



**A monetary union for the ASEAN?
An empirical assessment**

by

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Biographic note

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Abstract

The Asian financial crisis in 1997 has brought to the discussion the creation of a regional monetary union for the Association of Southeast Asian Nations (ASEAN). Grounded on the Optimum Currency Areas (OCA) theory, this dissertation assesses whether there is economic support for such a move. The assessment is based on post-crisis data, focusing on a set of essential criteria suggested by the OCA theory, namely, similarity of inflation rates, degree of trade integration and correlation of business cycles. According to the empirical results, it seems that, at the current stage, only Myanmar does not seem to *ex-ante* obey all the three basic requirements analyzed. Would the creation of a monetary union be based only on the three criteria, there would be no strong reason for the remaining nine ASEAN countries not sharing a common currency.

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Glossary of Abbreviations

AEC - ASEAN Economic Community

AFTA - ASEAN Free Trade Union

ASEAN - Association of Southeast Asian Nations

CEPTS - Common Effective Preferential Tariff Scheme

OCA - Optimum Currency Areas

EMU - European Monetary Union (or, Euro Area)

EU - European Union

NEER - Nominal effective exchange rates

NTMs - Non-tariff measures

REER - Real effective exchange rates

Chapter 1. Introduction

Founded in 1967, the Association of Southeast Asian Nations (ASEAN) is currently one of the largest economic zones in the world, having an important role in global international trade. As of 2017, ASEAN has 10 official member states, namely, Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, the Philippines, Singapore, Thailand and Vietnam. According to 2015 statistics for the world, ASEAN is ranked as the sixth largest economy as measured by the Gross Domestic Product (GDP), having the third largest population, and the fourth largest international trade.¹

In the early years of the Association, ASEAN was aimed to ensure security and political stability in the region. From the late 1970s onwards, ASEAN countries changed their attention to closer economic cooperation. The creation of the ASEAN Free Trade Union (AFTA) in 1992 shows the determination of ASEAN countries to increase regional economic integration. Later on, in 2007, the members of ASEAN signed the *Declaration on the ASEAN Economic Community Blueprint* which, ultimately, led to the establishment of the ASEAN Economic Community (AEC) in 2015. The AEC aims at building an ASEAN single market and production base (through free flow of goods, services, investment, skilled labor and freer flow of capital), a highly competitive region, with equitable economic development, and fully integrated into the global economy (ASEAN Secretariat, 2015).

The financial crisis that hit East Asian in 1997 was an ignition for discussing greater monetary and exchange rate cooperation among ASEAN countries. The crisis started in Thailand when the Thai baht was hit by speculative attacks, forcing local authorities to give up the exchange rate peg against the US dollar and devalue. Then, the crisis spread over Asia, forcing other ASEAN countries, such as Indonesia, to abandon their exchange rate regimes and letting their currencies float.

The 1997 crisis revealed that, acting individually, most of the ASEAN countries were vulnerable to speculation. One way to overcome such weakness could be a regional

¹ In 2015, the GDP of ASEAN was USD 2.4 trillion, accounting for a 3.3% share of world GDP. ASEAN's population was 629 million persons and its total trade amounted to USD 2.3 trillion, accounting for 7.6% share of the world's total trade (ASEAN Secretariat, 2016).

currency arrangement able to rebuild a stable ASEAN exchange rate environment while providing members with flexibility against major international currencies, namely the US dollar, the euro, and the yen (Bayoumi and Mauro, 2001). It is not thus surprising that the demand for greater economic integration and better monetary co-operation since the aftermath of the Asian financial crisis has brought to the discussion the creation of a monetary union in the region. A monetary union could promote trade by eliminating transaction costs and enhance the allocative efficiency of the price mechanism, by reducing exchange rate uncertainty (De Grauwe, 1993).

The theoretical support for establishing a monetary union is the theory of Optimum Currency Areas (OCA). Under the traditional OCA theory, there are several prerequisites that need to be fulfilled before establishing a monetary union, such as: price and wage flexibility, labor mobility, financial market integration, fiscal and political integration, a high degree of trade openness, similarity of inflation rates, and synchronization of business cycles. More recent approaches consider the hypothesis of endogeneity (e.g., Frankel and Rose, 1997). According to this hypothesis, a set of countries that do not fulfill the relevant OCA criteria before joining a monetary union may fulfill them *ex-post*, just as a result of participation in the union.

Published research supporting (or not) the creation of an ASEAN monetary union is scarce. Furthermore, the available research mainly focuses on a narrow set of ASEAN members as in the case of Ng (2002), Ramayandi (2005), and Cortinhas (2007). The likely explanation for the existing studies to consider a monetary union only for a subset of countries is the heterogeneity that can be found in the ASEAN group. The potential candidates to a monetary union analyzed in the mentioned studies are the founding members of ASEAN, that happen to be the most developed countries and that did not belong to the former “Communist bloc”.

This dissertation tries to fill the gap in the existing literature on the feasibility of an ASEAN monetary union, particularly in two aspects. Firstly, it examines the whole set of ASEAN countries (i.e., the 10 members), taking into account the recent political changes and economic integration in the ASEAN region. Secondly, it uses updated data

(up to 2015), covering the period of rapid social and economic development and growth of the more recent members of ASEAN.²

In order to assess if the creation of an ASEAN monetary union is economically grounded, this dissertation uses a set of criteria suggested by the OCA theory. In particular, the investigation focuses on the historical behavior concerning the similarity of inflation rates, the degree of trade integration and the correlation of business cycles among ASEAN members.

The rest of this document is organized as follows. Chapter 2 provides a brief review of the OCA theory, refers to the European Monetary Union, and overviews the existing literature discussing a monetary union for the ASEAN. For familiarity, chapter 3 presents some key indicators of ASEAN members and also their exchange rate regimes. Chapter 4 contains the empirical analysis that provides (or not) support to establishing a monetary union in the ASEAN region. This chapter describes the data and methodology adopted, and comments the results obtained. Chapter 5 concludes with some remarks and recommendations based on the study.

² This is the case of Cambodia, Myanmar, Lao and Vietnam (CMLV). According to SCB (2015), “*over the past few years, CMLV has experienced a rapid social and economic development due to numerous factors such as abundant low-cost labor and natural resources, open trade policy, and the strategic position in the center of ASEAN.*”

Chapter 2. The Optimum Currency Areas: Theory and Applications

2.1 Optimum Currency Areas Theory

The term “*Optimum Currency Area*” (OCA) was first mentioned by Mundell (1961), who considered that a currency area should be “*a domain within which exchange rates are fixed*”, with borders not necessarily coinciding with national borders.

More recently, more specific definitions of OCA have been provided. For example, for Mongelli (2002), “*an OCA is defined as the optimal geographic domain of a single currency, or of several currencies, whose exchange rates are irrevocably pegged and might be unified. The single currency, or the pegged currencies, can fluctuate only in unison against the rest of the world. The domain of an OCA is given by the sovereign countries choosing to adopt a single currency or to irrevocably peg their exchange rates.*”

The OCA theory has evolved from the pioneering work of Robert Mundell to the current days. Along about half a century of history, different approaches can be found, starting from the so-called traditional OCA theory and developing to the “new” approaches.

The traditional approach mainly emphasized the cost side in a cost-benefit analysis of a monetary union (De Grauwe, 1993). Following this line, various OCA criteria have been suggested. Some of the main OCA criteria in the early stage of the OCA theory include:

1) Prices and wages flexibility

According to Friedman (1953), when prices and wages between and within countries are flexible, the imbalance caused by the shift in demand is less likely to result in unemployment in one country and inflation in another. Suppose that there are two countries having flexible prices and wages. If an adverse demand shock hits country A in favour of country B, in country A there will be a decrease in GDP and an increase in unemployment, while in country B demand increases, causing an inflationary pressure. With flexible wages, they would fall in country A, making the country more competitive relative to country B. As a result, demand in country A would rise while the inflationary pressure in country B would diminish. Therefore, the need for adjusting the exchange rate

decreases, thus reducing the cost of losing the control over the exchange rate instrument.

2) Mobility of production factors

Mundell (1961) argued that the mobility of labor and capital is an essential criterion in forming an OCA. He explained this by considering a mechanism of coping with unemployment and inflation. Suppose that the world consists of two countries which have their own currencies and is divided into two regions which do not correspond to their national borders. If there is a demand shock causing unemployment in region A and inflationary pressure in region B, central banks in both countries in region A would have to expand money supplies to reduce unemployment, while in region B, central banks in both countries would have to reduce money supply to curb the inflation. Thus, unemployment may be decreased in both countries, but in the cost of increasing their inflation. However, if there is a high mobility in production factors across countries, the movement of labor and capital from one place to the other would reduce both unemployment and inflation pressure without using exchange rate adjustments. He concluded that if the world can be split into regions with internal factor mobility and external factor immobility, each region should have their own currency which can fluctuate against other currencies.

3) Correlation of shocks

Another criterion suggested by Mundell (1961) for deciding the set of countries that should join a monetary union is the similarity of shocks: countries having high correlated economic shocks are more recommended to join a monetary union than those facing uncorrelated shocks. The reason is that by joining a monetary union, countries lose control over monetary policy. Therefore, if shocks are idiosyncratic (which means that one - or some - country in the union may face a crisis, while others do not), hurting countries may not use national monetary instruments to adjust their imbalances. Instead, if all countries in the union experience the same shocks, a common monetary policy fits all.

4) Financial market integration

Ingram (1962) argued that financial integration can reduce the necessity for using exchange rate instruments. If the domestic financial markets are highly integrated with capital markets in the region, countries may quickly response to adverse disturbances, through international capital flows (countries with a surplus lend to countries with a

deficit), In highly integrated financial markets, even a small change in interest rates would induce capital mobility across partner nations, creating an equilibrium. These equilibrating flows would reduce the financing of external shocks and improve the efficient allocation of capital. Therefore, under a high degree of financial integration, countries would be able to finance their temporary deficits without any exchange rate adjustments.

5) Degree of economic openness

McKinnon (1963) underlined the degree of openness (which can be defined as the ratio of tradable goods to non-tradable goods) as another crucial criterion for assessing an OCA. He suggests that a high degree of openness leads to more incentive to have a pegged exchange rate or to form a monetary union, because in a very open economy, it is more likely that the international price of tradable goods is transferred to the national cost of living. Under those circumstances, adjusting exchange rates would highly affect wages and prices, making the policy tool less effective. In general, the higher the degree of openness, the lower is the cost of giving up the national currency to join a monetary union.

6) Diversification of production and consumption

Kenen (1969) emphasized the diversification in production and consumption for supporting a monetary union. He suggests that countries with a high degree of diversification in production and consumption are less prone to asymmetric shocks since the corresponding diversification in the trading structure would reduce the impact of shocks on a specific sector. Thus, a country with a highly diversified economy would not be so pressured to adjust exchange rates to cope with disturbances. Such a country would be in a situation to peg the exchange rate and join a monetary union.

