

**ASEAN Monetary Union:
Is ASEAN an Optimum Currency Area?**

by

LEW YUEN SIN

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List of Abbreviations

ADB	Asian Development Bank
ADF	Augmented Dickey Fuller test
ADPS	ASEAN Dialogue Partner System
AEC	ASEAN Economic Community
AECC	ASEAN Economic and Currency Community
AFAS	ASEAN Framework Agreement on Services
AFTA	ASEAN Free Trade Area
AIA	ASEAN Investment Area
AIC	Akaike Information Criterion
AIC	ASEAN Industrial Complementation
AIP	ASEAN Industrial Project
AIJV	ASEAN Industrial Joint Ventures
APEC	Asia Pacific Economic Cooperation forum
ASA	ASEAN Swap Arrangement
ASC	ASEAN Security Community
ASCC	ASEAN Socio Cultural Community
ASEAN	Association of South East Asian Nation with its 10 countries of Indonesia, Malaysia, the Philippines, Singapore, Thailand, Brunei Darussalam, Cambodia, Lao PDR , Myanmar, Vietnam
ASEAN+3	10 ASEAN countries plus China, Japan and South Korea
ASEAN 3	Malaysia, Singapore, Thailand
ASEAN 5	Indonesia, Malaysia, the Philippines, Singapore, Thailand
ASEAN 6	Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore, Thailand
ASEAN 8	ASEAN 5 plus Lao PDR, Myanmar and Vietnam
ASEAN 9	ASEAN 10 minus Singapore
ASEAN 10	Brunei Darussalam, Indonesia, Malaysia, the Philippines, Singapore, Thailand, Cambodia, Lao PDR, Myanmar, Vietnam
BSA	Bilateral Swap Agreements
CEPT	Common Effective Preferential Tariff
CLMV	Cambodia, Lao PDR, Myanmar, Vietnam
CMI	Chiang Mai Initiative
CPI	Consumer Price Index
DBS Bank	The Development Bank of Singapore Limited
EPA	Economic Partnership Agreement
ECB	European Central Bank
ECOWAS	Economic Community of West African States
EMU	Economic and Monetary Union
Euro area	Countries in which Euro has been adopted as the single currency in accordance with the Treaty and in which a single monetary policy is conducted under the responsibility of the ECB
Euro area 12	Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain

ESCB	European System of Central Banks
EU	European Union
FTA	Free Trade Agreement
GDP	Gross Domestic Product
GE	General Exceptions List
GNI	Gross National Income
HLTF	High Level Task Force
HP filters	Hodrick and Prescott filters
IFS	International Financial Statistics
IL	Inclusion List
IMF	International Monetary Fund
MERCOSUR	Southern Common Market
MU	Monetary Union
MYR	Malaysian ringgit
NAFTA	North America Free Trade Agreement
OCA	Optimum Currency Area
OECD	Organization for Economic Cooperation and Development
PTA	Preferential Trading Arrangement
RTA	Regional Trade Arrangement
SAARC	South Asian Association for Regional Cooperation
SGD	Singapore dollar
SIC	Schwarz Information Criterion
SL	Sensitive List
TEL	Temporary Exclusion List
THB	Thailand baht
UNCTAD	United Nations Conference on Trade and Development
UK	United Kingdom
US	United States of America
USD	United States dollar
WAEMU	West African Economic and Monetary Union
WEO	World Economic Outlook
WTO	World Trade Organization
ZOPFAN	Zone of Peace, Freedom and Neutrality

**Kesatuan Kewangan ASEAN:
Adakah ASEAN Memenuhi Kriteria
Rantau Mata Wang Optimum (OCA)?**

Abstrak

Hujah ekonomi yang menyokong pembentukan kesatuan kewangan menekankan bahawa kesatuan kewangan mampu memberikan kestabilan kadar pertukaran, kadar bunga dan inflasi yang rendah serta merangsang perdagangan sesama negara anggota. Jika pelancaran mata wang Euro boleh dianggap sebagai satu kejayaan, maka ia boleh dijadikan model bagi negara-negara anggota ASEAN dalam mengelak berulangnya krisis kewangan 1997/1998. Teori Rantau Mata Wang Optimum (Optimum Currency Area – OCA) boleh dijadikan rujukan asas dalam mempertimbangkan pembentukan kesatuan kewangan. Teori ini menggariskan beberapa kriteria penting yang perlu dipenuhi sebelum pembentukan kesatuan kewangan. Tesis ini mengkaji kesesuaian teori OCA ini sebagai asas pembentukan kesatuan kewangan di kalangan negara-negara ASEAN. Bersandarkan kepada teori OCA tersebut, tesis ini bertujuan untuk mengkaji a) pelarasan kitaran perniagaan, b) integrasi kewangan, dan c) penumpuan KDNK per kapita di kalangan 10 buah negara ASEAN. Bagi mengkaji pelarasan kitaran perniagaan, kajian ini menggunakan penyulingan Hodrick-Prescott dan kaedah ARDL (Autoregressive Distributed Lag) bagi mendapatkan pelarasan. Hasil kajian mendapati kesemua negara-negara ASEAN mempunyai pelarasan kitaran perniagaan kecuali Myanmar. Analisis integrasi kewangan juga mengkaji sama ada wujud integrasi kewangan di kalangan sepuluh buah negara ASEAN tersebut. Hasil kajian mendapati bahawa terdapat integrasi inflasi di kalangan sepuluh buah negara-

