UNIVERSITI PUTRA MALAYSIA

AN ECONOMETRIC APPRAISAL OF SINGLE CURRENCY MODEL ON ASIAN COUNTRIES

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By

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ABSTRACT

This project paper investigates empirically the relationship between the Maastricht Convergence Criteria involves inflation rate, deficit per GDP, and debt per GDP, with the GDP per capita growth rate in seven Asian countries – Indonesia, Malaysia, The Philippines, Singapore, Thailand, Japan, and Korea – over the period 1970 to 2004. Recent development methods of multivariate cointegration analysis followed by vector error-correction modeling were undertaken. The empirical results of the analysis suggest that there is a long run relationship between the Maastricht Convergence Criteria and GDP per capita growth rate for each country. In addition, the results from long-run equilibrium estimates show that the Maastricht Convergence Criteria, especially deficit per GDP and debt per GDP have significant negative impact on economic growth in most of the Asian economies. These results are quite consistent with the work by Afxentiou and Serletis (2000) in which indicated that the Maastricht Convergence Criteria should have an adverse effect in promoting economic growth. The most interesting finding from the results of Granger-causality test is the exogeneity of debt per GDP among the Maastricht Convergence Criteria. In most cases, debt per GDP is found to be exogenous. Therefore, these findings are consistent to the results of long-run equilibrium estimates in which support that deficit per GDP and debt per GDP, in particular, is the significant policy instruments to stimulate economic growth.

ABSTRAK

Kertas projek ini mengkaji secara empirikal hubungan di antara Kriteria Gabungan Maastricht meliputi kadar inflasi, defisit per KDNK, dan hutang per KDNK, dengan kadar pertumbuhan KDNK per kapita dalam tujuh negara-negara Asian – Indonesia, Malaysia, Filipina, Singapura, Thailand, Jepun, dan Korea – sepanjang tempoh 1970 hingga 2004. Kaedah baru yang dibangunkan meliputi analisa kointegrasi berbilang variasi diikuti model vaktor pembetulan ralat telah digunakan. Keputusan empirikal daripada analisa mendapati terdapat hubungan jangka panjang di antara Kriteria Gabungan Maastricht dengan kadar pertumbuhan KDNK per kapita untuk setiap negara. Sebagai tambahan, keputusan daripada penilaian keseimbangan jangka panjang menunjukkan Kriteria Gabungan Maastricht terutamanya defisit per KDNK dan hutang per KDNK mempunyai impak negatif yang signifikan ke atas pertumbuhan ekonomi dalam kebanyakan ekonomi Asian. Keputusan ini hampir tepat dengan kajian yang dilakukan oleh Afxentiou dan Serletis (2000) di mana telah menyatakan bahawa Kriteria Gabungan Maastricht perlu mempunyai kesan yang berlawanan dalam menggalakkan pertumbuhan ekonomi. Penemuan yang paling menarik daripada keputusan ujian penyebab Granger ialah "exogeneity" bagi hutang per KDNK dikalangan Kriteria Gabungan Maastricht. Dalam kebanyakan kes, hutang per KDNK telah ditemui sebagai "exogenous". Maka keputusan ini adalah selaras dengan keputusan penilaian keseimbangan jangka panjang yang mana menyokong bahawa, deficit per KDNK dan hutang per KDNK, secara khususnya merupakan alat dasar yang signifikan untuk merangsang pertumbuhan ekonomi.

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DECLARATION

I hereby declare that the project paper is based on my original work except for quotation and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at UPM or other institutions.