7) Fiscal integration

Kenen (1969) stressed the need for a fiscal union, as a condition for having a monetary union. The rationale is that a member of a monetary union that is hit by an idiosyncratic shock needs an instrument that replaces foregone monetary policy instruments. A supranational fiscal policy would, through international transfers, help in recovering from this type of disturbances.

8) Political integration

Some economists (e.g., Mintz, 1970)³ consider political integration a relevant

³ As cited by Mongelli (2005).

criterion for deciding the adoption of a single currency. The rationale is that political integration among members of the union promotes conformity to joint commitments, maintains collaboration on different economic policies, and strengthens institutional linkages.

9) Similarity of inflation rates

According to Fleming (1971), similar inflation rates are of utmost importance to maintain a fixed exchange rate system. Thus, participants in a monetary union should have similar preferences concerning price stability.

Under the traditional OCA theory, the set of criteria described above have been taken as pre-requisites that candidates to a monetary union should observe before joining such an arrangement. Under this approach, the decision of joining or not a monetary union is thus based on a backward view of the performance of candidates. More recently, a forward looking view has also emerged, with opposing conclusions. Two good examples of this “new” approach are Frankel and Rose (1997) and Krugman (1993).

Having in mind the case of the European monetary union, Frankel and Rose (1997) have raised the *OCA endogeneity hypothesis*. Focusing on two of the conventional pre-requisites for participation in a monetary union, namely a high level of trade integration and high correlation of business cycle among members, Frankel and Rose argue that the behavior of the two indicators is endogenous. According to the researchers, by joining a monetary union, a country may improve their trade integration since a reduction in trade costs occurs. Furthermore, closer trade links may lead to more correlated business cycles among members of the union, particularly because intra-industry trade in the union increases and common demand shocks become more relevant. Frankel and Rose thus conclude that “*a country is more likely to satisfy the criteria for entry into a currency union ex-post than ex-ante*”.

Besides the endogeneity of trade and business cycles analyzed in Frankel and Rose (1997), further OCA endogeneities have latter on been addressed. For example, in the study by De Grauwe and Mongelli (2005), the potential OCA endogeneities include economic integration, financial integration, symmetry of shocks, and product and labor market flexibility.

Contrasting arguments were raised well before by Krugman (1993). According to the author, the increase of international trade that follows from participation in a monetary union leads member countries to become more specialized in the production of goods and services. If this “specialization hypothesis” applies, participation in a monetary union would not increase business cycles synchronization but, rather, would have an opposite impact.

The issue is, thus, an empirical one, namely the assessment for existing monetary unions whether they (i) have increased trade among members, and (ii) have altered the correlation of business cycles. According to Glick and Rose (2002), “*a pair of countries which joined/left a currency union experienced a near-doubling/halving of bilateral trade.*” These conclusions have, meanwhile, been disputed and, in a reassessment, Glick and Rose (2015) came to the conclusion that estimations of the effect of currency union on trade are sensitive to the used methodology.

2.2 The Euro Area: A living example of a monetary union

Around the world, one can find both formal and informal monetary unions, being the Euro Area the most well-known and the largest one. Members of the European monetary union share a common currency, the euro, which currently is the official currency in 19 out of the 28 European Union countries, being used by 338.6 million people in their daily lives.^{4:5} The euro was introduced in 1999, first as a virtual currency for non-cash payments and accounting purposes, and since 2002 also in the form of cash (banknotes and coins).

Since its launching, the euro has become the second most important currency in the world after the US dollar (European Commission, 2014). According to the Treaty of the European Union, all members of the European Union will eventually join the monetary union and replace their currencies by the euro.

⁴ Actually, the number of euro users is ampler, since the euro is also officially used by some States that, although not belonging to the European Union, have made agreements with the European authorities for using the euro (e.g., Andorra, San Marino, Vatican, and Monaco). For details on the use of the euro, see http://europa.eu/european-union/about-eu/money/euro_en

⁵ Information cited from: European Union (2016), *The Euro*. Available at: http://europa.eu/european-union/about-eu/money/euro_en.

In order to become a member of the Euro Area, a member of the European Union has to fulfill a set of pre-requisites. This is in line with the traditional OCA theory, as referred above. The criteria that have to be observed *ex-ante* are the following:

- Inflation: the rates of inflation of the candidate country have to be aligned with the lower inflation rates observed in the monetary union.
- Interest rates: rates on 10-year government bonds have to be close to the lower rates observed in countries participating in the monetary union.
- Government budget: the candidate country cannot observe a government deficit that exceeds 3 percent of the GDP.
- Public debt: the candidate should have a public debt below 60 percent of its GDP; in case of being higher, it must show a trend converging to the reference value.
- Exchange rates: the exchange rate of the candidate's currency has to show stability against the euro for, at least, the last two years.

This set of conditions became known as the “convergence criteria” of the European monetary union.

In 1999 the Euro Area was launched with 11 countries (Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal, and Spain). In 2001, Greece also became a member. The next enlargement took place in 2007 when Slovenia joined the Euro Area. Later, between 2008 and 2015, six countries were qualified to accede the Euro Area, including Cyprus and Malta in 2008, Slovakia in 2009, Estonia in 2011, Latvia in 2014, and Lithuania in 2015.

Whether the Euro Area is, or is not, an OCA is a question that the empirical literature has extensively dealt with. An example of *ex-ante* assessment is, among others, Bayoumi and Eichengreen (1996).⁶ Based on the actual working of the Euro Area, many other studies have also assessed Euro Area optimality. One example is Wortmann and Stahl (2016).⁷ In general, the conclusion drawn from these empirical studies is that not all the countries in the European Union and/or in the Euro Area form an OCA.

⁶ Bayoumi and Eichengreen (1996) examined countries' readiness for EMU. They suggested that European countries were divided into three groups: those with a high level of readiness (Austria, Belgium, the Netherlands, Ireland and Switzerland), those with a tendency to converge (Sweden, Italy, Greece, Portugal and Spain), and those with little or no convergence (UK, Denmark, Finland, Norway and France).

⁷ Wortmann and Stahl (2016) proposed an assessment of core-periphery structures within the European Union. According to their study, “countries such as the United Kingdom, Denmark, and Sweden would also

Since the eruption of the global financial crisis of 2008, which was followed by an economic crisis and by public debt crises in some countries, the Euro Area has been in trouble. The events observed in recent years have revealed weaknesses in the institutional arrangements and in the economic governance framework of the European monetary union. This led to a number of reforms, such that the improvement in the functioning of the Euro Area is still a process in course.

The experience of the Euro Area is, no doubt, a case from which a lot can be learned by any set of countries, in any part of the world, intending to share a common currency.

2.3 ASEAN monetary union: A review of the literature

The literature on the creation of an ASEAN monetary union is relatively scarce. The existing work typically consists of *ex-ante* assessments on the optimality of an ASEAN monetary union, using for that purpose the conventional OCA criteria. Most of the papers only focus on a subset of ASEAN countries, namely the founding members, which happen to be the most developed ones. This is the case in Ng (2002), Ramayandi (2005), Cortinhas (2007), and Tawadros (2008). In general, the existing literature provides partial support for a monetary union in ASEAN. In what follows, the relevant papers are reviewed.

Bayoumi and Mauro (2001) analyzed the costs, benefits, preconditions, and implications of forming an ASEAN regional currency union using data from 1988 to 1997. Regarding intra-regional trade, macroeconomic stability and level of economic development, the conclusion is that ASEAN countries appeared to be less suitable for adopting a single currency than European Union nations before signing the Maastricht Treaty (the European treaty that has created the Euro Area). Further, the authors stressed the need for a lasting and firm political commitment among ASEAN members as a condition to tackle difficult policy decisions such as maintaining central bank independence, obeying fiscal and exchange rate arrangements, and complying with supranational directives.

fit well within such a hypothetical euro area. However, Greece, Ireland, Italy, Portugal, and Spain plus Cyprus and Croatia on the southern periphery, as well as most of the countries of the eastern enlargement are found to form very distinct clusters in terms of competitiveness, indebtedness, and economic performance.”

Ng (2002) evaluated the support for five members of ASEAN (Indonesia, Malaysia, the Philippines, Singapore, and Thailand) forming a currency union. For that purpose, the criteria used were the correlation of shocks, intra-regional trade, and consensus on monetary policy. The conclusions are (i) regarding the correlation of shocks, the five ASEAN countries were suitable for forming a monetary union; in particular, the shocks of Indonesia, Singapore, and Malaysia were found highly correlated. Moreover, the five members of the Association exhibit stronger correlated shocks, as compared with European Union countries; (ii) regarding trade, the analyzed ASEAN countries had large tradable sectors, which supported a shift to a common currency. However, the share of intra-regional trade among them was lower than that of European Union members; (iii) regarding an agreement on monetary policy, the study underlined some diversity in inflation and interest rate policies of ASEAN members. While Malaysia and Singapore have pursued relatively low inflation and interest rates, other ASEAN countries have maintained higher inflation and interest rates.

Ramayandi (2005) also examined the feasibility of a monetary union for the five ASEAN countries above mentioned. Regarding the trade pattern and the symmetry of economic shocks, the conclusion is that the five countries would potentially obtain considerable benefits from a cooperative monetary policy or even a single currency. However, the dispersion in the level of economic development was considered a potential obstacle. The details of the institutional arrangement were considered an open issue, deserving a deeper analysis.

Using data for the period 1962-1996, Cortinhas (2007) examined whether the observed large increase in intra-regional trade between the five mentioned ASEAN countries has contributed to closer economic integration and, thus, helped in satisfying the prerequisites for a currency union. The conclusion is that the increase of intra-industry trade amongst all members but Indonesia has increased business cycle synchronization. This is a relevant conclusion since when intra-industry trade is dominant, the costs of forming a currency union decrease.

Bacha (2008) analyzed the common linkages of a wide set of countries that included the ASEAN members, plus China, Japan, Korea, Australia and New Zealand. The purpose of the study was to identify the sub-set of countries recommended to share a common currency. The assessment was made with data for the period 1970-2003, using

three key criteria, namely, business cycle synchronization, similarity of inflation rates and policy congruence. The results suggest that there were no broad-based common linkages. However, several pairs of countries were found to be promising candidates such as Malaysia/Singapore, Japan/Korea, Indonesia/Thailand and Australia/New Zealand. The author considered that, by the time of the study, it would not be recommended to form a region-wide common currency area, but there was support for forming paired clusters, that could eventually lead to an enlarged currency union.

Tawadros (2008) tested whether observed increase in trade flows led to more synchronized business cycles. The analysis focused on seven ASEAN members (Brunei Darussalam, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, and Thailand), using data from 1960 to 2004. The author found that the relationship between the level of trade intensity and the degree of business cycle synchronization was almost non-existent. Despite the fact that greater trade flows between the analyzed countries caused business cycles to be less divergent, the conclusion is that a sufficient synchronization was not reached yet to allow for the creation of a monetary union.