negara ASEAN yang dikaji. Daripada sudut integrasi kadar pertukaran, hanya Kemboja dan Vietnam sahaja yang menunjukkan kecenderungan integrasi dengan negara-negara lain. Kajian menunjukkan tidak wujud hubungan jangka panjang bagi angkubah bekalan mata wang (M1 dan M2) di kalangan negara-negara ASEAN. Untuk menganalisa penumpuan KDNK per kapita, kajian ini dipecahkan kepada dua – pertama dengan menggunakan KDNK per kapita Singapura sebagai asas ukuran dan kedua dengan menggunakan purata KDNK per kapita negara-negara ASEAN. Analisis ini menggunakan pendekatan Bernard dan Durlauf (1995). Hasil kajian menunjukkan tidak wujud penumpuan KDNK per kapita negara-negara ASEAN. Sebagai kesimpulan, dapatan daripada kajian ini menunjukkan terdapat faktor-faktor yang menyokong kesatuan kewangan serta juga faktor-faktor yang tidak menyokong pembentukan kesatuan kewangan dikalangan negara-negara ASEAN. Walaupun wujud pelarasan kitaran perniagaan dan integrasi inflasi dikalangan negara-negara ASEAN yang boleh dijadikan asas pembentukan kesatuan kewangan bersandarkan teori OCA, namun pemesongan KDNK per kapita dan ketiadaan integrasi pertukaran mata wang dan bekalan wang tidak menyokong pembentukan kesatuan kewangan. Berdasarkan penemuan tersebut, kesediaan ASEAN untuk membentuk kesatuan kewangan tidak dapat dibuktikan buat masa ini.

ASEAN Monetary Union: Is ASEAN An Optimum Currency Area?

Abstract

Economic arguments in support of monetary union argues that a monetary union is capable of providing stable exchange rate, low interest and inflation rate as well promoting trade within the monetary union zone. If the launch of Euro currency can be regarded as a success, then it can be used as a model for ASEAN countries to prevent the repeat of the 1997/1998 financial crisis. The Theory of Optimum Currency Area (OCA) is the main reference point in considering the establishment of a monetary union. The theory has listed out several important criteria that need to be fulfilled before the establishment of monetary union. This thesis examines the suitability of the OCA theory as a basis for the adoption of monetary union among ASEAN member countries. Based on the OCA theory, the thesis is aimed to analyze a) synchronization of business cycle, b) financial integration, and c) GDP per capita convergence among 10 ASEAN member states. For the first analysis, the approach uses Hodrick-Prescott filter to obtain the business cycle and ARDL method to trace out synchronization. The results show that synchronization of business cycles exist among all ASEAN countries except Myanmar. The financial integration analysis examines whether financial integration exist among ASEAN. In terms of inflation, result has shown that ASEAN as a whole is highly integrated. In terms of exchange rate, only Cambodia and Vietnam show the tendency of integration with other ASEAN countries. Finally, there is the non presence of a stable long run relationship in money supply (M1 and M2) for ASEAN. To analyze

the convergence of GDP per capita on ASEAN, the analysis is split into two parts. The first part uses Singapore GDP per capita and the second part uses average ASEAN GDP per capita for calculation. This follows Bernard and Durlauf (1995) approach. The analysis has shown that all ASEAN countries are diverging from each other in terms of GDP per capita. As a conclusion, the study shows a mix of encouraging facts as well as non significant results. Although business cycle synchronization and inflation rate integration are present and this promotes the fact that ASEAN is an OCA, the divergences of GDP per capita of most ASEAN countries, the non integration of exchange rates as well as money supply are discouraging the creation of monetary integration. Therefore, it cannot be concluded whether ASEAN as a whole is ready for the formation of a monetary union.

CHAPTER 1

INTRODUCTION

1.1 Introduction

One main lesson from the 1997/98 Asian financial crisis is the vulnerability of the financial sector as a result of over dependence on the US dollar as a reserve currency. This expensive lesson has indeed made many of the Asian nations including the ASEAN countries to realize the importance of a more stable currency exchange system. Resulting from this, numerous attempts have been made to study the possible replication of a successful implementation of currency exchange systems such as the euro currency¹ on the ASEAN nations (for example: Ng, 2002 and Madhur, 2002). Some of the options considered in those studies are currency peg (either to a single currency or basket of currencies), flexible exchange rate regime and monetary union. Countries such as South Korea, Thailand, and Indonesia have moved to the flexible exchange rate regime after the Asian financial crisis. Within ASEAN countries, some initiatives have been introduced such as the Chiang Mai initiative which was initiated in 2000, as well as the ASEAN Economic Community (AEC) in 2003. However, both the

¹ Euro currency was introduced since 1999 among the Euro area 12. Those countries that first adopted Euro are Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, and Spain, collectively known as the Euro area 12.

efforts seemed to point to the formation of a common currency area emulating the European monetary integration. This leads to the question of whether ASEAN could be an Optimum Currency Areas (OCA), fulfilling the criteria set forth by Mundell (1961), McKinnon (1963) and Kenen (1969).

