UNIVERSITI PUTRA MALAYSIA

THE EMPERICAL ANALYSIS OF MONETARY MODEL TO THE EXCHANGE RATE DETERMINATION: MALAYSIA RINGGIT, SINGAPORE DOLLAR AND INDONESIA RUPIAH CASES

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By

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FOREWORD

There are three approaches in asset market approaches to determinate of exchange rate : portfolio balance approach, monetary approach and currency substitution model. In this project paper, I utilized the monetary approach to determine Malaysia Ringgit, Singapore Dollar and Indonesia Rupiah exchange rate.

This project paper is written in order to fulfill requirement of Master Economic at Faculty of economic and management, UPM. The title of this project paper : The Empirical Analysis of Monetary To Exchange Rate Determination : Malaysia Ringgit, Singapore Dollar And Indonesia Rupiah Cases.

I would like to Acknowledge the UPM's teaching staff especially my supervisor, Dr. Ahmad Zubaidi Baharumshah who has helped me tremendously to untangle the many problems that I had at the beginning of the project and continued to guide me until the project comes to its completion.

I aware that this paper is far from excellent, therefore, any positive critics and comments from whoever are wellcome. The constructive critics will help me to advance this paper

Serdang, November, 1999

Tanza Erlambang

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ABSTRACT

This study concerned with an empirical analysis and validation of monetary model to determine exchange rate of 3 ASEAN countries (Malaysia, Indonesia and Singapore) against major developed country currencies, namely USA, Japan, Germany and United Kingdom. Based on 3 different statistic test results (aunit root test, Johansen cointegration test and single equation diagnostic test), it is could be concluded that monetary model is a valid framework to analyze movement of Malaysia Ringgit to Japan Yen, and Movement of Singapore Dollar to British Pound, Germany Mark, US Dollar and Japan Yen

CHAPTER I

INTRODUCTION

1. Background

The monetary crises in the Mexico in 1995 and the recent Asia financial crisis in 1997 influenced the currencies value in the region. During the Mexico crisis, devaluation of Mexican peso dragged the value of the US dollar against Japanese yen at all time low (88.75 yen/US dollar). Then, the currency crises quickly spread all over the world. As pointed out by Shishido and Nakajima(1999), long-term as well as short-term private debt quickly accumulated in many Asian countries. Following the Mexican crisis, massive capital inflows resulted in the appreciation of the national currencies of these countries. The appreciation of the currency worsened the trade balance, but the trade deficit was successfully covered by the continuation of further foreign capital inflow. Strong confidence of investors in future growth potentials of these economies, contributed to a continuing source of foreign currency earning. But as the currencies of these economies appreciate, the chance of speculative attack also increased. In July 1997, the Thailand baht collapsed due to the speculative attack, and the currency crisis exerted wide and serious impacts on other Asian countries based on band-wagon effect, included giant economic power of Japan and South Korea.

In the ASEAN region, the ASEAN crisis has lead to the value of the Thailand Baht against US dollar to fall sharply. Malaysia ringgit (RM), Indonesia rupiah (Rp) and Singapore dollar (SD) have been forced to undergo to the lowest point from RM 2.4 to RM 3.8; from Rp 2,450 to Rp 8,500, and from SD 1.49 to SD 1.7 against US dollar respectively in the current crisis, and the fluctuation of these currencies seems endless. There are many factors believed to have contributed to the financial turmoil either in Mexico or in ASEAN countries recently. These factors include the current account deficits, foreign debt, trade account and economic performance which trigger currency speculator to attack the currency both in Mexico and in the South-east Asia countries.