Chapter 3. A brief overview of ASEAN

3.1 Chronology of ASEAN economic integration

The ASEAN was founded in 1967 with five members, namely Indonesia, Malaysia, the Philippines, Singapore, and Thailand. Later on, the Association was enlarged by Brunei Darussalam in 1984, Vietnam in 1995, Lao PDR and Myanmar in 1997, and Cambodia in 1999. Currently, the ASEAN is composed of 10 member states.

In the beginning, ASEAN was established with the main purpose of ensuring security and political stability as well as preventing the dissemination of communist ideology (Eccleston *et al.*, 1998). From the 1990s onwards, ASEAN countries changed their attention to closer economic cooperation. The *Framework Agreement on Enhancing ASEAN Economic Cooperation*, signed in 1992 in Singapore, marked the beginning of the economic integration process in the region. The main objective of the Agreement was to improve intra-regional economic co-operation to foster economic growth and development of all ASEAN members. The 1992 Agreement stressed the role of cooperation in trade, in industry, minerals and energy, in finance and banking, in food, agriculture, and forestry, and in transport and communications. The *Framework Agreement* was the cornerstone of two crucial agreements for the effective improvement of intra-regional: (i) the *Agreement on the Common Effective Preferential Tariff Scheme* (CEPTS) for the *ASEAN Free Trade Area* (AFTA), signed in 1993 (then replaced by the *ASEAN Trade in Goods Agreement* in 2010); and (ii) the *ASEAN Framework Agreement on Services* signed in 1995.

In 2003, it was first announced the establishment of an *ASEAN Economic Community* (AEC) with “*the agreed goal of regional economic integration*”. Later, in 2007, the *AEC Blueprint 2015* was signed, setting out the goals to build: “(a) a single market and production base, (b) a highly competitive economic region, (c) a region of equitable economic development, and (d) a region fully integrated into the global economy”.

In 2015, the AEC was officially launched, marking an important milestone in the regional economic integration process (ASEAN Secretariat, 2015). At the same time, the *AEC Blueprint 2025* was adopted, providing guidelines for the AEC from 2016 to 2025. It aims at building an AEC by 2025 that is “*highly integrated and cohesive; competitive,*

innovative and dynamic; with enhanced connectivity and sectoral cooperation; and a more resilient, inclusive, and people-oriented, people-centered community, integrated with the global economy”.⁸

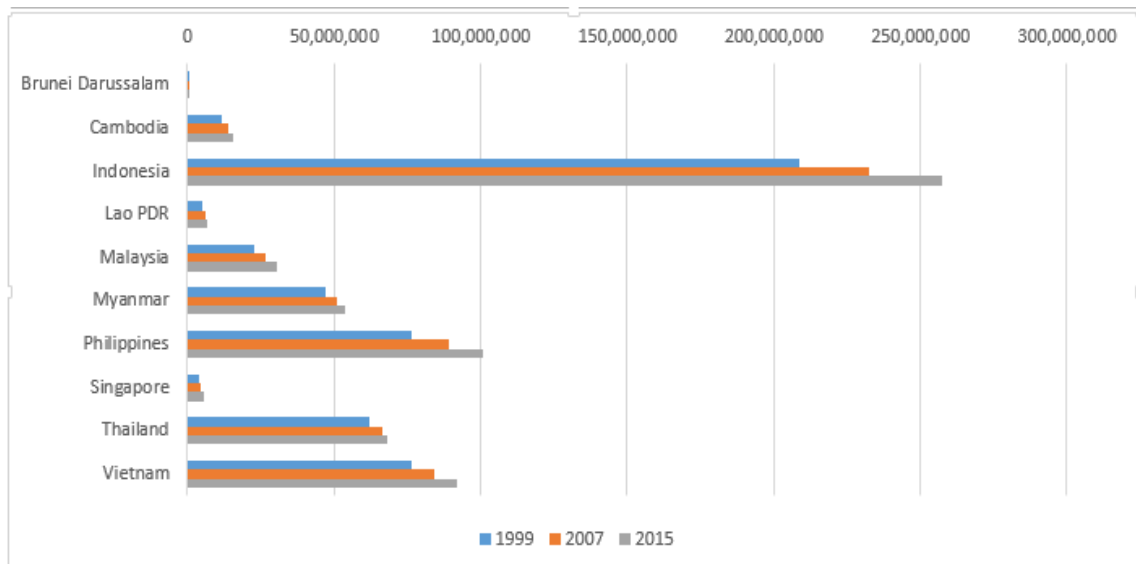
Despite the several commitments among ASEAN countries toward economic integration in ASEAN region, the idea of having a common currency has not yet been formally discussed by ASEAN leaders.

3.2 Some key indicators of ASEAN countries

3.2.1 Population

The ASEAN is quite heterogeneous in what concerns the size of the members, as measured by different indicators. This can be seen in Figure 3.1 for population. The Figure displays information for three milestone years: (i) 1999, when the last enlargement of ASEAN occurred; (ii) 2007, the year the *AEC Blueprint* was agreed; and (iii) 2015, the year the AEC entered into force.

Figure 3.1 - Population of ASEAN countries



Source: The World Bank (accessed in March 2017), available at <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators&preview=on#>

⁸ Quotes taken from <http://asean.org/asean-economic-community/>.

Figure 3.1 shows that the ASEAN is composed by “big” countries (e.g., Indonesia) and by “small” countries” (e.g., Brunei Darussalam). To overcome the scale problem of the Figure, Table 3.1 also provides the dimension of the populations of ASEAN members.

Table 3.1 - Population of ASEAN countries

Countries	1999	2007	2015	Δ% 1999-2015
Brunei Darussalam	323,812	374,459	423,188	30.7
Cambodia	11,928,306	13,728,700	15,577,899	30.6
Indonesia	208,644,079	232,296,830	257,563,815	23.4
Lao PDR	5,256,207	5,939,634	6,802,023	29.4
Malaysia	22,898,579	26,730,607	30,331,007	32.5
Myanmar	47,106,923	50,698,814	53,897,154	14.4
Philippines	76,285,225	88,965,508	100,699,395	32.0
Singapore	3,958,723	4,588,599	5,535,002	39.8
Thailand	61,973,957	66,353,572	67,959,359	9.7
Vietnam	76,596,700	84,218,500	91,713,300	19.7
ASEAN	514,972,511	573,895,223	630,502,142	22.4

Source: The same as in Figure 3.1.

Between 1999 and 2015, the whole ASEAN population grew by 22.4%. Among ASEAN countries, Indonesia has the largest population and ranks 4th in the world, after China, India and the United States. The Philippines and Vietnam have the second and third largest populations among ASEAN members, ranking 12th and 14th in the world, respectively. On the contrary, Brunei Darussalam, Singapore and Lao PDR have the smallest populations among ASEAN members. The Brunei’s population represents only 0.15% of Indonesia’s population, while the populations of Singapore and Lao PDR are slightly higher, corresponding to less than 3% of Indonesia’s population.

In 2015, with a total number of over 630 million people, ASEAN population was the 3rd largest in the world, after China and India. Furthermore, more than half of ASEAN’s residents were young (below the age of 30), comprising a big portion of the workforce (ASEAN Secretariat, 2015).

3.2.2 GDP

The relative size of the ASEAN countries, as measured by the GDP in 2015 at current USD prices, is provided in Table 3.2. Overall, it is clear that ASEAN members contributed differently to the total regional GDP. In 2015, the five founding members contributed to 90% of the whole ASEAN's GDP, whereas the remaining five countries accounted only for 10%. Like for population, Indonesia is the biggest country of ASEAN when GDP is the reference indicator. In 2015, Indonesia represented over 35% of the region's output. This figure is more than the double of Thailand's GDP, the second largest country, and more than 70 times the GDP of Lao PDR, the country having the smallest GDP in the Association.

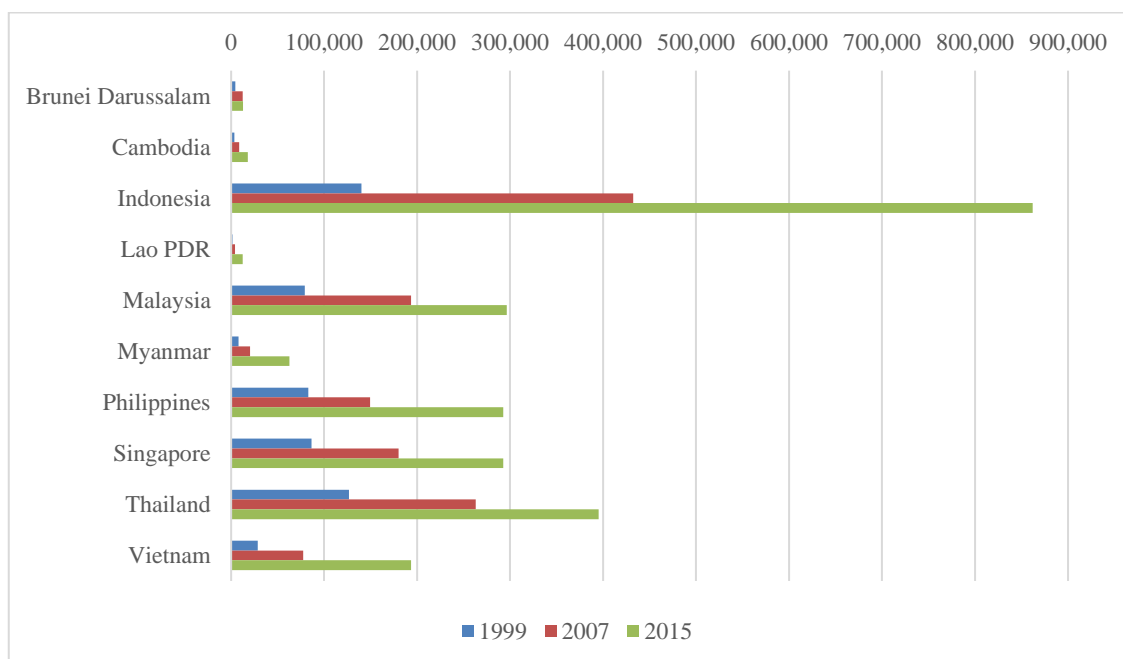
Table 3.2 - GDP of ASEAN countries in 2015

Countries	USD 10⁶	%
Brunei Darussalam	12,930.4	0.5
Cambodia	18,050.0	0.7
Indonesia	861,934.0	35.4
Lao PDR	12,369.1	0.5
Malaysia	296,283.2	12.2
Myanmar	62,600.9	2.6
Philippines	292,451.4	12.0
Singapore	292,739.3	12.0
Thailand	395,168.0	16.2
Vietnam	193,599.4	7.9
ASEAN	2,438,125.6	100.0

Source: The World Bank (accessed in March 2017):
<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators&preview=on#>

In recent past, the economies of ASEAN show remarkable growth. Such performance can be observed in Figure 3.2, which displays total GDP for the reference years 1999, 2007, and 2015 at constant 2010 prices. The data used as input in the Figure is also described in Table 3.3, which further provides the percentage increases in GDP between 1999 and 2015.