There are several prominent economists whom are proponent of OCA. Robert Mundell, recipient of the Nobel Memorial Prize in Economics in 1999, is greatly involved in establishing the groundwork for the introduction of the euro through his pioneering work in monetary economics and optimum currency areas. Ronald McKinnon is another economist with interest in regional exchange rate arrangements among countries that are highly integrated, or highly competitive, in commodity trade. Peter Kenen also is a figure best known for his work on the theory of optimum currency areas. He argued that groups of countries with diversified domestic production are more likely to constitute optimum currency areas than groups whose members are highly specialized.

Besides the traditional OCA theories, there are also new theories such as Krugman's Specialization hypothesis and "Endogeneity of OCA" hypothesis. The main difference between traditional and modern view of OCA is that traditional economists emphasized more on potential costs, while the modern view concentrates more on the benefits of common currency areas (Broz, 2005). There are many issues that the new theory of optimum currency area is emphasizing on. These include the effectiveness of monetary policy, credibility of monetary policy, Endogeneity vs. Specialization

hypothesis of optimum currency areas, correlation and variation of shocks, character of shocks, effectiveness of exchange rate adjustments, labor market institutions, synchronization of business cycles and political factors. Table 1.1 indicates the most important attributes regarding optimum currency areas.

Table 1.1: The most important attributes regarding optimum currency areas

The most important attributes regarding optimum currency areas	
Variables	Effect
Labor mobility	The greater the labor mobility (when wages and prices are not flexible) the easier it is to join/form a common currency area.
Wage and price flexibility	If there is wage and price flexibility in a common currency area, it will be easier to overcome asymmetric shocks and the common currency area will be more stable.
Openness	The more open the economy is, the stronger is the case for joining/forming a common currency area.
Diversification of production/exports	The more diversified the economy is, the more attractive is a common currency area.
Size of economy	The larger the economy is, the more attractive is the flexible exchange rate.
Inflation differential	If there is inflation differential between countries, it will be harder to maintain the fixed exchange rate.
Capital mobility	The higher the capital mobility, the harder it is to maintain a fixed exchange rate (except, of course, if the country joins a common currency area).
International risk sharing	If a country is able to share risk with its partners in a common currency area, this regime could ameliorate other rigidities in the area.
Usefulness of money	Joining the common currency area enhances the usefulness of money, but the effect is that much greater the smaller and more open the economy is.
Effectiveness of monetary policy	If a monetary policy is not effective, the loss of monetary independence is not a high cost.
Credibility of monetary authorities	If monetary authorities do not have credibility to curb inflation, having a fixed exchange rate as a nominal anchor will be beneficial.
Endogeneity	A country is more likely to satisfy the criteria for entering a common currency area ex post than ex ante due to increased business cycle correlation.
Specialization	A country is more likely to satisfy the criteria for entering a common currency area ex ante than ex post due to increased specialization of the countries forming the area.

Table 1.1: Continued

Similarity of shocks	Costs of loosing independent monetary policy are lower the higher the association of shocks between the client (potential member of a common currency area) and the anchor is.
Monetary shocks	If a country is facing monetary shocks, having a fixed exchange rate will be attractive.
Real shocks	If what a country is facing are real shocks (domestic or foreign), a flexible exchange rate will be more feasible.
External nominal shocks	If what a country is facing are external nominal shocks, a flexible exchange rate will be even more attractive.
Effectiveness of exchange rate adjustments	If exchange rate adjustments are not effective, the cost of loosing the exchange rate as adjustment mechanism is not significant.
Labor market institutions	If countries have different labor market institutions, it will be hard to adjust to the same kind of shock in the same way in a common currency area.
Business cycle synchronization	If countries forming a common currency area have synchronized business cycles, they will not need flexible exchange rates as an adjustment mechanism
Dominant trading partner	If a country has a dominant trading partner, it is beneficial to form a common currency area.

Source: Broz, T.(2005), “ The Theory of Optimum Currency Areas: A Literature Review”. *Ekonomiska politika* 104, Table 1, p.72

The creation of the Economic and Monetary Union (EMU) among the European Union countries since the last decade has led to a new framework of monetary and fiscal policy within EU. It has also stimulated a renewed interest in the design, implementation and transmission of monetary and fiscal policy in Europe. The successful design and implementation of the common monetary policy, which was maneuvered by the European Central Bank (ECB), required detail knowledge of the transmission mechanisms of monetary policy. With the EMU in place, it gives insight into the effects of the common monetary policy on the Euro area economy, since individual member states of the Euro area have their own fiscal authorities while the monetary policy is pursued by a single monetary authority, namely the ECB.