In fact, the rupiah value tends to depreciate against US dollar in the long term. Bank Indonesia (1995) reported that in the 1981-1994 period, rupiah depreciation on average of 2.46% per-year against US dollar. Fluctuation of key currency against rupiah affects the level, the structure, and the economic cost of Indonesian debt. During this period, Central Bank has devalued the rupiah twice : rupiah has been devalued from Rp 703/USD to Rp 970/USD on March, 30, 1983; and second devaluation was on September 12, 1986 from Rp 1.354/USD to Rp 1.644/USD. The main objective of devaluation is to promote export and discourage import, and consequently to improve the trade balance. Unfortunately, as pointed out by Upadhyaya *et al* (1999) and Khasnobis (1999), devaluation is a popular instrument for stimulating exports and improving the trade balances of small open economies in the developing world. Although it has some theoretical appeal, in reality, a devaluation does not always succeed in either stepping up exports or reducing the trade deficit. Moreover, higher imports prices, caused by devaluation, can contribute to higher domestic prices of nontraded goods. Thus, a

nominal devaluation can be neutralized by induced inflation in the domestic currency, the nominal exchange rate alone may not affect the trade balance. The resulting overall inflation raises the effective real exchange rate, perhaps eliminating the potential for trade balance to improve.

Similarly trend also occurred with Malaysia ringgit. In the last 17-years, the Malaysian ringgit had a moderate depreciation of 9.8 % against US dollar. The depreciation tends to generate larger future depreciation. The foreign exchange market in Malaysia is relatively small, and is being susceptible to speculative trading. As pointed out by Tse and Tsui (1997) that Malaysia current account balance was generally negative during the period of study (3 January 1978 to 29 June 1994). A depreciation in ringgit may cause traders to revise their priors and speculate against government intervention. Such speculative activities would increase if the market does not have consensus as to whether the intervention would be successful or given un-favorable balance of payment situation. Speculative activities had indeed caused the Bank Negara Malaysia to impose daily limits on non-trade related Swaps (temporary sales of dollar by central banks to the banking system for a specified period). At the last, Malaysia government fixed the exchange at rate RM 3.8 level against the US dollar since September 1998.

Except for the present financial crisis, Singapore dollar showed opposite trend compared with Malaysia ringgit and Indonesia rupiah. The Singapore dollar had appreciated by about 42.5% against the US dollar for 1978 – 1994 period. This condition reflects the strength of Singapore economic, in which growth was sustained with the low inflation rate. The city state of Singapore has high per-capita income, expanding and

vibrant financial service, strong and excellent human capital and low inflation and un-employment rate.

During the last two decades, many exchange rates have shown large fluctuations. These fluctuations relate to both intra-day changes and movements within longer periods : months and years. Concurrently, the link slacked between the exchange rate and the exchange market on one hand and real phenomena such as international trade in goods and services and relative prices on the other. The bulk of the transaction on the foreign exchange market is driven by financial motives. Hence, the exchange rate determination is similar to the determination of asset market prices. This theory is, therefore, called asset market approaches of exchange rate determination. The emphasis on financial stocks does not imply that the asset market approach does not consider the trade balance, which played such a dominant role in the traditional explanations of the exchange rate. On the contrary, the approach assumes that the current account balance plays a significant role in the medium term when the system moves from one short-run equilibrium to another (Jong, 1991)

There are three approaches to determine the exchange rate based on asset market model : first is portfolio balance approach, the second is monetary approach, and the last is the currency substitution model. In the portfolio balance approach, foreign and domestic bonds are considered to be imperfect substitutes. In term of excluding non-interest-bearing foreign money from private agent's wealth, portfolio balance approach is the same with monetary approach. However, in the monetary model, foreign and domestic bonds are considered to be perfectly substitutes. The currency substitution

approach focuses on the possibility that foreign money is a substitute for domestic money; foreign money is therefore considered to be part of the domestic agent's wealth.