**Figure 3.2 - GDP of ASEAN countries in 1999, 2007 and 2015
(USD 10⁶, constant 2010 prices)**



Source: The World Bank (accessed in March 2017)

<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators&preview=on#>

**Table 3.3 - GDP of ASEAN countries in 1999, 2007 and 2015
(USD 10⁶, constant 2010 prices; %)**

Countries	1999	2007	2015	Δ%1999-2015
Brunei Darussalam	11,639.5	13,869.1	13,637.7	17.2
Cambodia	4,787.6	9,935.6	15,903.6	232.2
Indonesia	432,151.5	640,863.5	987,514.1	128.5
Lao PDR	3,385.8	5,666.1	10,415.4	207.6
Malaysia	149,295.9	236,695.4	329,952.5	121.0
Myanmar	14,053.0	37,073.0	70,537.7	401.9
Philippines	120,052.4	176,022.6	265,833.2	121.4
Singapore	123,502.7	202,775.9	287,018.0	132.4
Thailand	208,427.7	314,057.5	392,474.6	88.3
Vietnam	57,259.9	97,817.4	154,508.6	169.8
ASEAN	1,124,556.1	1,734,776.0	2,527,795.4	124.8

Source: The same as in Figure 3.2

As can be seen from Figure 3.2 and Table 3.3, real GDP of ASEAN countries have grown significantly in the first years of the current century. As of 2015, total GDP of ASEAN had increased 124.8% as compared to 1999 (when the tenth member joined

ASEAN) and 45.7% as compared to 2007 (when the AEC Blueprint entered into force). Looking at the individual economies, between 1999 and 2015, nine out of ten ASEAN nations experienced high and stable growth rate. In general, the smaller economies, namely Cambodia, Lao PDR and Myanmar had higher growth rates than the other countries in the region. During this period, only Brunei Darussalam did not witness a permanent growth trend. Real GDP of Brunei Darussalam rose from 11,639 USD in 1999 to 13,869 USD in 2007, then declined slightly to 13,637 in 2015. Overall, between 1999 and 2015, Brunei Darussalam experienced modest real output growth of only 17.2%, a remarkable low figure when compared with the performance of the partners.

3.2.3 GDP per capita

Combining the data from the two previous sub-sections, in what follows information on GDP per capita is provided. Table 3.4 describes the GDP per capita of ASEAN members in 2015, using current USD prices. It also informs how the GDP per capita of each member compares with ASEAN's GDP per capita. Figure 3.3 contains information on GDP per capita in the reference years of 1999, 2007, and 2015, using 2010 USD constant prices. The data from the Figure is also described in Table 3.5. The Table further informs about the increase in real GDP per capita between 1999 and 2015.

Table 3.4 - GDP per capita of ASEAN countries in 2015

Countries	USD	Country/ASEAN*100
Brunei Darussalam	30,555	790
Cambodia	1,159	30
Indonesia	3,346	90
Lao PDR	1,818	50
Malaysia	9,768	250
Myanmar	1,161	30
Philippines	2,904	80
Singapore	52,889	1370
Thailand	5,815	150
Vietnam	2,111	50
ASEAN	3,867	-

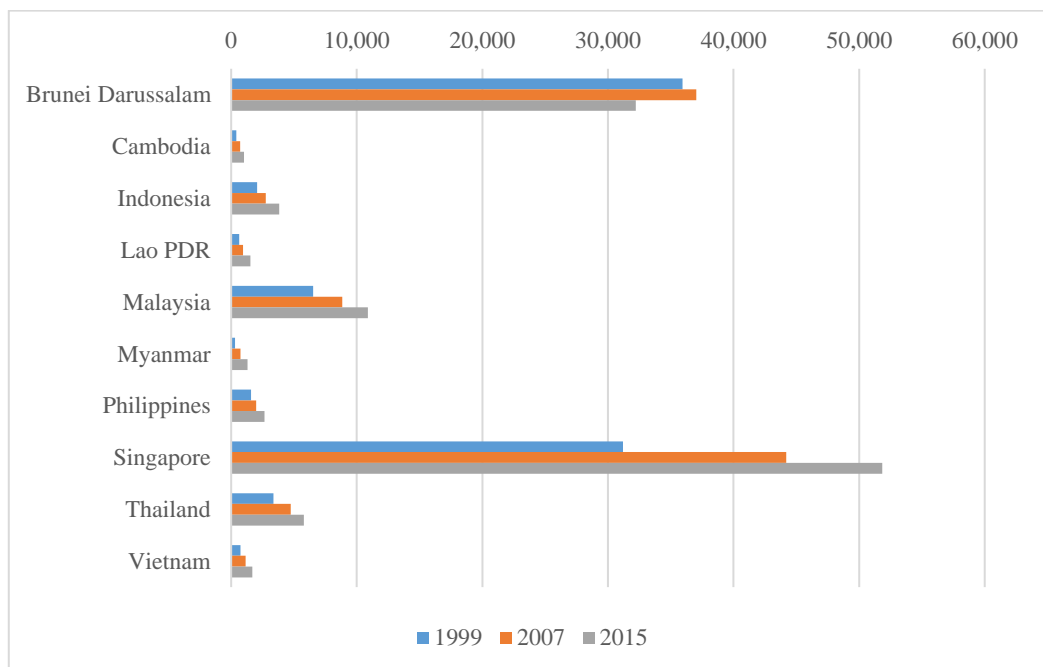
Source: The World Bank (accessed in March 2017)

<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators&preview=on#>

As can be seen from Table 3.4, in 2015, four countries had GDP per capita higher than that of the region, namely Brunei Darussalam, Malaysia, Singapore and Thailand. It is clear that Singapore is far ahead of the nine remaining ASEAN countries. In 2015, GDP per capita of Singapore was 52,889 USD, ranking 10th in the world. Brunei Darussalam, the country having the smallest population in the region is also one of the wealthiest country in the world. Its GDP is mostly contributed by exporting crude oil and natural gas. In 2015, GDP per capita of Singapore and Brunei Darussalam was, respectively, almost six times and three times higher than that of Malaysia, the country having the third highest GDP per capita in the region.. On the other hand, GDP per capita of Singapore in 2015 was fifty times higher than that of Cambodia and Myanmar, the countries having the lowest GDP per capita in the region.

To better understand the recent path of real GDP per capita of each ASEAN country, Figure 3.3 presents the information for the three milestones years (1999, 2007 and 2015).

Figure 3.3 - GDP per capita of ASEAN countries in 1999, 2007 and 2015 (USD, 2010 constant prices)



Source: The World Bank (accessed in March 2017)
<http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators&preview=on#>

The data used as input in the Figure 3.3 is also described in Table 3.5, which further provides information on the percentage increase of real GDP per capita between 1999 and 2015.

Table 3.5 - GDP per capita of ASEAN countries in 1999, 2007 and 2015 (USD, 2010 constant prices; %)

Countries	1999	2007	2015	Δ%1999-2015
Brunei Darussalam	35,945	37,038	32,226	-10.3
Cambodia	401	724	1,021	154.4
Indonesia	2,071	2,759	3,834	85.1
Lao PDR	644	954	1,531	137.7
Malaysia	6,520	8,855	10,878	66.8
Myanmar	298	731	1,309	338.7
Philippines	1,574	1,979	2,640	67.7
Singapore	31,198	44,191	51,855	66.2
Thailand	3,363	4,733	5,775	71.7
Vietnam	748	1,161	1,685	125.4
ASEAN	2,183.7	3,022.8	4,009.2	83.6

Source: the same as in Figure 3.3.

Overall, it can be seen that, between 1999 and 2015, there was a remarkable increase in real GDP per capita of ASEAN countries. The real GDP per capita of ASEAN has almost doubled. Myanmar, the country with the lowest GDP per capita in the region in 1999, had the highest growth rate, growing by more than 300%. Following Myanmar, the less-developed countries in ASEAN, namely Cambodia, Lao PDR and Vietnam also achieved high growth rates of real GDP per capita, with increases in the period that amount to 154.4%, 137.7%, and 125.4%, respectively. In contrast, among the ASEAN members, in the period, only Brunei Darussalam experienced a negative growth rate of real GDP per capita. In 1999, Brunei Darussalam had the highest real GDP per capita in ASEAN. However, in 2015, the real GDP per capita in Brunei Darussalam was behind Singapore.

3.3 Exchange rate arrangements of ASEAN countries

If the ASEAN countries decide to create a monetary union, they actually decide to move to an irrevocable internal pegged exchange rate system. An additional required

decision is the exchange rate system of the common currency against non-member countries.

In order to better understand how a single currency would change the exchange rate policy of the participants in an ASEAN monetary union, in what follows the current exchange rate regime of each country is briefly described.

Brunei Darussalam

The official currency of Brunei Darussalam is the Brunei Dollar (BND), which started being in use in 1967. Since the adoption of the BND, Brunei Darussalam has a currency board arrangement with Singapore, which is still in effect until today. This agreement gives permission for the BND and the Singapore dollar being exchanged at a 1:1 ratio, which aims at promoting bilateral trade between the two countries.⁹

Cambodia

The official currency of Cambodia is the Cambodia Riel (KHR). The Riel currently in use was first introduced in 1980. The Cambodia Authority has maintained a market-oriented exchange rate policy, which targets to pursue price stability. Following the managed floating arrangement, the National Bank of Cambodia may intervene in the foreign exchange rate market, being the US dollar the relevant reference currency.¹⁰

Indonesia

The official currency of Indonesia is the Indonesian Rupiah (IDR), introduced in 1946. From 1971 to 1978, Indonesia maintained a fixed exchange rate against the US dollar (415 IDR per USD). In 1978, following a sharp decrease in oil prices and foreign exchange reserves, there was a significant devaluation of the Rupiah, which led to a shift from the fixed exchange rate regime to a managed floating. The Indonesian authorities maintained the managed floating regime until 1997, when the Asian financial crisis broke out. Bank Indonesia made an effort to cope with high inflation but eventually had to replace the managed floating exchange rate system by free floating. This new regime started in August 1997 (Frederick et al., 2011). In 2005, Bank Indonesia adopted an

⁹ Source: Autoriti Monetari Brunei Darussalam (<http://ambd.gov.bn>).