While EU member countries have expanded rapidly, adoption of Euro currency itself have increased from the initial twelve countries². Such experience has actually motivated studies on the possible inclusion of the relatively new members of ASEAN such as Cambodia, Lao PDR, Myanmar and Vietnam (CLMV) countries into a supposed ASEAN monetary union. There has been a rapid social and economic progress in these CLMV countries for the past few years. Vietnam, for example, has emerged as an attractive place for foreign investment. This is in part due to abundance of labor force in Cambodia, Lao PDR and Myanmar. From the economics perspective, if a monetary union is introduced, it can bring benefit by replacing the individual ASEAN countries currency, which is normally alien to the outside world. For example, the Cambodia's riel, Lao PDR's kip and Myanmar's kyat are not popularly accepted. This could hinder foreign direct investment as the stability of those currencies may be in doubt. On the other hand, investors are more familiar with the Singapore dollar (SGD), the Malaysian ringgit (MYR) and the Thailand baht (THB) as FDI in these countries are abundant and these currencies are commonly traded in most of the FOREX market. Thus, if a new ASEAN currency regime dominated by SGD, MYR and THB is being formed and accepted by all the members, the uncertainties atmosphere among foreign investors on the stability of the currencies from the CLMV countries is eliminated. Besides, if there is a common ASEAN currency in circulation, regional trade obstacle within the ASEAN nations would be removed and this will benefit the CLMV countries' economy as well as other ASEAN countries'.

² UK did not join the EMU due to two reasons. The first reason relates to maintaining Central Bank independence, and second one is relating to exchange rate performance. The UK's inability to stay within the ERM in the 1992 crisis reveals the fact that business cycle is out of phase with other European partners.

The organization of this chapter is as follows. After the introduction in Section 1.1, problem statements of this thesis are explained in Section 1.2. Objectives of the study are defined in Section 1.3. Section 1.4 explains the significance of the study, and finally, Section 1.5 lists out the organization of the study.

1.2 Problem Statements

The suitability of countries to form an optimum currency area revolves among few well known criteria which include price and wage flexibility, labor mobility, trade and financial integration, similarity in inflation and shock, and economic openness and diversification. This is especially true with regards to ASEAN 5 (ASEAN 6 less Brunei Darussalam). A few studies have been conducted on the fulfillment of OCA criteria among ASEAN 5 are Cho and Kwek (2004) and Yuen (2001). In particular, synchronization of shock literature is prevalent. However, the inclusion of Brunei Darussalam and CLMV countries into OCA consideration is not common, due to the notion that these countries are underdeveloped. Nevertheless, Saxena (2003), Obiyatulla (2005) and Kawai and Motonishi (2005) have partially or fully included Brunei Darussalam and the CLMV countries into their modeling and analysis. The above mentioned studies have not reached a concrete verdict on the synchronization of shocks on the suitability of ASEAN, in particular Brunei Darussalam and CLMV countries in fulfilling part of the OCA criteria

On the other hand, researches on ASEAN OCA are always tied with other East Asian countries. ASEAN 5 is always being evaluated with China, Japan and South Korea (e.g. Zhang *et al.* (2004)) for the feasibility to form a monetary union. Further to that, currency basket peg is another favorite topic as alternative to monetary union (e.g. Williamson, 1999). Also, the use of yen or yuan as the anchor currency for East Asian countries emerged to be another branch of study for economic integration (e.g. Kwan, 2000).

Therefore, concentration of ASEAN OCA researches is mainly focused on the monetary perspective. The in-depth understanding of basic integration or convergence of economic elements are lacking at the moment. As ASEAN countries generally can be separated into tier 1 (ASEAN 6, developed or developing countries) and tier 2 (CLMV, under developed countries), the research on income disparity, output co-movement, and price correlation shall be a good indicator for the possibility to create a monetary union. There is a need to carry out research from this aspect on all ASEAN countries, revealing new evidence or prospects to judge whether ASEAN as a whole has been improving on integration.

1.3 Objectives of the Study

The general objective of the study is to examine the suitability of the ASEAN countries to form a monetary union and adopt a common currency. The study therefore will concentrate on one of the OCA criteria, in particular on the “Endogeneity of OCA”. The assessment of endogeneity can be achieved by measuring the business cycle

synchronization. Also, since CLMV countries have evolved and transformed themselves to be more trade and business prone, the analysis of whether convergence of GDP per capita with the more advanced ASEAN 6 shall provide informative indicators on economic integration. From the financial integration perspective, investigating the convergence of inflation rate, exchange rate and money supply in the ASEAN economies shall greatly enhance the overall picture of the suitability of forming an ASEAN monetary union.