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LIST OF ABBREVIATIONS

ACU	Asian currency unit
AERM	Asian exchange rate mechanism
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
CFA	French African Community
EMI	European Monetary Institute
EMU	European Monetary Union
EMS	European Monetary System
ERM	exchange rate mechanism
JJ	Johansen-Juselius
OCA	optimum currency area
OECD	Organization for Economic Cooperation and Development
OLS	Ordinary Least Square
PP	Phillips-Perron
VAR	Vector Auto Regression
VECM	Vector Error-Correction Modeling
VSTFF	very short term financing facility

CHAPTER ONE

INTRODUCTION

1.1 Background Of Study

Interest in regional financial and monetary cooperation in East Asia has increased dramatically since the outbreak of the Asian financial crisis in July 1997 (Jin, 2002). Since the Asian crisis, a popular view among academic economists and policymakers is that developing countries with open capital accounts have a bipolar solution to the exchange rate dilemma they face: either a free float or a hard peg (Madhur, 2002). Within a hard peg, two alternatives can be considered: (i) a currency board arrangement or its equivalent, the domestic usage of the currency of another country; and (ii) an adoption of a new common currency by a group of countries, or the formation of a monetary union.

This study focused on the second alternative of the fixed exchange rate regime that is the adoption of a new common currency by a group of Asian countries. Given the adoption of a monetary and financial cooperation, it hopes that the region will be protected from a similar crisis that may recur in the future. Moreover, some benefits of a monetary union include a regionally low inflation rate, huge savings of maintaining separate currencies and multiple currency transactions, a protection from speculative attacks on national currency and from external economic shocks, and a stronger competitive ability in international market (Aimy, 2004).

However, question has been raised to whether Asian region should have a monetary union and ready to form such regional integration by interlocking the exchange rates in order to make themselves more resilient and more able to response quickly and effectively when financial crises threaten to strike again. This is because as to prepare for a monetary union, a selected group of neighboring countries should first exhibit some level of economic convergence prior to forming a more intensive economic cooperation. For instance, in European Union, candidate country's ability has been measured using a set of convergence criteria, known as the Maastricht Convergence Criteria prior to joining the European Union. If these countries fulfill all the criteria required by this Maastricht Treaty then it demonstrates that these countries are ready to join the union.

The Maastricht Convergence Criteria include three monetary criteria that are inflation rate, interest rate, and exchange rate, and two fiscal criteria that are deficit per GDP ratio and debt per GDP ratio. A brief description about each criterion is represented in the following table:

Table 1.1

Convergence Criteria

Source: Rajan (1998)

INFLATION RATE	Average inflation rate of a country (as measured by the consumer price index) must not exceed that of the average of the three lowest country inflation rates by more than 1.5 percent.
EXCHANGE RATE	No exchange rate realignment for the last two years.
INTEREST RATE	A country must have an average long-term nominal interest rate that does not exceed the average of the three countries with the lowest inflation rates.
BUDGET DEFICIT	A government budget deficit must not exceed 3 percent of each country's GDP.
GOVERNMENT DEBT	The outstanding government debt must not exceed 60 percent of GDP.

The first three convergence criteria are designed to ensure monetary stability by supporting a fixed exchange rate regime among member countries. Meanwhile, the stability of euro is reinforced by the last two criteria, which protect the European Union from treats of inflation, which may arise from government budget deficits.

Using these convergence criteria, Afxentiou and Serletis (2000) have developed the Ordinary Least Square (OLS) estimates to examine the significance of these criteria in promoting to overall economic growth in the European Union member states. In their study, however, they have included only three convergence criteria, namely, inflation rate, deficit per GDP ratio and debt per GDP ratio in examining their significance as contributing factors to economic growth. The exclusion of the interest rate criterion was

argued due to the Fisher effect, but the reason for excluding the exchange rate criterion was not explained. The model is presented as follow:

$$g_t = \beta_0 + \beta_1 INF_t + \beta_2 DEFG_t + \beta_3 DEBG_t + \varepsilon_t \quad (1.1)$$

where g_t is GDP per capita growth rate, INF is inflation rate, DEFG is deficit/ GDP ratio, and DEBG is debt/ GDP ratio.

