information content of money with regards to forecasting future movement of inflation (Shrunk, 2000). In this study, P-Star model approach, which is pioneered by Hallman et al. (1989) will be utilized to examine the predictive power of monetary aggregates in tracking the future price level movements. It is also used to forecast which monetary aggregates are better suited as a prediction tool for the future. However, before proceeding further, the economics background of Singapore and the Philippines will be discussed in the next chapter to explain the development and economic growth of both countries in the past. Besides that, the introduction of the monetary aggregates methods of Simple sum and Divisia monetary aggregates will be briefly described in this chapter too. The P-Star model will also be briefly explained in order to figure out the usage of P-Star model as a basic understanding.
1.1 Monetary Policy and Financial Liberalization in Singapore

By further advancing of Singapore in developed and diversified in the late 1960s, economists notified that enhancement in commerce and industry was a better supporable trading for Singapore (Toh and Linda, 1990). As a result, in the past three decades Singapore has shown a remarkable success as a regional financial centre in serving the domestic economy as well as neighboring economics in Southeast Asia. With the aim to further evolution into regional financial region, Singapore government has been actively undertaking financial reforms and liberalizations since 1960s which embarked on a different route by adopting an outward-looking financial development strategy (Hew, 2002).

By looking at the achievement in the financial sector for the past 30 years, the Singapore government has successfully managed to increase attractions in the foreign financial institution by implementing a financial sector reform, opening new financial markets and enacting regulatory and fiscal incentives. In view of the growth in financial institutions and markets which was in tandem with the vibrant activities like manufacturer and trader, it reflects that even a small and open country like Singapore, its economy heavily depends on export and import in which its amount covers to twice of the GDP. In response to the high trading in export and import, the monetary policy in Singapore has been centered by exchange rate targeting as the most effective tool in controlling inflation since 1981 (Monetary Authority of Singapore, 2007).

Since the established of MAS in 1971, Monetary Authority of Singapore (MAS) heavily relied on the changing of minimum reserve requirement of banks to
conduct monetary policy. Since the 1970s, financial reforms in minimum ratio reserve requirement had been reformed for several times as to manage inflation and economic growth. The continuous evolution of financial reform in Singapore enables hastened financial liberalization in order to create a more resilient financial sector, which could compete in an increasingly globalised environment and meanwhile can strengthen the domestic banks and increasing foreign participation in the financial sector (Hew, 2002).

Since the implementation of exchange rate regime in 1980s, there were no independent targets of other policies on the interest rate or money supply. The Singapore dollar is monitoring against a limited flexibility trade-weighted basket of currencies of Singapore's major trading partners and competitors from June 1973 until June 1983, where it was managed within a disclosed policy band. The band provided a mechanism to accommodate short-term fluctuations in the foreign exchange markets and flexibility in managing the exchange rate (Documents for Small Business & Professionals, 2008). While in July 1987 until September 2004, Singapore dollar was operated with a managed float regime (Tan et al., 2004). The size of Singapore, the degree of openness and capital mobility are always a basis sound to influence the policy implemented; while domestic demand is essentially triggered by interest rate and money supply, where there are no significant influence on the overall level of economics (Song, 2003).

In the sight of implementation of the exchange rate policy, other minor monetary policies are required and are unable to avoid its existence. For instance, MAS conducted money market operations to balance out the short-term fluctuation in
bank liquidity to ensure the banking system is in a good condition with sufficient level of liquidity. The importance of the availability of foreign exchange swaps, reverse swaps, borrowing from banks and reverse repurchase agreements in government securities acted as the money market instruments (Documents for Small Business & Professionals, 2008). Besides controlling the liquidity and interest rate, MAS also altered the net amount of Treasury bills auctioned weekly (Sockarni, 1995).

Since a large portion of change in domestic quantity money were controlled from the flows of external sector net foreign assets, it caused the controlling of domestic money supply to be limited to narrow monetary aggregate like M1. Before the 1973 reforms, open current and capital account were adopted with a Simple sum monetary management while interest rate management was the main thrust of monetary policy to maintain inflation in a manageable range. However, in 1973 with the increasingly open international condition in conjunction with important information that Singapore is an openness country to capital flows, a rapid variation in the movement of capital was assorted if there is a change in the domestic and foreign interests. Therefore, an exchange rate management was relatively distinct with the monetary management (Ariff and Khalid, 2000). Exchanges rate, hence, is a better targeting to Singapore as monetary targeting is unlikely to implement.