The monetary model has critical problem after fixed exchange rate era, because exchange rate is more volatile than money stock and income in the floating exchange regime. The monetary model appear to work in the countries with very high inflation rates (hyperinflation) such as Brazil, Argentine, Chile and Israel (Macdonald, 1988 and Bleaney *et al*, 1999). It is because, in the high-inflation countries, institutional and legal arrangement such as long-terms contract and price control makes price sticky has been collapsed. In particular, attempts to fix the exchange rate are soon swamped. The end result is that both price and exchange rate move smoothly along their equilibrium PPP path.

In the industrial countries, monetary model has been grown to work to Japan and Germany. For the Japan, there is discernible upward trend in the value of Japan Yen, it is warranted by the rise in Japan's relative GDP and fall in its relative money supply. For Germany, ever since the early 1950's, Germany economy enjoyed rapid growth, but monetary policy is less expansion. As predicted by monetary model, the outcome has been balance of payment surplus and reserve accumulation, as well as long term of appreciation of the Deutsche Mark (Frenkel, 1977 and 1978).

From above discussions, we noticed that a number of researchers give a long-run explanation for monetary approach to the exchange rate in the some developed nations and in the countries with very high inflation rate. Then, the currencies of ASEAN countries against their major trading partners are considered to be ideal issues to be a turning point to empirically examine the monetary model. The aim of the present study is

to examine if monetary model works in the long run to determine exchange rate between Malaysia ringgit, Indonesia rupiah and Singapore dollar against currencies of USA, United Kingdom, Germany, and Japan. We investigate the long-run properties of the monetary model by using state-of-the-art techniques in econometrics.

2. Problem statements

The simple or pure monetary model of a floating exchange rate predicts that the domestic currency will depend on variables of money stock, national income and interest rate. A given percentage increases in the domestic money supply leads, other things being equal, to a depreciation of the same proportion in the value of the domestic currency. Contrary, a rise in GDP leads to an appreciation of the home currency (other things being equal). Moreover, with given nominal money stock and income, a rise in domestic interest rates relative to those in the foreign country will be associated with a depreciation in the domestic currency.

As suggested by Rasulo and Wilford (1980); Haynes and Stone (1981); and MacDonald and Taylor (1991), from empirical perspective the monetary model has failed to perform well during the recent float. Thus its (short-run) in-sample and out-of-sample performances have been demonstrated to be abysmal. Perhaps the most startling indictment against the model is the finding by a number of researchers that it does not even give a long-run explanation for the movement of nominal exchange rate.

The monetary model only performed well in the certain developed nations such as Germany and Japan in which the variables of money supply, income and interest rate fluctuate at quite predictable rate. Change of the fundamental variables in great amount may create problems in modelling of exchange rate models. The difficulty in exchange rate determination by any models could affect on economic performance of one country. The volatility leads to welfare loss and balance of payment problems, and thus might create the economic dislocation or even turmoil as we have seen in the present financial crisis. Therefore, the prediction of exchange rate fluctuation at least in the long-run is important for economic planning of a country.

The USA, UK, Germany and Japan are major trading partners of Indonesia, Malaysia and Singapore. International trade (export and import destination) of Malaysia, Singapore and Indonesia mainly go and come from these countries. Thus, it is interesting to know whether the monetary model fitted to exchange rate of Malaysia ringgit, Singapore dollar and Indonesia rupiah against US dollar (USD), British Pound (BP), Germany Mark (DM), and Japan Yen (JP).

3. The objectives of the research

This study is concerned with an empirical analysis and the validation of monetary model to determine exchange rate of 3 ASEAN countries against major developed country currencies, namely the USA, Japan, Germany and United Kingdom. The multivariate Johansen and Juselius (1990) cointegration test procedure is supplemented

by vector error correction model and single equation diagnostic test method to analyze dynamic aspect of the monetary model. Results of the analysis are important since the fundamental variables that determine exchange rate will be identified. The specific objectives of the study are :

3.1. To estimate the monetary model in order to asses how the model could potentially explain the process of exchange rate determination of Malaysia ringgit, Indonesia rupiah and Singapore dollar against the currencies of USA, Japan, Germany and United Kingdom.