For the purpose of this study, we also applied the similar model by Afxentiou and Serletis (2000) to determine the relationship between the selected Maastricht Convergence Criteria and overall economic growth of seven Asian countries, namely Indonesia, Malaysia, The Philippines, Singapore, Thailand, Japan, and Korea. However, instead of using the usual OLS estimates, the recently developed multivariate cointegration analysis followed by vector error-correction modeling are applied in hope to see the importance of these selected convergence criteria in promoting to overall economic growth in Asian countries. In that way, we can see whether Asian region is ready to form a monetary integration based on the standard of the Maastricht Convergence Criteria.

1.2 Perspectives Of A Common Currency

In order to ascertain whether monetary union is beneficial over an arrangement one must start with a review of optimum currency areas (Stanek, 2001). By definition, an

optimum currency area (OCA) is a region whose economies perform better with a single currency than with separate national currency (Hall and Lieberman, 2005). This is the theory of explaining the idea of forming a single currency area in which introduced by Robert Mundell in 1961.

According to the OCA literature, by having a common currency, the major benefit would be of facilitating trade and investment among the countries of the union since transaction cost in cross- border business has been reduced and exchange rate volatility has been removed (Madhur, 2002). This, in turn, would give incentives to trade, investment, and commerce among the union countries. Other advantage of having a monetary union with a common currency includes greater flexibility in wages and prices among the countries of the union. However, this is not to suggest that wages and prices will become perfectly flexible once exchange rate across countries are locked in, but that wage and price setters will adapt in order to avoid increases in unemployment to levels that would provoke resistance to continued participation in the currency union (Eichengreen, 1996).

Moreover, by having an OCA there will be greater mobility of factors of production across countries. For instance, if labor is highly mobile from one country to another, in that way, if one country is experiencing a negative shock and goes into a recession, at least its unemployed workers can find work in other countries whose economies are performing better. An OCA also provides benefits to union countries if there are more symmetric shocks across countries, so that they tend to go into booms and

recessions together. Finally, a common currency also promotes greater openness among the economies within the union, and also larger share of trade among the countries of the region.

1.3 The Suitability Of Asian Countries For A Common Currency

Madhur (2002), in his study of the costs and benefits of a common currency for ASEAN has made a general view about the suitability of ASEAN in forming a common currency. By applying the guidelines of the OCA literatures, several features of the ASEAN that suggest that the benefits of a common currency may be important relative to the costs have been recognized. The summary of these features is as follow.

Firstly, under a common currency, there is no scope of independent monetary policy by the member of the union countries. Therefore, in order to form a common currency, these countries should first give up their national autonomy of monetary policy. However, the cost associated with the loss of monetary independence by these countries may not be very large since many developing countries have several constraints in conducting independent monetary policy effectively prior to join the union.

Secondly, in terms of factor mobility (i.e. labor- as well as capital- mobility), ASEAN has shown high degree of factor mobility across countries of the region (Goto and Hamada, 1994; Eichengreen and Bayoumi, 1999; Moon et.al., 2000). For instance,

10 percent of the employment in Singapore included workers from Indonesia, Malaysia, The Philippines, and Thailand (Madhur, 2002).

Moreover, in terms of wage and price flexibility, ASEAN are traditionally known for their flexibility and speed of adjustment to shocks. This is proven by Bayoumi and Eichengreen (1994), who's indicated that almost changes in output and prices in East Asia in response to shocks occurs in about two years, and these are consistent with the common thought that ASEAN labor markets are more flexible than in Western Europe.

In terms of intraregional trade, near to 25 percent of the intraregional trade in ASEAN is found to be significant rising, even lower than in the EU (Bayoumi and Mauro, 1999). Finally, the symmetry in shocks among the countries in the region is found to be similar to the EU (Eichengreen and Bayoumi, 1999) thus reflects both the high degree of openness and the similarities in the production structures among these economies.