Hence, the specific objectives of the thesis are as follows:

1. To determine whether the business cycle in the ASEAN economies are synchronized.
2. To examine whether there is convergence in real GDP in the ASEAN economies.
3. To investigate whether there is financial integration within the ASEAN economies by looking at the integration of inflation rate, exchange rate and money supply.

It should be noted that throughout this thesis, ASEAN refers to the ten member countries of the ASEAN nations. There also exist other definition of ASEAN such as ASEAN 5 and ASEAN 6 of which definition is provided accordingly.

1.4 Significance of the Study

This study adds to the existing literature that analyzed the suitability of ASEAN economies to form a monetary union. The existing literatures only concentrate on ASEAN 5 to determine whether ASEAN 5 have synchronized business cycles, but not for ASEAN as a whole. Also, the majority of the research method is using cross country macroeconomic variable, which is per capita gross domestic product (GDP/capita). As pointed out by Frankel and Rose (1997), countries can benefit from a currency union if they have more synchronized business cycle, present study will enhance the understanding of possible establishment of monetary union for ASEAN countries. It should be recognized that the business cycle synchronization criterion is not to fulfill any certain standard in order to satisfy the OCA criteria. The judgment can be based on empirical results.

Also, another significance of the study is to bring out the evidences of income convergence of ASEAN as a whole. Brunei Darussalam and in particular the CLMV countries, of which have gone through the aftermath of Asian financial crisis 1997/98, have improved the respective real income or real GDP for the past years. Therefore, it is important to see how far these countries have progressed in comparison to their more advanced neighbors. This study provides fresh evidence in terms of ASEAN income integration.

On the other hand, research on financial integration shall reveal other important elements on the suitability of ASEAN to form a single currency. Financial integration

allows the productive investment opportunities to become available to investors, and hence encourages financial development. Financial integration also increases competitive pressure on exchanges and intermediaries, and thereby reduces the transaction costs. Thus, financial integration is expected to stimulate financial efficiency and economic growth. On the other hand, financial integration is likely to reduce the negative effects of idiosyncratic shocks in a currency union through cross border portfolio diversification and capital mobility. Thus, financial integration can allow countries with asymmetric economic structures to form a currency union. In view of these benefits, the question of whether ASEAN has achieved financial integration will be a significant contribution of this study.

1.5 Organization of the Thesis

This thesis is organized as follows: Chapter 2 provides an overview of the OCA theory and the advantages and disadvantages of monetary union. Empirical evidences of business cycle synchronization, income convergence as well as financial integration are elaborated.

Chapter 3 elaborates on the ASEAN monetary initiative, which includes the background of ASEAN, inter and intra-trade and financial integrations, labor mobility and inflation indicators. Developments on ASEAN Economic community (AEC) shall also be explained.

Chapter 4 discusses the methodologies concerning the three specific objectives of examining whether ASEAN is an OCA. The chapter discusses the theoretical method for the various analyses. In this chapter, the model and the system of estimations are specified and the details of various measurements are discussed. Sources of data are shown in the last section of the chapter.

Chapter 5 provides the empirical results and discussions of the findings in detail. The last chapter, Chapter 6, provides a summary of the results, limitations of the study as well as suggestions for future researches, policy implication and finally general conclusion.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter begins with the discussion of the Optimum Currency Area (OCA) theories. It examines different views which were portrayed in the traditional as well as the modern theories of OCA. The traditional views are given in Section 2.2 followed by some reviews on the literature regarding OCA criteria in Section 2.3. Section 2.4 examines the new theories of OCA which include the Krugman's Specialization hypothesis, the "Endogeneity of OCA" hypothesis and some recent literature of the new OCA theory. In Section 2.5, the advantages and disadvantages of monetary union are discussed. Section 2.6 discusses the empirical evidence of business cycle synchronization. Section 2.7 and 2.8 provides empirical evidence of income convergence and financial integration. Section 2.9 concludes.

2.2 Optimum Currency Area (OCA) in Theory – The Traditional Approaches

2.2.1 Mundellian Approach to OCA Theory

Mundell's theory was formulated based on believes of the Keynesian economy in the ability of monetary and fiscal policy to manage aggregate demand and offset supply shocks (Kenny, 2003). The goal of Mundell's original paper is to provide a foundation in choosing to adopt a system of flexible exchange rates or to operate under a system of fully fixed exchange rates. Mundell tried to determine whether there are certain ideal criteria on which exchange rates should be fixed in order to obtain the collaborative benefit. Countries that fulfilled these set of criteria can be included in the Optimum Currency Area. These criteria include capital mobility, labor mobility and wage flexibility.

a. Capital Mobility

Capital mobility signifies the free movement of capital. Perfect capital mobility means all securities in the system are perfectly substitutable across the borders. In Mundell's (1968) paper, he explains the extreme degree of mobility which happens when a country cannot maintain the interest rate difference between domestic and foreign interest rate. These differences are due to different currencies being involved, and the currencies' exchange rates are expected to persist indefinitely where spot and forward exchange rates are identical.

