

EVALUATING ECONOMIC INTEGRATION IN ASEAN: PERSPECTIVES FROM A CLUSTER ANALYSIS

*Maria Estela Varua, Arlene Garces-Ozanne and Rachel Benic**

This paper uses hierarchical cluster analysis to examine the degree of economic integration among member countries of the Association of Southeast Asian Nations (ASEAN), and Japan, China and the Republic of Korea during three time periods: 1969-1984, 1985-1994 and 1995-2009. The results indicate that the five founding members of ASEAN, Indonesia, Malaysia, the Philippines, Singapore and Thailand, have become less integrated over time. Moreover, the region as a whole does not appear to have attained the degree of integration that was hoped for at the time the Association was established 30 years ago.

JEL Classification: F15, O53.

Key words: ASEAN, economic integration, cluster analysis, Japan, China, Republic of Korea, Asian economies.

I. INTRODUCTION

ASEAN was jointly established on 8 August 1967 in Bangkok by five countries, Indonesia, Malaysia, the Philippines, Singapore and Thailand, to promote regional peace and stability, and to accelerate economic growth, social progress and cultural development within the region.

The underlying motivations for the creation of ASEAN were related to the escalating war in Viet Nam and the Cultural Revolution in China. Thus, it was initially political and security objectives, as opposed to economic ones, that prompted increased cooperation within the region. ASEAN has since expanded to include five additional countries: Brunei Darussalam joined in 1984; followed by

* Maria Estela Varua and Rachel Benic, School of Economics and Finance, University of Western Sydney, NSW, Australia; Arlene Garces-Ozanne, Department of Economics, University of Otago, New Zealand

Viet Nam in 1995; Lao People's Democratic Republic and Myanmar in 1997; and Cambodia in 1999. Currently, economic, rather than political cooperation, is the primary goal of the Association.

In addition to increasing economic cooperation and integration within its membership, ASEAN has strengthened ties with other Asian nations. In November 1999, leaders of Japan, China and the Republic of Korea issued a joint statement with some of the leaders of ASEAN member countries outlining areas of cooperation among them. The grouping of these countries with ASEAN is referred to as ASEAN+3. Since the tie-up, ASEAN has also stepped up efforts to establish a unified economic community, the ASEAN Economic Community, similar to that of the European Union (EU), by 2015. One objective is to have a free flow of goods, services, investment and skilled labour within the next few years. Recently, there have also been proposals for a single EU-style ASEAN visa in the hopes of encouraging more trade and tourism among member nations.

The main objective of this paper is to examine whether ASEAN is achieving its goal of becoming more economically integrated. This will be verified using hierarchical cluster analysis to discern the natural grouping of countries within the region. The findings of this analysis can help determine whether the clustering of ASEAN member countries have changed over the years, and if the members have become more similar, which is an indication that current efforts of ASEAN towards economic integration have been successful, or at least moving in that direction.

The remainder of the paper is organized as follows. The next section presents a review of existing literature on economic integration in general and ASEAN economic integration in particular. Section III describes the data and the method of analysis used in this study. Section IV presents the results of the cluster analysis, and finally, section V summarizes and concludes the paper.

II. REVIEW OF LITERATURE

Economic Integration

The benefits and costs of economic integration and trade liberalization in developing countries are often debated. While the advantages of lower trade barriers among economies in a particular region are extensive, the costs can be disastrous, especially for the smaller economies in the region. Theoretically, free trade maximizes welfare as it fosters specialization on the basis of comparative advantage. This, in turn, results in lower cost imports. Alternatively, economies of

scale may arise at the regional level through increased cooperation, which would not be possible in individual economies that are too small to support such activities.

However, Hussey (1991) notes that trade liberalization generally benefits the more economically developed members but could retard growth in the less developed countries. Thus, in regions that include countries at various stages of development, trade liberalization may not be in the best interest of all of its members.

Venables (2000) considers the implications of regional economic integration, although, he focuses more narrowly on trade liberalization in the form of free trade areas and customs unions. He argues that welfare losses may arise from importing intraregional products in preference to lower cost imports from the rest of the world (trade diversion). Conversely, gains from trade may arise if domestic production is displaced by cheaper intraregional products (trade creation). Venables further points out that changes in tariffs as a result of trade liberalization results in a loss in government tariff revenue. This cost can be severe in developing countries where tariff revenue comprises a significant portion of government income. He cites the example of Cambodia, which derived 56 per cent of its total tax revenue from customs duties prior to its entry into ASEAN.

Trade diversion may also result in an improvement in the terms of trade for the integrating region, as demand for extraregional imports falls. Winters and Chang (2000) demonstrate that the membership of Brazil in the Southern Common Market (MERCOSUR) has been accompanied by a significant decline in the relative prices of imports from non-member countries. While this is clearly beneficial for regional members, any economic gain is at the expense of outside countries.