Overall, using the composite OCA indices for the region, Madhur (2002) based on Eichengreen and Bayoumi (1999) concluded that from a purely economic perspective, East Asia/ ASEAN is as suitable for an OCA as Europe was prior to the Maastricht Treaty. This subsequently gives preliminary signal for Asian to form a monetary union with a common currency as similar as to the European Union. But, is the Asian countries are able and qualify to form a monetary union based on the standard of Maastricht

Convergence Criteria? This is the major question in this study that needs to find for the solution.

1.4 Problem Statement

The Maastricht Treaty establishing the European Union (EU) requires EU members to satisfy a number of criteria before joining the economic and monetary union (EMU). Regarding the monetary and fiscal aspects of the Treaty, five convergence criteria were laid down that have to meet by a member country in order to qualify for participation in the EMU. These so-called Maastricht Convergence Criteria. These convergence criteria include an inflation rate no more than 1.5 percentage points above the average of the three countries with the lowest inflation rates, nominal long-term interest rates not exceeding by more than 2 percentage points those for the three countries with the lowest inflation rates, no exchange rate realignment for at least two years, a government budget deficit not in excess of 3 percent of each country's GDP, and gross debt to GDP ratio that does not exceed 60 percent.

However, if these criteria are directly applied to Asian economies, problem has been raised to whether selected Asian countries in this study will fulfill these convergence criteria to hold the quality requirement to go into a union. In another word, are those criteria suitable to determine membership qualification for Asian economies since the Maastricht Convergence Criteria are designed for EU member-states, and imply integration in the European internal market. Therefore, availability, quality and

comparability of data on the fulfillment of these criteria are not the same in the Asian economies as it is the case in European Union member-states.

By applying three selected criteria to Asian countries (i.e. inflation rate, deficit as a percentage of GDP, and debt as a percentage of GDP), we hope to find evidence to support that these convergence criteria are compatible and appropriate for the purpose of determining membership's qualification of monetary union for Asian economies and also gives preliminary signal for the formation of a monetary union in Asian. Unless otherwise, Asian economies need to develop its own criteria set as a benchmark in measuring their economic performance in order to support the implication of the readiness of Asian countries to form a monetary union.

1.5 Objectives Of Study

The European Monetary Union (EMU) has used the five Maastricht Convergence Criteria in order to measure a candidate country's competency prior to joining the union. These convergence criteria are the satisfaction of which produced a monetarily and fiscally stable environment and guaranteed membership in an economically integrated Europe. By applying three out of the five similar criteria, namely inflation rate, deficit per GDP, and debt per GDP, this study seeks to investigate whether these convergence criteria are also appropriate in measuring Asian countries' ability before they admitted to the union. Therefore, the main objective of this study is to examine the significance relation of the Maastricht Convergence Criteria on economic growth in the selected Asian

countries, namely Indonesia, Malaysia, The Philippines, Singapore, Thailand, Japan, and Korea. The specific objectives of this study are:

i. To examine the long run relationship between the Maastricht Convergence Criteria and economic growth in Asian economies.

ii. To determine the form of causality between the proposed criteria and the economic growth for Asian countries.

1.6 Significance of Study

In general, the findings of this study would contribute to the existing findings and economics literatures related to the issues of monetary cooperation especially for the case of Asian economies.

In particular, evidence from this empirical study would indicate whether direct application of Maastricht Convergence Criteria on Asian economies is appropriate in order to measure a candidate country's competency prior to joining the union. Only in that case, the policy maker should identify the suitable criteria for measuring economic performance of Asian countries in order to form such economic integration. Beside, this study also hopes to find some evidence supporting the readiness of our economies to form a monetary union. These findings will be of benefit especially to the policy makers in planning to form a monetary cooperation among Asian countries.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents review of literature from selected previous studies that concern about the issue of monetary union. These literatures are divided into three parts. The first part presents various proposals for monetary and exchange rate cooperation in Asian. The second part presents a review of selected previous studies, which supports or against the formation of a monetary union in Asian and other parts of the world.