To further elaborate, Mundell presented his idea in three different situations. This comprises policies under flexible exchange rates, policies under fixed exchange rates, and a combination of the two. He emphasized that under the flexible exchange rate system, an open market purchase of domestic securities shall result in an increase in bank reserves, which means multiple expansions of money and credit, which exert a downward pressure on the interest rate. In this situation, foreign exchange policy, like monetary policy, becomes a forceful stabilization tool under flexible exchange rates.

Mundell in his paper also demonstrated that perfect capital mobility implies different concepts of stabilization policy. Monetary policy has no impact on employment under fixed exchange rates, whereas fiscal policy has no effect on employment under flexible exchange rates. On the other hand, fiscal policy can have an effect on employment under fixed exchange rates, whereas monetary policy has a strong effect on employment under flexible exchange rates.

In the case of high capital mobility, foreign and domestic interest rates can coincide. Under a fixed exchange rate, the central bank must intervene on the currency market in order to satisfy the public's demand for foreign currency at a different exchange rate. As a result, the central bank loses control of the money supply, which then impacts the demand for money. However, if government expenditure increases, this can raise national income and the level of domestic activity, therefore escaping the problems of rising interest rates or a stronger exchange rate.

Under a floating exchange rate, the fluctuation is determined by the market which then makes fiscal policy ineffective. If monetary policy is unchanged, increased government expenditures give rise to a greater demand for money and tendencies towards higher interest rates. Capital inflows will strengthen the exchange rate to the point where lower net exports eliminate the entire expansive effect of higher government expenditures. However, under floating exchange rates, monetary policy is powerful tool to influence economic activities. Expansion of the money supply tends to promote lower interest rates, resulting in capital outflows and a weaker exchange rate, which in turn expand the economy through increased net exports.

b. Labor Mobility

Labor mobility means the freedom of labor movement. Mundell (1961) emphasizes the importance of high labor mobility as part of OCA criteria. He characterizes an optimum currency area as a set of regions among which the propensity to migrate is high enough to ensure full employment when one of the regions faces an asymmetric shock. When a region faces an asymmetric shock, the changes in demand resulting from it requires the reduction in real wage. The reduction in real wage will increase unemployment. If labor mobility is high, the unemployment can move to the region with no asymmetric shock.

Mundell (1963) recognizes that optimum currency areas are identical with economic regions when defined by inter regional labor mobility. To support this argument, he brings up the example of adjustment to asymmetric shock in the case of

two large economies – the US and Canada. The US and Canada are countries with two regions, East and West. In the East area, both countries produce timber, while on the West area both countries make cars. During the time of an asymmetric shock, unemployment in the East tends to increase, which central banks in both countries try to relieve. This in turn increases the inflationary pressures in the West area. If inflation is prevented in both regions, unemployment cannot be avoided. From this example, it is not clear which country should devalue. Therefore flexible exchange rates do not necessarily bring back equilibrium. He concluded that exchange rate changes between the US and Canadian dollar did not provide either country with a satisfactory means of adjustment, since the main asymmetry was not between the countries themselves, but between the eastern and western parts of both countries. Mechanisms are therefore required to adjust relative prices between east and west rather than between north and south. Mundell's analysis suggested that if the impact of shocks on particular areas is similar or symmetric, fixed exchange rates or a monetary union will be appropriate. However, if the impact of shocks is asymmetric, high labor mobility will be the main prerequisite.

Kucerova (2003) reinforces Mundell's idea and illustrates that high factor market integration and factor mobility within a group of partner countries can reduce the need to alter real factor prices and the nominal exchange rate in response to disturbances. In the case where one country suffers from depression due to a negative shock, factors of production may move from this country to another which is enjoying a positive shock. Therefore, prices of these factors do not need to fall so sharply in the depressed country

and rise in the booming country. This labor mobility is then able to compensate for the exchange rate changes.

c. Wage Flexibility

In order to understand this, consider two countries A and B. Country A has a serious unemployment problem while country B has a huge demand for workers. If wages in both nations are flexible, unemployed workers in country A will reduce their wage claims. In country B excess demand for labor will push up the wage rate. The reduction of wage rate in country A shifts the aggregate supply curve downwards, whereas the wage increased in country B shift the aggregate supply curve upwards. These shifts tend to bring back equilibrium for both countries. In country A, the price of output declines, making country A's product more competitive, hence increasing demand. The opposite occurs in country B. Also, the wage and price increase in country B make country A's product more competitive. This shall create an upward shift in country A's aggregate demand curve. At the same time, the decline in country A's cost and price makes country B's products less competitive and shifts the aggregate demand curve downwards. All these shall only happen if wage is flexible, and mobility of labor between the two countries is perfect.

Suppose mobility is not perfect, country A will be faced with the disequilibrium problem. For country B, the excess demand for labor will put pressure on the wage rate, and shift the supply curve upwards. In this case, the adjustment has to come from price

increase in country B. When this happens, country A's goods will be more competitive, hence shifting the demand curve in country A upwards. To counter for inflation problem in country B, one possibility will be exchange rate adjustment. On the other hand, government in country A can also increase tax to reduce aggregate demand.