¹⁰ Source: National Bank of Cambodia (<https://www.nbc.org.kh>).

inflation targeting strategy for monetary policy, while keeping the free-floating exchange rate regime. However, Bank Indonesia has the right to take some actions to avoid excessive exchange rate fluctuations.¹¹

Lao PDR

The official currency of Lao PDR is the Lao Kip (LAK). The Kip currently in use was introduced in 1979. From 1979 to 1988, to manage inflation, Lao PDR authorities adopted a system of multiple official exchange rates, through which the rates applied were depending on the type of international transaction. In September 1987, there was a 900 percent devaluation of the LAK against the US dollar for commercial purposes, and the multiple exchange rates system was replaced by a single floating exchange rate system applied to all transactions (Savada and Whitaker, 1995). Nowadays, the exchange rate is determined by the market and officially adjusted, based on the daily average trading rate of the inter-bank market (where the participants are commercial banks and foreign exchange bureaus). In some circumstances, the Bank of Lao PDR can decide the exchange rate on its own for the commercial banks and foreign exchange bureaus.¹²

Malaysia

In 1967, the Bank Negara Malaysia first issued the Malaysian dollar. In August 1975, the Malaysian dollar was replaced by the Malaysian Ringgit (MYR), which has been the official currency of Malaysia until now. From 1975 to 1998, Malaysia adopted a floating exchange rate system, based on a basket of foreign currencies issued by the main trading partners. In September 1998, to protect the economy from the negative impact of the 1997 financial crisis, the Malaysian authorities decided to peg the Ringgit to the US dollar at the rate of 3.8 MYR per USD. In July 2005, Malaysia replaced the fixed exchange rate system with a managed float system. The exchange rate of the Ringgit against other currencies is determined by market forces. The Malaysian central bank only intervenes in case of excess volatility.¹³

¹¹ Source: Bank Indonesia (<http://www.bi.go.id>).

¹² Presidential Decree Law No. 01/OP dated August 9, 2002, *Governing the Management of Foreign Exchange and Precious Metals*. Available at: <http://www.bol.gov.la/english/Decree%20law%20on%20management%20of%20FC%20%20PM2.html>

¹³ Source: Bank Negara Malaysia (<http://www.bnm.gov.my>).

Myanmar

The official currency of Myanmar is the Myanmar Kyat (MMK), being in circulation since 1952. From 1974 to March 2012, the Government adopted a fixed exchange rate regime. The MMK was pegged to the Special Drawing Rights (SDR) at the rate of 8.5 MMK per SDR and this official rate was only applied to the public sector. In 1989, foreign trade in Myanmar has been legalized for the private sector, but no official market for the private sector was available to convert currencies. Therefore, for more than 20 years, the informal/parallel market was the only place for the private firms to exchange currencies (Bangkok Research Center, 2014). In April 2012, Myanmar replaced the pegged exchange rate system with a managed floating system. Immediately after implementing the new exchange rate regime, the exchange rate of MMK against USD jumped from around 6 MMK per USD to circa 820 MMK per USD. Since then, the Kyat has been continuously depreciating against the USD. Recently, the observed exchange rate was of about 1,300 MMK per USD.¹⁴

Philippines

The official currency of the Philippines is the Philippine Peso (PHP), which was introduced in 1949. Before 1997, the Philippines adopted a managed floating exchange rate system. The relevant exchange rate for the authorities was an effective rate composed by a basket of foreign currencies, where the USD had the highest weight (Walker, 1999). However, following the Asian financial crisis of 1997, the Philippines had to let the Peso fluctuate freely. At present, the Philippines have a freely floating exchange rate regime, under an inflation target framework for monetary policy. Although exchange rates are normally determined by market forces. The central bank of the Philippines intervenes in case of sharp fluctuations in the exchange rate.¹⁵

Singapore

The official currency of Singapore is the Singapore dollar (SGD), being in circulation since 1967. In the beginning, the SGD was pegged to the British pound. This system lasted until 1973 when the authorities of Singapore decided to replace it by a peg

¹⁴Source: Myanmar Legal (<http://www.myanmarlegalservices.com>)

¹⁵ Source: Bangko Sentral ng Pilipinas (<http://www.bsp.gov.ph>).

to “*a fixed and undisclosed trade-weighted basket of currencies*”. From 1985 onwards, the SGD is allowed to fluctuate within an undisclosed bandwidth, closely supervised by the Monetary Authority of Singapore (Mele, 2015). The main task of the monetary authorities is the management of the exchange rate with the ultimate goal of ensuring price stability.¹⁶

Thailand

The official currency of Thailand is the Thai baht (THB). It has been officially used as national currency since 1897. From 1990 to 1997, Thailand maintained a peg against the US dollar at a rate of 26 THB per USD (Walker, 1999). Following the 1997 Asian financial crisis, Thailand had to give up the peg to the USD and adopted a managed float exchange rate system. This new managed float system is still in effect. Under this system, the exchange rate of the THB is determined by the market, and the Bank of Thailand intervenes in case of excess volatility.¹⁷

Vietnam

The official currency of Vietnam is the Vietnamese dong (VND). The dong currently in use was introduced in 1986. In the past, Vietnam maintained a crawling peg with the USD, and the exchange rate was only allowed to fluctuate within a band. Recently, the State Bank of Vietnam decided to shift to a more flexible exchange rate system.¹⁸ According to IMF (2016), currently the exchange rate regime of Vietnam is classified as stabilized arrangement. Vietnam maintains an exchange rate anchor to a composition of an undisclosed basket of currencies.

3.4 The recent exchange rate behavior of ASEAN currencies

In case ASEAN countries decide to form a monetary union, nominal exchange rates will become irrevocably pegged among the participants. Concerning real exchange rates, their stability will depend upon differentials in inflation rates. In order to understand how the exchange rates of each ASEAN country have behaved in recent years relative to

¹⁶ Source: Monetary Authority of Singapore (<http://www.mas.gov.sg>).

¹⁷ Source: Bank of Thailand (<https://www.bot.or.th>).

¹⁸ Source: State Bank of Vietnam (<http://www.sbv.gov.vn>).

the currencies of the partners, in what follows information on effective rates is provided. The information concerns both nominal and real effective exchange rates of each currency/country vis-à-vis the remaining 9 currencies/countries of ASEAN. The rates for the period 2010-2015 are computed as follows:

- (i) Nominal effective exchange rates (NEER): 1st, through the USD cross rates,¹⁹ bilateral rates of ASEAN members are obtained; 2nd, bilateral rates are transformed into indexes; 3rd, the bilateral indexes for each country are weighted, based on the relative importance of international trade in goods (imports plus exports of goods) of each ASEAN member.²⁰
- (ii) Real effective exchange rates (REER): 1st, based on annual inflation rates,²¹ a consumer price index (CPI) for each country is constructed; 2nd, the CPI of the trading partners are obtained with the international trade weights used to compute nominal effective exchange rates; 3rd, the real effective rates of a given country are obtained by combining the country's CPI, the weighted foreign CPI and the nominal effective exchange rates.

Table 3.6 below provides the NEER of each ASEAN country against its ASEAN partners. The rates are annual averages, for the period 2010-2015. By construction, an increase in the NEER means that the currency of the corresponding country is depreciating against the currencies of the remaining 9 partners.

Table 3.6 - Nominal effective exchange rates against ASEAN partners (2010=100)

Country	2010	2011	2012	2013	2014	2015
Brunei Darussalam	100.0	96.7	94.0	92.1	89.7	89.4
Cambodia	100.0	98.3	96.7	96.5	94.4	86.6
Indonesia	100.0	102.2	108.2	119.8	132.4	135.8
Lao PDR	100.0	99.6	96.3	96.1	93.5	89.9
Malaysia	100.0	100.1	99.1	99.5	99.9	110.4
Myanmar	100.0	105.5	10,292.9	15,079.5	15,296.6	16,760.9

¹⁹ USD bilateral rates (period average) were collected from The World Bank (accessed in March 2017), available at: <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators#>

²⁰ Due to the lack of information for bilateral trade in services, the analysis only uses data on international trade of goods.

²¹ Inflation rates were collected from The World Bank (accessed in March 2017), available at: <http://databank.worldbank.org/data/reports.aspx?source=world-development-indicators#>

Country	2010	2011	2012	2013	2014	2015
Philippines	100.0	101.0	96.9	95.7	96.0	89.7
Singapore	100.0	95.8	92.2	88.4	84.3	81.3
Thailand	100.0	100.1	94.7	89.3	90.5	90.6
Vietnam	100.0	113.5	113.1	111.8	107.6	102.5

Sources:

- Exchange rates against USD: The World Bank (accessed in March 2017).
- Bilateral trade: ASEANstats (accessed in March 2017).
- NEER: author's calculation.

Table 3.6 shows that over the period 2010-2015, the NEER of Brunei Darussalam, Cambodia, Lao PDR and Singapore declined over time, implying that their currencies consistently appreciated against the currencies of their ASEAN partners. The Singapore dollar is the one that appreciated the most, almost 20% during the period. On the other extreme, NEER of Indonesia increased over time, showing a depreciation trend of this currency against ASEAN partners. During this period, the Indonesia Rupiah experienced a high depreciation of 35.8%. Myanmar witnessed a big jump in NEER, from 105.5 in 2011 to 10,292.0 in 2012 due to the impact of changing in its exchange rate regime.²² From 2012 to 2015, NEER of Myanmar continuously rise, with the total rate of more than 60% during this period. NEER of Malaysia, Philippines, Thailand, and Vietnam slightly fluctuated over the time. As compared to 2010, in 2015, the Malaysian ringgit and the Vietnamese dong depreciated 10.4% and 2.5%, respectively, while the Philippine peso and the Thai bath appreciated about 10% against remaining ASEAN currencies.

In order to assess whether ASEAN countries have gained or loss competitiveness against regional partners, Table 3.7 reports the REER of each country..

Table 3.7 - Real effective exchange rates against ASEAN partners (2010=100)

Country	2010	2011	2012	2013	2014	2015
Brunei Darussalam	100.0	93.8	87.4	83.4	80.4	80.1
Cambodia	100.0	95.7	92.3	92.7	92.3	85.2
Indonesia	100.0	102.5	109.4	125.7	144.4	156.4
Lao PDR	100.0	101.5	96.7	101.7	99.5	96.7
Malaysia	100.0	97.8	94.2	93.5	95.1	106.7

²² In April 2012, Myanmar replaced the pegged exchange rate system with a managed floating system.

Country	2010	2011	2012	2013	2014	2015
Myanmar	100.0	105.9	10,129.9	15,297.2	16,007.8	19,444.1
Philippines	100.0	100.4	95.7	94.5	96.4	90.7
Singapore	100.0	96.2	94.0	89.2	82.6	77.0
Thailand	100.0	98.3	92.2	85.7	85.4	84.0
Vietnam	100.0	128.9	135.8	139.3	135.5	129.2

Sources:

- Exchange rates against USD: The World Bank (accessed in March 2017).
- Bilateral trade: ASEANstats (accessed in March 2017).
- CPI: The World Bank (accessed in March 2017).
- REER: author's calculation.

By construction, an increase/fall in REER indicates that the country is losing/gaining competitiveness against the ASEAN partners. From 2010 to 2015, the REER of Brunei Darussalam, Cambodia, Singapore, and Thailand decreased steadily, showing an upward trend in competitiveness of these countries against the rest of ASEAN. Similar to NEER, REER of Indonesia increased sharply over time, meaning that it consistently lost competitiveness against their partners. REER of Myanmar had a leap in 2012 then continuously increased from 2012 to 2015. The other ASEAN countries (Lao PDR, Malaysia, Philippines, and Vietnam) witnessed a fluctuation in their REER against ASEAN partners between 2010 and 2015. In general, as compared to 2010, in 2015, the competitiveness of Lao PDR and Philippines improved while that of Malaysia and Vietnam declined.