2.2 Proposals For Monetary And Exchange Rate Cooperation In Asian

There are three developed proposals in regards to the monetary and exchange rate cooperation in Asian. These are the Williamson's Common Basket Peg, Asian Exchange Rate Mechanism, and the Yen Bloc Proposal. Each of these proposals will be discuss briefly in the following section.

2.2.1 Williamson's Common Basket Peg

This developed proposal of Willamson (1999, 2000) has seven main characteristics. Based on Fabella (2002), the first characteristic includes a common basket of currencies. These currencies consist of US dollar, Japanese yen, and EEC's Euro. Second characteristic is that it targets a common set of weights attached to these currencies based on regional trade shares. Thirdly, each member announces a central parity of the basket and pledges to keep the central parity within a unilaterally chosen band. Fourthly, it allows a range of formal exchange rate systems such as the fixed parity in Malaysia, the crawl in Indonesia, or various types of managed floating in Korea, Singapore, and The Philippines. Fifthly, there is an adoption of McKinnon's (1989) 'restoration rule', which allowed to temporarily suspending the peg when national authorities confronted with massive speculative attack. Sixthly, it allows member countries to crawl central parity and the band as a response to the changes in economic fundamentals and basket currency misalignments, and finally, it predicts a financing analog to the European VSTFF to help member currencies under attack from speculators.

From these seven characteristics, only four are similar to the EMS. The common characteristics include a common target basket, a band around the central parity, a loan facility to allow quick foreign exchange liquidity to currencies in distress, and allowance of adjustment in response to fundamental disequilibria. Besides, the differences considerable include five features. The first difference is the band and the central parities that are collectively agreed upon in the EMS, is not so in the Williamson's Common

Basket Peg. Next, the EMS allowed only a target zone exchange rate regime with a float within the zone, while the Williamson's Common Basket Peg allows all exchange rate regimes except a float. Furthermore, the composition of the common basket between the EMS and the Williamson's Common Basket Peg is somewhat different, in which in the EMS, the common basket consists of member country currencies, while in the Williamson's Common Basket Peg, the basket consists of the major currencies in the world. Finally, the Williamson's Common Basket Peg uses a common regional trade share-based set of weights.

Form these comparisons; it is clearly shows that the degree of cooperation in the EMS is considerably larger than it would be under Williamson's Common Basket Peg. However, it believes that the Williamson's Common Basket Peg may lead to greater convergence among Asian countries.

2.2.2 Asian Exchange Rate Mechanism (AERM)

This proposal of Oh and Harvie (2001) seeks to replicate EMS's Exchange Rate Mechanism (ERM) in the Asian region. According to Fabella (2002), there are six features for this proposal. The features include an Asian Currency Unit (ACU) to dovetail the European Currency Unit of the EMS, assigning the trade share of the country in total trade of the region as weights for each country, the member country exchange rates are to float within a band of 15 percent plus or minus the central parity in which the central parities are not unilaterally determined, a lender of last resort in the form of a quick

disbursing loan facility similar to the EMS' VSTFF to weather speculative attacks, the central parity is to be approved by an authority such as the Asian Monetary Institute in order to manage the AERM and implement agreed coordination and surveillance policies, and, finally, require the target zone exchange rate regime for each country.

What is the most important in this proposal is that since it requires either a target zone or a fixed exchange rate system, therefore, the current exchange rate arrangements may need to be given up. For example, Hong Kong and China's currency board would be given up if a target zone is adopted, or Korea and The Philippines's managed float would be given up if a fixed exchange rate were adopted.

2.2.3 The Yen Block Proposal

This proposal of Ohno and Shirono (1997) and Dornbusch and Park (1999) would have been the most natural for East Asia before the collapse of the Japanese bubble economy in the late 1980s. According to Fabella (2002), the elements for this proposal include a peg or a target zone regime with the yen as the anchor currency. This is similar to the EMS in the late 1980s when the deutschmark became the effective anchor of the ERM. Furthermore, other features of EMS, such as the EMI-type coordination and surveillance body and the establishment of the initial central parity cooperatively agreed on, would also be present.