2.2.2 McKinnon's Approach to OCA Theory

Openness is defined as the share of tradable (as the sum of import and export) of the total product of an economy. McKinnon (1963) emphasizes on the degree of openness in an economy as a main criterion of OCA. A high degree of openness reduces the effectiveness of an autonomous monetary policy, and limits the usefulness of exchange rate as means of restoring competitiveness, because devaluation will happen quickly in domestic prices. The main idea of floating exchange rates is creating an autonomous conduct for independent monetary policy. If a country is too open and the role of non traded goods is minimal, then the usefulness of implementing autonomous monetary policy will be small because the wage level will immediately adjust to the international level. McKinnon also illustrated that openness to external trade should be another important criterion. If an economy is very open, a flexible exchange rate would be relatively ineffective, since changes in the exchange rate would destabilize the internal price level and have few beneficial effects on real wages or the terms of trade.

McKinnon also argued that a small open economy by itself will not be an optimum currency area. This is because devaluation or depreciation of the country's

currency will have large effects on the domestic price level. This shall have two consequences. First, it will reduce the real wage and thus generate pressure to raise the nominal wage. These pressures will vitiate the effect of the devaluation or depreciation on the real exchange rate. Second, it will tend to reduce the usefulness of domestic currency as a unit of account or for storage of value. Therefore, an optimum currency area must be big enough to have a large body of non tradable goods. The prices as defined in the domestic currency will serve to stabilize the purchasing power of the currency in the area.

According to Kucerova (2003), when the degree of openness is getting higher, more changes in international prices of tradable are likely to be transmitted to the domestic cost of living. Also devaluation would be more rapidly transmitted to the price of tradable as well as the cost of living. Hence, nominal exchange rate is less useful as an adjustment instrument for small and open economies.

2.2.3 Kenen's Approach to OCA Theory

Kenen's (1969) approach for OCA criteria is production diversification. It describes how a more diversified partner country is more likely to endure small costs from forsaking nominal exchange rate changes among member countries. For a given set of trading partners hoping for closer integration, the more diversified the countries are in terms of production and consumption, the less asymmetric shock effects these countries will experience. A well diversified portfolio of employment ensures that if

any one sector is hit hard, the economy will not be relying on a change in the exchange rate to correct the shock.

Therefore, under a high degree of product diversification, the more a group of countries or regions specialized in the production of particular goods, the more likely it is that these countries would be having asymmetric effects. This means if output is more diversified, the country would be a better candidate to adopt a fixed exchange rate with its neighbors because shocks would be offset in the aggregate. Kenen found that developed countries should adhere to the Bretton Woods regime as these countries seldom resort to changes in exchange rates. The less developed countries, due to being less diversified and less well equipped with policy instruments, should make more frequent changes or resort to a full flexibility exchange rate.

According to Kucerova (2003), Kenen also emphasized that high diversification in production and consumption shall diminish the possible impact of shocks to any particular sector. When two regions are highly specialized in the production of distinct goods, their prices are affected very differently by disturbances. By contrast, when the two regions have the same industrial structure and produce the same goods, disturbances are more likely to be symmetrical. Therefore, diversification reduces the need for changes in terms of trade via the nominal exchange rate and provides an insulation effect against a variety of disturbances. More diversified partner countries are more likely to endure small costs from forsaking nominal exchange rate changes among them and to find a common currency beneficial. Countries with widely diversified

production and exports and that are of similar structure can form an OCA. As a result, regions with high product diversification would be better able to maintain a currency union than those with low diversification since the latter is subject to larger disturbances.

2.2.4 Similarity in Inflation

This criterion is introduced by Haberler (1970) and Fleming (1971). They identify three factors that determine the level of inflation. The first is similar objectives with regards to national unemployment. The second is similar productivity growth rates. The third is similarity of union behavior regarding wages. These three points do not have to be fulfilled simultaneously. If one of these points is not fulfilled, the other two points can compensate for it.

2.3 OCA Criteria

2.3.1 Measurement of Business Cycle

Business cycle means the recurring expansions and contractions of the national economy, which is usually measured by real gross domestic product. A complete cycle typically lasts for a few years. The cycle can be divided into four phases: expansion, peak, contraction, and trough. To rectify the problems of business cycles, government will normally undertake various fiscal and monetary counter-measure policies in order to suppress inflation and unemployment.

The measurement of business cycles provides a reference point against which macroeconomic theories and policy discussion can be assessed (Harding and Pagan, 2006). The process requires an operational definition of a cycle, a criterion to distinguish business cycles from other forms of fluctuation, and the procedure to detect and measure the presence of a business cycle. A good measurement should not prejudge the nature of the phenomenon under investigation. Moreover, the measurement should produce statistics which are informative about features of interest and which can be formally analyzed.