Chapter 4. An ASEAN monetary union? Empirical evaluation

According to the endogeneity hypothesis referred in chapter 2, the *ex-ante* fulfillment of the OCA criteria is not required to create a monetary union. The rationale is that the adoption of a common currency puts in action mechanisms of integration that lead to a homogeneous area, where the loss of monetary autonomy is not a major problem for any participant.

Since the endogeneity hypothesis is disputable, a set of countries that decide to form a monetary union should be on the safe side. Besides taking into account all non-economic aspects that are relevant for such a decision, being on the safe side also means fulfilling *ex-ante* the relevant OCA criteria.

In this chapter what is done is just an assessment of whether the set of countries participating in ASEAN fulfill *ex-ante* some of the criteria listed in the literature to check whether a group of countries is prepared for having a common monetary policy (and the related common exchange rate policy).

Following Alesina and Barro (2002), in this dissertation, the analysis focuses on three criteria, namely, the similarity of inflation rates, the degree of trade integration and the correlation of business cycles.²³ The analysis uses data post-1997 (the year of the Asian financial crisis), up to 2015. For comparison purposes, the Euro Area (EMU), which is the largest living monetary union in the world, is used as a benchmark.²⁴

4.1 Inflation

If a set of countries displays similar inflation rates before creating a monetary union, very likely they will keep having similar inflation rates in the new arrangement. This is relevant for preventing bias in internal trade since in a monetary union there is no exchange rate mechanism able to offset inflation rate differentials among the members.

²³ A similar procedure is undertaken in Loureiro *et al.* (2011) for two actual African monetary unions, whose currencies are pegged to the Euro.

²⁴ Currently, the Euro Area is composed by 19 countries. Here only 12 of them are considered, namely those that by 2003 (the beginning of the sample) were already members.

The behavior of inflation rates of ASEAN countries, in the period 2000-2015, is summarized in Table 4.1 and in Figure 4.1.²⁵ The data is annual, based on consumer price indexes, and is collected from the World Bank.

Table 4.1 describes summary statistics for the period, namely simple unweighted averages, the corresponding standard deviations and the maximum and minimum inflation rates of the period (with the respective years). The table also presents (i) the average inflation rate of ASEAN as a whole, computed as a simple mean of the averages of each member; and (ii) the corresponding standard deviation.

Table 4.1 - Inflation rates of ASEAN countries, 2000-2015

Country	Inflation rate (%)			
	Average	Standard deviation	Max. (year)	Min. (year)
Brunei Darussalam	0.6	1.0	2.1 (2011)	-2.3 (2002)
Cambodia	4.5	6.0	25.0 (2008)	-0.8 (2000)
Indonesia	7.4	2.9	13.1 (2006)	3.7 (2000)
Lao PDR	7.8	5.9	25.1(2000)	0.0 (2009)
Malaysia	2.2	1.2	5.4 (2008)	0.6 (2009)
Myanmar	15.5	16.2	57.1 (2002)	-0.1 (2000)
Philippines	4.2	1.7	8.3 (2008)	1.4 (2015)
Singapore	1.9	2.0	6.5 (2008)	-0.5 (2015)
Thailand	2.4	1.8	5.5 (2008)	-0.9 (2015)
Vietnam	7.2	6.4	23.1 (2008)	-1.7 (2000)
ASEAN*	5.4	4.5	-	-

Sources: World Bank (accessed in March 2017).

*Simple (unweighted) average of the inflation across member nations.

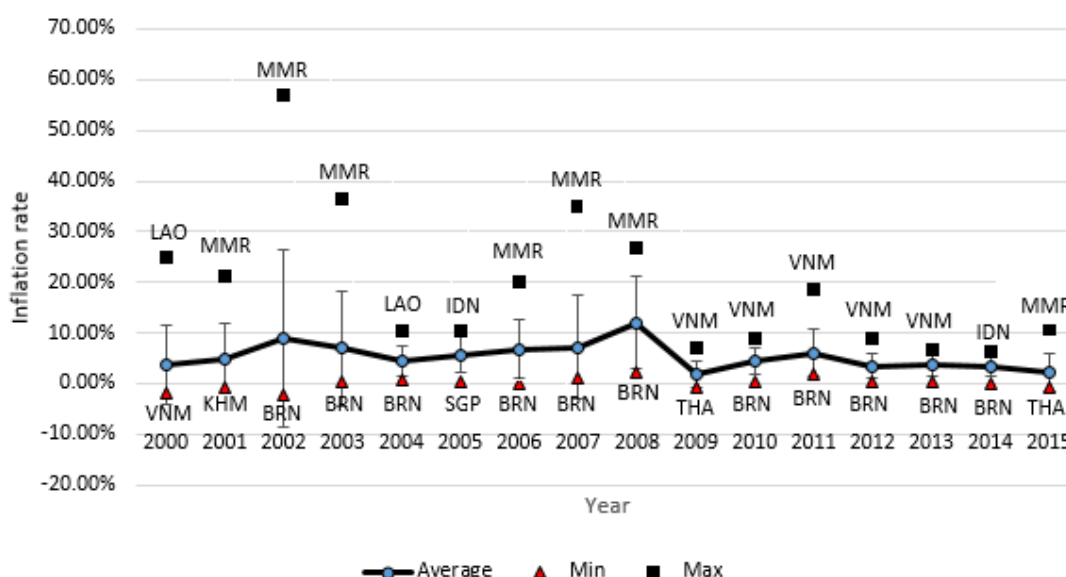
As can be seen from Table 4.1, diversity of inflation rate behaviors among ASEAN countries is a feature in the period. Brunei Darussalam, Malaysia, Singapore, and Thailand (the wealthier countries and founding members of ASEAN) displayed low average levels of inflation (below 2.5%), with relatively low volatility. In turn, five other countries (Cambodia, Indonesia, Lao PDR, the Philippines, and Vietnam) showed, on average, moderate inflation (between 4% and 8%), as well as moderate volatility. In

²⁵ The years 1998 and 1999 are not considered to avoid biased descriptive statistics due to the abnormal high inflation rates observed in those years in some ASEAN countries. In particular, the inflation rates of Lao PDR were 91.0% in 1998 and 128.5% in 1999; in Myanmar they were 51.5% and 18.4% in 1998 and 1999, respectively; and in Indonesia the inflation rate in 1998 was 58.4% and in 1999 it was 58.4%.

contrast, Myanmar showed a very high average for inflation rate, with substantial volatility, indicating that the inflation rate of Myanmar has fluctuated significantly during the sample period.

In order to better understand how inflation has evolved in ASEAN countries in the first fifteen years of the century, Figure 4.1 displays, for each year, the average, the standard deviation, and the minimum and maximum inflation rates observed in the ASEAN area. The vertical bars in the diagram link two points: the mean minus one standard deviation and the mean plus one standard deviation.

Figure 4.1 - Inflation rates in ASEAN countries, 2000-2015



Sources: World Bank (accessed in March 2017).

Note: BRN=Brunei Darussalam, KHM=Cambodia, IDN=Indonesia, LAO=Lao PDR, MMR=Myanmar, SGP=Singapore, THA=Thailand, VNM=Vietnam.

As can be seen from the Figure 4.1, during the period 2000-2015 there was a wide fluctuation in the annual inflation rates of ASEAN (as measured by the simple mean of member's inflation rates), particularly between 2000 and 2008. During this period, Lao and Myanmar, alternatively, had the highest inflation rates in the region and their values were far higher than the average inflation levels of the whole ASEAN. On the contrary, for the most of the period, Brunei Darussalam had the lowest inflation rates in ASEAN. However, in the most recent years (from 2009 onward), both the average inflation rates

and the corresponding standard deviations remarkably decreased, as compared to the previous years. Vietnam witnessed the highest inflation rates (although at relatively low levels, as compared with previous years), while Brunei Darussalam still kept the lowest inflation rates among ASEAN countries. Given the information provided in Figure 4.1, it can be concluded that ASEAN has recently witnessed a downward trend both in inflation rates and in the divergence of inflation rates across members.

To compare the recent behavior of inflation rates of ASEAN with the most well-known existing monetary union in the world, Table 4.2 presents the averages and the standard deviations of inflation rates of ASEAN and EMU in every year from 2011 to 2015. The average inflation rates are computed as the simple unweighted mean of all countries in each region. As shown in Table 4.2, the average inflation rates of ASEAN was higher than that of EMU but it declined sharply in recent years from 6.1% in 2011 to 2.2% in 2015. However, what is important to stress is not the average value of inflation, but rather the dispersion of inflation rates. In this regard, the standard deviations of the inflation rates of ASEAN countries were higher than those of the EMU region, indicating that in term of inflation rates, the ASEAN is not as homogeneous as the EMU. Very likely, this is the result of the very high growth rates observed in many ASEAN countries, which tend to pressure prices up.

Table 4.2 - Average and standard deviation of inflation rates, 2011- 2015

Inflation rate (%)	Area	2011	2012	2013	2014	2015
Average	ASEAN	6.1	3.5	3.8	3.4	2.2
	EMU	3.0	2.4	1.1	0.4	0.0
Standard deviation	ASEAN	4.4	2.3	2.1	1.9	3.5
	EMU	0.6	0.5	0.9	0.8	0.7

Sources: The World Bank (accessed in March 2017) and author's calculation

All in all, the information from Figure 4.1 and from Table 4.1 suggests that despite the large difference in inflation rates among ASEAN countries in the beginning of the 21st century, more recently, the inflation differential among ASEAN countries has been narrowed, i.e., a convergence process of inflation rates has been observed. Such a behavior gives support to the formation of a monetary union in ASEAN. However, the behavior of inflation rates is not the only economic criterion for deciding the creation of

a monetary union. Accordingly, in what follows two other relevant important criteria (trade integration and business cycle synchronization) will be checked.

4.2 Trade integration

Trade integration is here represented by the degree of openness, as measured by the sum of exports and imports, divided by twice the country's GDP. Due to the lack of data concerning intra-ASEAN trade in services, the analysis only uses data on international trade in goods. Also due to data scarcity before 2003, the analysis covers the period 2003-2015.

For each ASEAN country, two measures of openness are computed: (i) Total exports and imports relative to GDP and (ii) exports to and imports from the remaining 9 members of ASEAN relative to GDP. The former is a measure of openness to the world, while the latter measures openness to the ASEAN region.

For comparative purposes, similar measures of the two above are also computed for the Euro Area (EMU), for exactly the same period. This allows understanding whether ASEAN countries are more or less integrated with each other and with the world than the countries belonging to the most well-known monetary union in the world.

The data on international trade in goods with the world, both for ASEAN and for EMU members is collected from United Nations Conference on Trade and Development (Unctadstast). The data of intra-ASEAN trade in goods is taken from the ASEAN Statistics Division and the data of intra-EMU trade is taken from World Integrated Trade Solution. Finally, the data on GDP, both for ASEAN and for EMU countries is collected from the World Bank.