In accordance with the ambition to attain financial liberalization, the consolidation of bank is needed to consider for instance development of Bank of Singapore (DBS) acquired the Post Office Savings Bank (POSB); Keppel Bank merged with Tat Lee Bank since 1998 as Singapore government would like to merge them into two major banks to welcome the new era of globalization. Meanwhile,
activity of merging and acquisition also continue to rise during 2001. DBS acquired Hong Kong’s fourth largest bank, Dao Heng Bank, for US$5.7 billion as part of its regional expansion plans; following the same year on 12 June, Singapore’s third largest bank, Overseas-Chinese Banking Corporation (OCBC) announced a S$4.8 billion bid for Keppel Capital Holding (KCH), which owned Singapore’s smallest Bank, Keppel TatLee Bank; in two weeks later, on 22 June, DBS Holdings group made an unsolicited bid of S$9.4 billion for Overseas Union Bank (OUB), the fourth largest bank; In addition, on 29 June 2001, second largest United Overseas Bank (UOB) made a competing bid for OUB, consisting of a cash and stock offer. The bid was successful in August 2001 and the merger formed Singapore’s largest bank in terms of assets. The beginning of the merger activities is a step to move forward to regional financial centre although stick in a small domestic market with limited growth prospects but expanding done in a regional market is a first step towards global market (Hew, 2002, pp. 5-6).

Nevertheless, MAS also introduced a five-year programme in order to liberalize Singapore’s banking sector and expedite the development of the local banks on 19 May 1999 (Hew, 2002). The programme was given a sign by setting guidelines for the best practices, giving banks more room to innovation and creating a stronger power with more competitive banking environment in the face of globalization trends and rapid developments in electronic delivery channels. In the first phase, MAS introduced a new category of full banking license, known as ‘Qualifying Full Bank’ (QFB) which was allowed to select foreign banks additional branches, off premise automatics teller machine (ATM), and ATM-sharing privileges. Continuous improvement in the financial liberalization programme - second phase was announced
on 29 June 2001, this package was exercised to measure a more substantial opening up of the financial sector to foreign banks and it will thus intensify competition in the hitherto protected domestic wholesale and retail markets. The implementation of this stage would create deeper and broader capital markets - expediting in Singapore dollar and induce foreign participation in the domestic wholesale market to broaden as the pressure of liberalization of the ATM extends. In the future, there will be no doubt that more challenges will exist in confronting the local banks. Thus, in May 2004, MAS lowered the Capital Adequacy Requirement (CAR) for local banks which allowed local banks to be more competitive (Tan et al., 2004, pp. 17).

For a moment in amidst of 2001, MAS also made an additional improvement to attain a communication monetary policy. Hence, MAS announced their exchange rate policy stance in a formal monetary Policy Statement (MPS) every six months. Besides that, MAS also took action by removing two monographs on Singapore’s exchange rate policy and monetary policy operations in February 2001 and January 2003 (Song, 2003).

In sound with the suitable policy implemented, MAS announced that it would maintain the policy of the modest and gradual appreciation of the S$NEER (Nominal Effective exchange rate) policy band which has been implemented since April 2004. Over the past few years, the policy stance has contributed to low and stable inflation and consequently, the economy was expanded in 2007 where inflationary pressure affected in the latter half of the year was contributed by the increase in oil prices, higher global food and Goods and Services Tax (GST) hike in July. However, it was believed that the condition will likely persist in 2008 which will expand in a slower
pace due to the global economic growth. Therefore, with the condition provided, MAS would continue with the policy of a modest and gradual appreciation of the S$NEER policy band in October 2007 by increasing slightly the slope of the policy band or without any re-centering or change in its width. Ultimately, the policy would be supportive to the economic growth while capping inflationary pressures and ensuring price stability over the medium term (Documents for Small Business & Professionals, 2008).

1.2 Monetary Policy and Financial Liberalization in the Philippines

Since financial liberalization and innovation had started to emerge at the end of the 1980s, it had affected each country’s monetary transmission channels, either by affecting the overall impact of policy or by altering the transmission channel. In addition, transmission mechanism is playing an essential role in allowing monetary policy to affect real economic activity and inflation through various channels. The emergence of financial liberalization gives an expression to us that this would lead to changes in financial structures and new financial products or services will develop. Therefore, the occurrence of financial liberalization and financial innovation would undermine the relationship between monetary aggregates and price levels over the years, which rendered monetary policymaking as a more challenging mission. Moreover, creating a new macroeconomic challenge for central banks in industrial and emerging market economies as the impact of monetary expansion on prices and output may hardly predictable. As a result, monetary policy implemented is no longer
suitable in an increasingly sophisticated financial innovation circumstance (Song, 1995).

Since the monetary policy fails to enhance its performance, the establishment of the Republic of the Philippines’s central bank, Bangko Sentral ng Pilipinas (BSP) plays its part in functioning to revamp the circumstances. In 1970s, banking system resorted to foreign credit that generally ignored foreign-exchange risk with the assistance of Central Bank in order to mitigate the development of financial intermediation in the economy, especially long-term saving’s growth. The dependence of the banking system on funds from the Central Bank in conjunction with the discretionary authority of the bank at low interest rate had caused the financial chaos to occur in 1980s. From the beginning since the establishment of BSP, June 1948 until the early of 1980s, both bank deposit and loans act as proxies for interest rates when adjusted for inflation. Besides that, via an extensive system of rediscounting, Central Bank credit was extended to commercial bank (Federal Research Division of the Library of Congress, 1991).