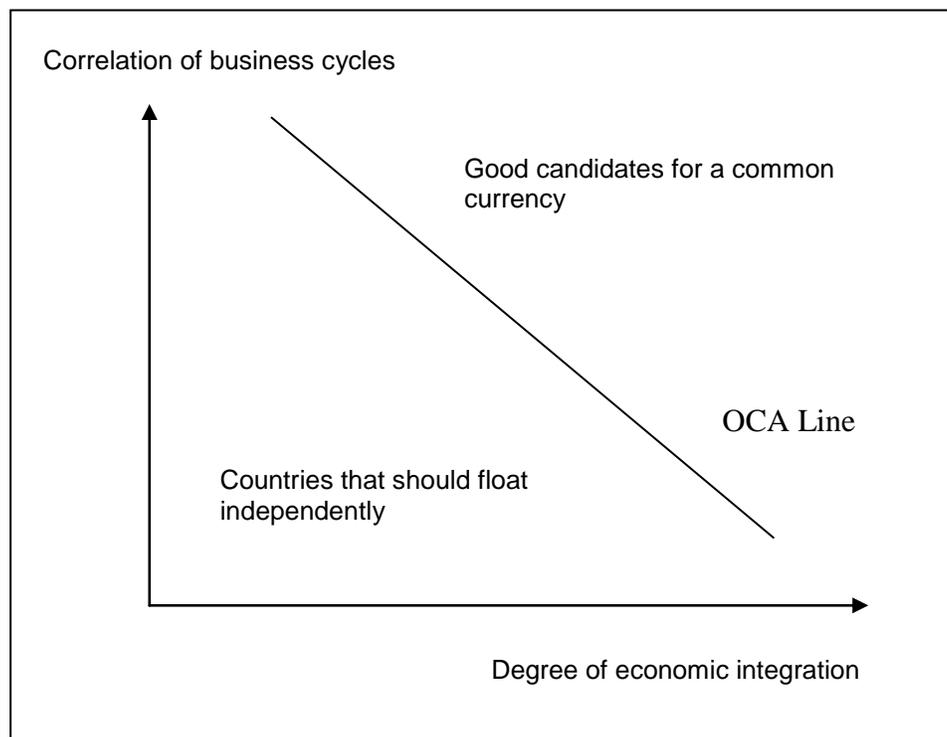
King and Rebelo (1993) provide examples on how the method measures persistence, variability, and co-movement when it is applied to observe time series and series simulated with real business cycle models. By comparing the cyclical component obtained using filters on level data, they obtained results with component corresponding to the business cycle frequencies of time series in difference. On the other hand, Hodrick and Prescott (1997) developed a method to measure business cycle via procedure called detrending. This method converts an additive decomposition of the economic time series into secular, cyclical and seasonal components where the growth component varies smoothly over time.

To assess the performance of the Hodrick and Prescott (HP) filters, Guay and St-Amant (1997) compare the spectrum of the unfiltered series at certain frequencies with filtered counterpart for several processes. Their main finding shows the HP filter is

capable of extracting business cycle frequencies of time series whose spectra have a peak at certain frequencies.

2.3.2 Synchronization of Business Cycle in OCA Context

The synchronization or correlation of business cycle is explained in Figure 2.1. The downward sloping of the OCA line shows the combination of the degree of economic integration (degree of openness) and the correlation of business cycles beyond which the advantages from a common currency would dominate for a group of partner countries. To the left of the OCA line, the advantages from monetary independence dominate and therefore countries should let their exchange rates float.



Source: Kucerova, Z. (2003), "The OCA Theory and its Application to Central and Eastern European Candidate Countries". Department of Macroeconomics, Technical University of Ostrava, Faculty of Economics. Figure 2, p.10

Figure 2.1: The OCA Line

In order to assess the synchronization of business cycles for the prospects of a currency union in East Asia with special focus on trade and financial integration in the region, Lee *et al.* (2002) considered a model in which the output of an economy is influenced by three different shocks, namely global, regional, and country specific. Based on the dynamic factor model, they find that regional common shocks in East Asia in 1990s were at least comparable to those in Europe, implying that the East Asian region is well prepared for a regional currency union. The business cycle synchronization indicators (intra-region trade share and trade structure similarity) have been quantitatively important for output variations in the Asian economies. Therefore, the continuing trade integration in the region will lead to further synchronization of business cycles, and encourage East Asian countries to create a currency union in the region.

2.3.3 Factor Mobility

The degree to which a factor of production such as labor or capital is able to move among industries or among countries is defined as factor mobility. The mobility tends to eliminate differences in factor price. According to Mundell (1961), the argument for flexible exchange rates based on national currencies is in accordance with the Ricardian assumption about factor mobility. If factor mobility is high internally and low internationally a system of flexible exchange rates based on national currencies shall work effectively. But if regions cut across national boundaries or if countries are multiregional then the argument for flexible exchange rates is only valid if currencies are reorganized on a regional basis. Hence, an essential ingredient of a common currency, or a single currency area, is a high degree of factor mobility. Mundell (1968)