The openness of ASEAN countries over the period 2003-2015 is summarized in Table 4.3. Column I (Intra-regional) reports intra-ASEAN trade relative to GDP while column II (World) reports total trade with the world relative to GDP. Column III informs about the share of intra-regional trade in total international trade. The values presented for each country are simple means of annual figures over the period. The table also provides values for the whole ASEAN, taken as a single entity, and the reported figures are the simple means of all the members. Comparative indicators are reported for the Euro Area.

Table 4.3 - International trade in goods, 2003-2015

Country/Region	Trade (% of GDP) with		III = (I)/(II)
	Intra-regional (I)	World (II)	(%)
Brunei Darussalam	10.7	42.2	25.5
Cambodia	12.4	49.4	25.1
Indonesia	5.1	20.8	24.6
Lao PDR	14.3	25.0	57.3
Malaysia	19.7	71.8	27.4
Myanmar	9.4	16.6	56.6
Philippines	6.1	26.9	22.8
Singapore	41.5	148.3	28.0
Thailand	12.0	52.9	22.8
Vietnam	12.2	66.4	18.3
ASEAN*	14.4	52.0	27.6
EMU*	17.2	33.6	51.1

Sources:

- GDP: The World Bank (accessed in March 2017);
 - Trade with the world: United Nations Conference on Trade and Development (Unctadstat) (accessed in March 2017);
 - Intra-ASEAN trade: ASEANstats (accessed in March 2017);
 - Intra-EMU trade: World Integrated Trade Solution (accessed in March 2017).
- *Simple (unweighted) mean of the trade openness indicators across the member countries.

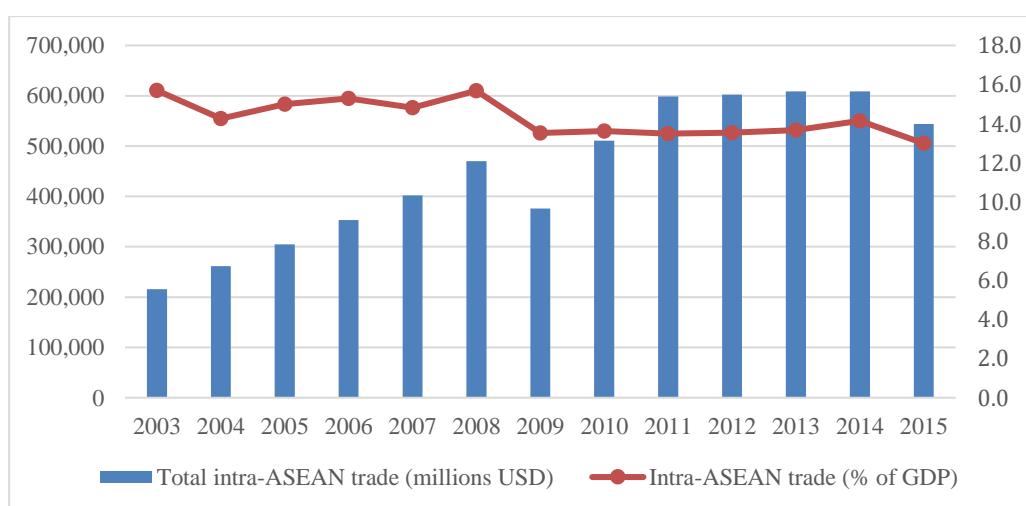
As can be seen from Table 4.3, from 2003 to 2015, the ASEAN's trade openness to the world was relatively high compared to that of the Euro Area (52.0% versus 33.6% of the corresponding GDPs). However, the uncommon high level of openness of Singapore (148.3%) distorted the average openness indicator of the whole ASEAN region. Excluding Singapore, the intra-trade mean of the 9 remaining countries represented 41.3% of GDP, which was still higher than that of the Euro Area. Six, out of the 10 countries of ASEAN had a degree of openness above 40% of the corresponding GDP, namely Brunei Darussalam (42.2%), Cambodia (49.4%), Thailand (52.9%), Vietnam (66.4%), Malaysia (71.8%), and Singapore (148.3%). On the other extreme, Myanmar was relatively closed (16.6%), followed by Indonesia (20,8%). In this latter case, the degree of openness can be explained by the dimension of the country. In fact, Indonesia has a domestic market with a big dimension, because of a population that exceeds 250 million people.

For the period 2003-2015, intra-regional trade in ASEAN as a percentage of GDP was slightly lower than that of the Euro Area. Intra-ASEAN trade represented, on average, 14.4% of the corresponding GDP and accounted for 27.6% of ASEAN total international trade while intra-EMU trade represents, on average, 17.2% of the GDP and 51.1% of the Euro Area total international trade.

As compared to the 9 remaining ASEAN countries, the trade of Singapore within the region is remarkably high, being almost three times the average of intra-trade of the 10 ASEAN members (41.5% versus 14.4%). If intra-ASEAN trade related to Singapore is not included, the average of intra-regional trade of ASEAN countries would fall to a much lower rate.

Figure 4.2 presents how intra-regional trade evolved in the ASEAN region between 2003 and 2015. As can be seen from the Figure, there was a steady increase in the level of intra-ASEAN trade during 2003 to 2011, with an exceptional drop in 2009 due to the world recession. From 2011 to 2014, intra-ASEAN trade remained stable at around 600 billion USD, slightly falling to 545 billion USD in 2015. However, during the period intra-ASEAN trade as a percentage of GDP was relatively stable, fluctuating between 14% and 16%.

Figure 4.2 - Intra-ASEAN trade in goods, 2003-2015



Sources:

- GDP: The World Bank (accessed in March 2017).
- Intra-ASEAN trade: ASEANstats (accessed in March 2017).

The relatively low levels of intra-ASEAN trade compared to ASEAN's trade with the world has been explained by a number of factors, namely the three that follows:

1) *The homogeneity of the factors of productions in the ASEAN economies*

The ASEAN economies have relatively similar factors of productions, which make them produce rather similar goods, both in agriculture and manufacturing. Therefore, the ASEAN countries are considered to be more in competition with each other than being complementary (Menon, 1996). Except in the case of Singapore, the nine remaining ASEAN economies are characterized by abundant natural resources and low-wage labour. Regarding exports, many ASEAN countries are large exporters of the same products. For example, Indonesia, Myanmar, Thailand, and Vietnam are large exporters of agricultural products while Brunei Darussalam, Indonesia and Malaysia export fuels and minerals. In turn, Malaysia, Philippines, Singapore, Thailand, and Vietnam export manufactured products. Regarding imports, China is the largest partner of most of ASEAN countries, due to its low price of exports and the favourable geographical location.

2) *The existence of tariff barriers*

During the observation period, ASEAN countries were in a process of tariff reduction and elimination. The removal of intra-ASEAN tariff barriers was part of the commitments catalogue on *Common Effective Preferential Tariff (CEPT)* under the AFTA (ASEAN Secretariat, 2014). In particular, the import duties on all products, except for those phased in from the *Sensitive and Highly Sensitive Lists* were planned to be eliminated by 2010 for ASEAN-6 and by 2015, with flexibility for some sensitive products by 2018, for CLMV (ASEAN Secretariat, 2008).²⁶ Although there has been significant progress in the removal of tariff barriers, this process has not finished yet and tariff barriers still have an impact on intra-regional trade in ASEAN.

3) *The increase in the number of non-tariff measures (NTMs)*

Contrary to tariff reform, little progress has been made in the removal of NTMs in ASEAN. On the other hand, the number of NTMs increased more than three times between 2000 and 2015, from 1634 measures in 2000 to 5975 measures in 2015. In 2015, there were 5975 NTMs implemented in the 10 ASEAN countries, of which (i) 33.2% of

²⁶ ASEAN-6 includes Brunei Darussalam, Indonesia, Malaysia, Philippines, Singapore, and Thailand. CLMV includes Cambodia, Lao PDR, Myanmar, and Vietnam.

total measures were in the form of sanitary and phytosanitary measures such as restrictions on substances, hygienic requirements, or other measures for preventing dissemination of diseases; (ii) 43.1% were technical barriers to trade such as labelling or other measures to protect the environment; (iii) 12.8% were export measures such as export taxes, export quotas, or export prohibitions; and (iv) 10.9% were in the form of various measures such as licensing, price control, subsidies, or rules of origin (Ing *et al.*, 2016).

From the analysis of the trade integration, it can be concluded that the openness of ASEAN countries to the world is considerably high, being abnormally high in the case of Singapore. Concerning intra-ASEAN trade, its relative importance is not much different from the case of the Euro Area. Furthermore, it is likely that the end of some barriers that have been in force will allow for internal trade to increase.

4.3 Business cycles synchronization

There are alternative approaches to measure the synchronization of business cycles. In this dissertation, the business cycles synchronization of ASEAN countries will be examined by computing the correlations of bilateral business cycles of ASEAN members as well as the correlations between the business cycles of each country and the business cycles of the ASEAN as a whole.

To measure the business cycles of each ASEAN country, the analysis uses real GDP per capita. Due to the scarcity of quarterly data, the business cycles have been calculated from annual data of real GDP per capita, covering 18 years, from 1998 to 2015.²⁷ Real GDP per capita is collected from the World Bank. To identify the business cycles of each country under examination, the “deviation cycle” approach suggested by Lucas (1977) is applied. The “deviation cycle” (or output gap) is defined by separating the cyclical component from the trend (or secular) component. It will be computed by filtering the logarithm of real GDP per capita using the Hodrick-Prescott (HP) filter (Hodrick and Prescott, 1997).

In a time series of, say, y_t , composed of a trend (g_t) and a cyclical component (c_t)

²⁷ The number of observations in the computation is a key issue. In order to have a minimum number of observations, the analysis uses data starting in 1998, i.e., one year after the break out of the Asian financial crisis.

$$y_t = g_t + c_t \quad (\text{for } t = 1, \dots, T)$$

to separate c_t from g_t , Hodrick and Prescott (1997) proposed to minimize the following expression:

$$\text{Min}_{\{g_t\}_{t=-1}^T} \left\{ \sum_{t=1}^T c_t^2 + \lambda \sum_{t=1}^T [(g_t - g_{t-1}) - (g_{t-1} - g_{t-2})]^2 \right\}$$

where λ is a smoothing parameter that penalizes the variability of the trend component.

Following Ravn and Uhlig (2012), the smoothing parameter (λ) is 6.25. This value is selected because when applying the HP filter for annual data, it generates results similar to those obtained with quarterly data.

To measure the aggregate business cycles of ASEAN as a union, the analysis uses the real GDP per capita of ASEAN from 1998 to 2015.²⁸ Given that the aggregate data for the real GDP per capita of ASEAN are not available, it is calculated by dividing the aggregate real GDP by the total population of ASEAN. Aggregate real GDP of ASEAN is computed by taking the GDPs measured at constant 2010 USD prices of all ASEAN countries, while the population of ASEAN is the sum of the population of each ASEAN country. Business cycles of ASEAN in a given year are also computed by de-trending the logarithm of real GDP per capita using the HP filter with a smoothing parameter of 6.25.