3.2. To examine the performance of two monetary models that are restricted and unresticted models in determination of exchange rate of 3 ASEAN countries against their major trading partners.

3.3. To explore the policy implications of the empirical results

4. Scope and assumptions of study

This study will focus on the long-run relationship between fundamental variables (money supply, national income and interest rate) with exchange rate of ringgit, rupiah and Singapore dollar against USA dollar, British Pound, Germany Mark,

and Japan Yen. The data for money supply is M1, income data is measured by net export and the 3 months interest rate or discount rate is used as interest rate.

The linear regression model is employed to see exchange rate of Ringgit, Rupiah and SD against US Dollar, British Pound, Germany Mark, and Japan Yen. The model employed in the analysis is adopted from McDonald and Taylor (1991), and Diamandis and Kouretas (1996). The model was applied to the major currencies : Germany mark, US dollar, Japan yen, French franc and British pound. The model is called as restricted model (model 1), the equation as following :

$$S_t = \beta_0 + (\beta_1 m_t + \beta_2 m_t^*) + (\beta_3 y_t + \beta_4 y_t^*) + (\beta_5 i_t + \beta_6 i_t^*) + \mu_t \qquad (1)$$

In this study, we also examine at an alternative model in which the spot exchange rate is determined by linear regression of domestic variables deduced by foreign variables (variables of domestic money supply, income and interest rate were reduced by their corresponding foreign variables) . The unrestricted model (model 2) is formed by the following equation :

$$S_t = \beta_0 + (\beta_1 m_t - \beta_2 m_t^*) + (\beta_3 y_t - \beta_4 y_t^*) + (\beta_5 i_t - \beta_6 i_t^*) + \mu_t \qquad (2)$$

Note for equation 1 and 2 :

St = Spot exchange rate (units of home currency per-unit of foreign currency)

m_t = Domestic money supply; y_t = domestic income; i_t = Domestic interest rate

* = An asterisk denotes the corresponding foreign variables; μt = Disturbance term

The first version of model (restricted monetary model or model 1) was used to reexamine the monetary approach to exchange rate. Whereas, the alternative model (unrestricted monetary model or model 2) was implemented to see whether this model perform better than the first model in determination of exchange rate. In both models, we examined the long-run properties, since the test of short-run samples has been faulty. In the long-run, the variables will tied together and cannot move "too far" away from their common trend. Any short term deviation (shock) of the variables will be adjusted back toward the long-run equilibrium path.

The monetary model is based on the following assumptions : a)real income and money supply are determined exogenously; b)capital and goods are perfectly mobile; c)foreign and domestic assets are perfect substitutes; d)goods prices are perfectly flexible; and e)domestic money is demanded only by domestic residents and foreign money only by foreign residents.

Diamandis and Kouretas (1996) described that in the past, flexible-price monetary model relies on the twin assumptions of continuous purchasing power parity (PPP) and the existence of stable money demand functions for the domestic and foreign economies. However, the assumption of continuous PPP is considered a drawback to the theory since it implies that the real exchange rate could not vary. The recent experience with floating exchange rates has shown that the real exchange rates exhibit great fluctuations, and that these have caused shifts in international competitiveness. Dornbusch introduced a class of models (called sticky price) that allows the real exchange rate to deviate from PPP in the short run, but PPP holds in the long run.

There is an evidence that PPP does not hold in the long-run. The result of study done by Baharumshah and Ariff (1997) showed that PPP conditions observed in the five South-east Asian countries namely Malaysia, Singapore, Thailand, the Philippines and Indonesia were not consistent with the prediction of PPP hypothesis, at least in relation to the post-1973 period. This evidence seems to suggest that shocks which lead to discrepancy between domestic and foreign prices be not reflected in the nominal exchange rate movements. This also implies that the real exchange rates in these countries fluctuate widely with no tendency to return to a predetermined path.

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