In addition, in the early 1980s, in response to the interest rate control, dearth of the long-term capital funds, highly-restricted activities and operation of financial institution of the financial system, it induced the financial system to be burdened with insufficient savings, inefficient allocation of resources and high intermediation costs which was directly stimulated from the way in which the financial system was controlled (Sorekarni, 1995, pp. 41). Hence, the government introduced a number of monetary measures built in 1972 reforms in order to enhance the banking industry’s ability which played hard to extend the capital base of banks in terms of on the
mergers and consolidations to provide adequate amounts of long term finance (Federal Research Division of the Library of Congress, 1991). In July 1980, the first important financial reform was introduced a modified concept of universal banking and the second action emphasized on the deregulation by freeing of interest rate ceiling in July 1981 on all types of deposits and loans except short-term loans (Sorekarni, 1995). Nevertheless, interest rates were completely abolished in January 1983. Open market operations become an important instrument used to manipulate monetary aggregates in the Philippines which was mainly through the sales of Central Bank securities since the framework reforms in 1984. Moreover, a single rediscounting rate operated for different purpose which was related to market interest rate (Tseng and Corker, 1991).

Following the early 1990s, monetary targeting was conducted as it was noted that a stable and predictable relationship between money supply and high-powered money was achieved and moreover, money supply also showed relationships with inflation and output level. Stabilization measures were often conducted too in order to obtain a relatively high reserve requirement. For the moment, M3 and operating target are selected as a proxy for intermediate target of monetary policy and reserve money respectively (Song, 2003).

Consequently, throughout the year, financial liberalization ongoing and has driven the relationship between monetary aggregates and the ultimate economic goals to become weak. Hence, the liberalization of the Philippine financial system had brought up to introduce new financial instrument due to the weakening of the traditional link between money, output and inflation. Moreover, there was a
modification in the monetary policy framework adopted in 1995 and it managed to place greater emphasis on price stability. Meanwhile base money is also allowed to be exceeded as long as actual inflation remains within programme levels. Nevertheless, the new modified framework failed to conduct as it did not considerate the long and variable lags in the effects of monetary policy. Subsequently, in 1996, monetary aggregates targeted based on base money by setting a floor for foreign reserve and a ceiling for net domestic assets (Song, 2003, pp. 86).

Likewise, due to the existence of the liberalization of the Philippine financial system, it induces instability in growth among these traditional macroeconomic variables, more particularly, causing failure to attain in monetary targets. In such condition, it induces BSP to make a shift to inflation targeting as the framework for monetary policy on 24 January 2002 instead of attaining monetary targeting. The inflation targeting adopted was in purpose to trigger the financial system by emphasizing more on the price stability objective and less weight on the intermediate monetary targets (Guinigundo, 2008). Greater accountability was investigated for the inflation targeting and it was found to be successful in building up credibility by demonstrating consistent adherence to the price stability over a given time horizon. In the investigation process, it was illustrated that inflation targeting was able to facilitate the functioning of efficient financial market by promoting greater transparency in the conduct of monetary policy (Song, 2003).
1.3 Monetary Aggregation Methods: Simple Sum and Divisia Monetary Aggregates

Since 1970s, price of user costs and the technical characteristics of money had been altered and were also associated by many other economics structures change which affected monetary aggregates for instance new forms of money, relaxed restriction and technological change. Therefore, transformation of monetary aggregates in every year is crucial to avoid the wrong prediction of monetary aggregates which would cause failure to predict inflation rate and tend to cause a misleading policy signal (Fisher and Fleissig, 1995). Following in a decade of the 1980s, there were more debates in criticizing the role and the significance of money particularly when financial liberalization and rapid innovation in financial sectors. In this case, most of the literatures deliberate the emergence of financial liberalization and the advance of financial innovation which were the major roots in triggering the break-down in the demand for money in a number of developed and developing economies based on Simple sum measures. Thus, this criticism is addressed in regards to the information content embedded in Simple sum money.

Before going further, the simple meaning of the Simple sum money aggregates are concerned. The construction of traditional Simple sum money aggregates are formed in order to create M1 and M2 monetary aggregates which are based on an arbitrary grouping of financial assets. The existence of monetary components forming the monetary aggregate has a natural characteristic in terms of perfect substitution. In other words, the monetary components can sum up together to generate a total value for the supply of money held in circulation. Hence, this measurement of money is referred to as Simple sum measures of money. The measurements of the monetary