The linear correlation coefficient between the business cycles of each country (g_i) and the business cycles of the whole ASEAN (g_{AMU}) is calculated as:

$$\rho(g_i, g_{AMU}) = \frac{\text{Cov}(g_i, g_{AMU})}{\sigma(g_i)\sigma(g_{AMU})} = \frac{\sum_t (g_{i(t)} - \bar{g}_i)(g_{AMU(t)} - \bar{g}_{AMU})}{\sqrt{\sum_t (g_{i(t)} - \bar{g}_i)^2 (g_{AMU(t)} - \bar{g}_{AMU})^2}}$$

where \bar{g}_i, \bar{g}_{AMU} are the average business cycles of the sample period of, respectively, country i and ASEAN.

The same method is applied to compute the bilateral correlation coefficients of pairs of ASEAN countries.

The correlation coefficients range from -1 to 1. A positive correlation coefficient means that the business cycles fluctuate in the same direction, while a negative correlation

²⁸ The HP filter has beginning-of-sample and end-of-sample problems. To avoid the beginning-of-sample problem, we filter real GDP per capita since 1996 and only use the data from 1998. To solve the end-of-sample problem, we filter real GDP per capita until 2017 and only use the data until 2015. The projections of real GDP per capita for 2016 and 2017 are computed by dividing the projections of real GDP by the projections of population for 2016 and 2017. The projections of real GDP for 2016 and 2017 are taken from the International Monetary Fund, while the projections of population for 2016 and 2017 are collected from the World Bank.

suggests that the business cycles move in opposite directions. The business cycles are considered to be significantly synchronized (at a significant level of 5%) if the correlation coefficients are equal to or larger than 0.4. In such a case, the business cycles have similar behaviors, which could give support to a common currency.²⁹

Table 4.4 - Correlation of business cycles between ASEAN countries, 1998-2015

Country	BRN	KHM	IDN	LAO	MYS	MMR	PHL	SGP	THA	VNM
BRN		0.16	0.27	0.33	0.31	-0.46	0.11	0.52	0.52	0.22
KHM			0.16	0.58	0.75	0.16	0.70	0.46	0.37	0.40
IDN				-0.09	0.34	0.20	0.42	0.19	0.40	0.61
LAO					0.40	0.04	0.34	0.43	0.29	0.14
MYS						0.12	0.82	0.70	0.59	0.44
MMR							0.38	0.15	0.07	0.43
PHL								0.65	0.74	0.51
SGP									0.64	0.45
THA										0.30
VNM										

Source: Author's calculations.

Notes: BRN=Brunei, KHM=Cambodia, IDN=Indonesia, LAO=Lao PDR, MYS=Malaysia, MMR=Myanmar, PHL=Philippines, SGP=Singapore, THA=Thailand, VNM=Vietnam.

Bold figures are positive and statistically different from 0 at a significance level of 5%.

Table 4.4 provides the computed correlations of bilateral business cycles among ASEAN nations for the period 1998-2015. As can be seen from the table, most of the cross-correlations (forty-three out of forty-five) are positive, only two being negative. These are the pairs of Brunei-Myanmar (with a correlation coefficient of -0.46) and Indonesia-Lao PDR (with a correlation coefficient of -0.09). Among the positive correlations, half of them (twenty-two out of forty-three) is equal to or larger than 0.40, the critical value for rejecting the null hypothesis of insignificant correlation at a one-

²⁹ The business cycles may be considered significantly synchronized (at a significant level of 5%) if the correlation coefficients are statistically different from 0. To test the significance of the correlation coefficient, we use the hypothesis test:

H₀: ρ=0 (variables are not correlated)

H₁: ρ≠0 (variables are correlated)

T-student test statistic: $t = r \sqrt{\frac{N-2}{1-r^2}} \sim t_{(n-2)}$, where r is observed correlation and N is sample size.

Given the sample size N=18, correlation coefficients equal to or larger than 0.4 can be considered statistically different from 0 (at a significant level of 5% and assuming normality).

tailed 5% level of significance.³⁰ More specifically, some pairs of countries exhibit a high correlation of business cycles, as are the cases of Malaysia-Singapore (0.70), Philippines-Cambodia (0.70), Philippines-Thailand (0.74), Malaysia-Cambodia (0.75), and Malaysia-Philippines (0.82).

Table 4.5 - Correlation of business cycles with ASEAN, 1998-2015

Country	ASEAN
Brunei Darussalam	0.47
Cambodia	0.61
Indonesia	0.61
Lao PDR	0.40
Malaysia	0.87
Myanmar	0.30
Philippines	0.87
Singapore	0.82
Thailand	0.81
Vietnam	0.59

Source: Author's calculations.

Note: **Bold** figures are positive and statistically different from 0 at a significance level of 5%.

Table 4.5 presents the correlation coefficients between the business cycles of each ASEAN country and the business cycles of ASEAN as a union. For the purpose of the present dissertation, these are, actually, the most relevant correlations to consider. Nine out of the ten ASEAN members show positive and significant levels of synchronization with the aggregate cycle of ASEAN. Among them, the business cycles of Thailand, Singapore, Philippines, and Malaysia exhibit high degrees of co-movement with ASEAN as a whole, with correlation coefficients of 0.81, 0.82, 0.87, and 0.87, respectively. These four countries are in the top five members of ASEAN, concerning total GDP. Indonesia, which is the ASEAN country with the highest total GDP of ASEAN shows a business cycle correlation with the whole ASEAN of 0.61.

On the other hand, Myanmar is the only country with business cycles not significantly correlated with the ASEAN. Even though, it presents a positive figure of 0.30. One possible explanation for the weaker synchronization observed for the business

³⁰ For a sample size of 18 observations and assuming normality.

cycle of Myanmar with ASEAN is the fact that Myanmar underwent many years of economic isolation and only started liberalizing its economy in 2011.

In order to compare the behavior of business cycles in the ASEAN with the business cycles in the Euro Area, a similar approach was conducted to compute the correlation of business cycles between each EMU country with the whole Area. Calculations cover the same period, i.e., 1998-2015.

Table 4.6 - Correlation of business cycles in the Euro Area, 1998-2015

Country	EMU
Austria	0.91
Belgium	0.90
Finland	0.95
France	0.96
Germany	0.92
Greece	0.20
Ireland	0.58
Italy	0.90
Luxembourg	0.87
Netherlands	0.92
Portugal	0.73
Spain	0.81

Source: Author's calculations.

Note: **Bold** figures are positive and statistically different from 0 at a significance level of 5%.

As shown in Table 4.6, eleven out of twelve Euro Area members show positive and significant levels of correlation with the aggregate cycle of EMU. Among them, there is a group of countries showing very high degrees of synchronization with the whole union (having the correlation coefficients equal to or higher than 0.9). This group includes Belgium (0.9), Italy (0.9), Austria (0.91), Germany (0.92), the Netherlands (0.92), Finland (0.95), and France (0.96). The business cycles of Ireland, Portugal, Spain, and Luxembourg are also significantly correlated with the whole union, with correlation coefficients of 0.58, 0.73, 0.81 and 0.87, respectively. Curiously, like in the ASEAN, also in the Euro Area there is one country with business cycles not correlated with those of the region (Greece).

In general, the business cycles of ASEAN countries are less correlated with the business cycles of whole region, as compared with the case of the Euro Area. In any case, the comparison is for two distinct realities. In one case (ASEAN), the assessment is for a set of countries that have not been in a monetary union, while in the other (Euro Area), the assessment is for an existing monetary union.

The conclusion that can be drawn from the present section is that, in general, correlation of business cycles would not be a major obstacle for ASEAN countries to form a monetary union. With the exception of Myanmar, all the remaining countries show a positive statistically significant correlation of economic fluctuations with those of the “union”. Additionally, the five countries with the highest GDPs in ASEAN show the highest correlations of business cycles with the Association.

According to the behavior of business cycles, Myanmar would be the ASEAN member subject to a higher cost, would it decide to adopt a single ASEAN currency. In that case, the common monetary policy of the union would not likely be the most suitable for Myanmar’s economy. In any case, the openness of Myanmar is a very recent phenomenon and, for that reason, a shift in the behavior of its business cycle is likely to be in progress.

Chapter 5. Conclusions

The ASEAN was founded in 1967 with five members (Indonesia, Malaysia, the Philippines, Singapore, and Thailand) and its main purpose was to ensure security and political stability, in a time the communist ideology was considered a potential threat. However, since the beginning of the 1990s, attention started to be focused on closer economic cooperation. First, the Association evolved to a free trade zone and, in 2015, the ASEAN Economic Community was launched. By that time, the number of members had already increased to the current ten.

Although the creation of an ASEAN monetary union has not been, so far, included in the official agenda, the issue has been occasionally discussed in some forums. Also in the economic literature, some few papers have dealt with the creation of an ASEAN monetary union, particularly following the financial crises of 1997 that has hurt many countries in the region.

This dissertation aimed to analyze the feasibility of a monetary union formed by the current ten members of ASEAN. For that purpose, the study refers to the classical OCA theory and, like in Alesina and Barro (2002), focuses on three particular indicators, namely inflation, trade integration and business cycle synchronization. The analysis assesses historical behavior in order to decide whether the set of ASEAN members fulfill *ex-ante* some basic requirements for sharing a common monetary policy.

Concerning the behavior of prices, the data shows that in recent years, inflation rates of ASEAN countries show a low dispersion. Even Myanmar that, for many years has shown very high inflation rates, has recently converged to the mean. This is good news for a monetary union, since similar performances in terms of inflation grant that real exchange rates among members do not follow an unsustainable path.

Regarding trade integration, the openness of ASEAN countries to the world is, on average, very high, actually much higher than, for example, that of the Euro Area. Most of the international trade of ASEAN members is not regional trade. In any case, intra-ASEAN trade is not, on average, much lower than trade between members of the Euro Area. It should be further noted that an eventual adoption of a common currency, may increase intra-ASEAN trade, as a result of the elimination of exchange rate risk and

foreign exchange transaction costs. In addition, it might help in reducing other trade barriers since a common currency would come along with a deepening of the union.

Concerning common economic fluctuations, the conclusion is that, in general, the business cycles of ASEAN members are significantly synchronized with the cycles of the whole ASEAN area. The only exception is Myanmar, which has a lower correlation that, despite being positive, is not statistically significant. One possible explanation for the case of Myanmar is the political closeness of the country for many years.

All in all, the conclusion that can be drawn from the investigation carried out is that none of the criteria assessed preclude the creation of an ASEAN monetary union. The only case for which reservations could be raised is Myanmar.

It should be stressed that conclusions are based only on a set of (relevant) economic criteria. However, beside economic considerations, political factors will also play a role in any monetary integration decision. Actually, it has a decisive role.

An additional issue that could be raised is: if an ASEAN monetary union is eventually adopted, what would be the appropriate exchange rate regime to choose for the new common currency? Being a relevant question, the answer to it is beyond the scope of this dissertation.

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