ASEAN Economic Integration

The discussion of whether the economic integration of ASEAN has been beneficial is controversial within the literature on this subject. Authors have been divided on many issues ranging from whether integration has been achieved to whether the Association has assisted in easing the detrimental effects of economic shocks. Despite disagreement over the economic success of ASEAN, it is widely agreed that the Association has fostered a strong regional identity among its members.

For instance, Hussey (1991) notes that although ASEAN has had limited success in promoting economic cooperation, it has, nonetheless, been more effective at curbing the outbursts of intraregional hostility and conflicts among the member countries prior to the establishment of the Association. Kurus (1993) also criticizes the progress ASEAN had made prior to the joining of Viet Nam, the Lao People's

Democratic Republic, Myanmar and Cambodia in the late 1990s. He notes, like Hussey, that the region has been substantially more successful in the political arena than in generating economic cooperation among members. The notion that ASEAN has achieved only limited success in its primary objective of developing economic cooperation and integration is shared by others (see also Buszynski, 1987 and Denoon and Colbert, 1999). Nevertheless, the possibility that greater political and diplomatic cooperation has both directly and indirectly led to economic gains within the region cannot be ignored.

The ASEAN free trade agreement (AFTA) of 1992 is considered by many scholars to be the first major step towards economic integration taken in the region since the inception of the Association in 1967. However, there are mixed opinions regarding its success. Angresano (2004) believes the agreement has not had a substantial impact, while Stubbs (2000) concedes a limited amount of success. Regardless of whether success has been achieved in trade circles, literature generally agrees that economic cooperation within the region increased as a result of AFTA.

In terms of lessening the effects of the 1997 Asian financial crisis and subsequently accelerating the economic recovery among members, Denoon and Colbert (1999) conclude that neither ASEAN as a whole nor any individual country were able to provide the resources to alleviate the crisis and restore financial and economic stability. They argue that the region's inability to deal effectively with the crisis affected the international status of the Association, which will take a lot of work to restore. Similarly, Ruland (2000) observes that the response of ASEAN to the crisis focused on alliance-building rather than designing a blueprint for better cooperation. He emphasizes the failure of the establishment of the Asian Monetary Fund (AMF), which the ASEAN finance ministers, with the support of Japan, proposed as an alternative to the International Monetary Fund (IMF). The IMF adamantly rejected the proposal. Ruland points out that, except for Singapore, no ASEAN country had the means to contribute to the fund in the first place.

Both Denoon and Colbert (1999) and Ruland (2000) concede that although the degree of cooperation within ASEAN was inadequate as a means of dealing with the crisis, it did reveal the importance of greater economic integration. The crisis served as a catalyst to reinforce the organization's focus on economic cooperation, resulting in such plans as the ASEAN Vision 2020.¹

¹ The ASEAN Vision 2020 is a commitment that heads of states/governments of ASEAN member countries reaffirmed during the fortieth anniversary of the establishment of ASEAN, calling for a stable, prosperous and highly competitive ASEAN economic region.

III. DATA AND METHOD OF ANALYSIS

The countries examined are classified into: ASEAN, which includes the current members:² Cambodia; Indonesia; Lao People's Democratic Republic; Malaysia; Myanmar; Philippines; Singapore; Thailand; and Viet Nam; ASEAN+3, which includes the current member countries plus China, Japan and the Republic of Korea; and ASEAN-5, which includes only the five founding members of ASEAN: Indonesia; Malaysia; Philippines; Singapore; and Thailand.

The rationale for including ASEAN-5 is derived from the fact that these countries have been integrated through their membership in ASEAN since 1968. It is presumed that ASEAN-5 would exhibit a higher degree of economic integration than ASEAN; hence, the comparison of these two regions is made to test whether this is in fact the case.

To provide a more comprehensive analysis and allow for data constraints, three time periods are examined, 1969-1984, 1985-1994 and 1995-2009. Data for a number of countries outside ASEAN-5 are not available prior to 1995; hence, only this subgroup is examined in all three periods. Breaking the period from 1969 to 1994 into two (1969-1984 and 1985-1994) is justified from an historical perspective since it was during that time that Brunei Darussalam became the first non-founding member to join the Association.³ ASEAN and ASEAN+3 are only investigated in the 1995-2009 period.

In this study, the optimum currency area (OCA) theory helps define and measure economic integration. To measure economic integration, variables of economic integration suggested by the OCA theory as well as other variables measured in other studies are considered. Deepening institutional integration is most beneficial among member nations participating in the regional arrangement. Inflation convergence, for example, is a key element of the Maastricht Treaty for the creation of a single European currency. As to exchange rate, low levels of exchange rate variability is a corollary of the OCA property on convergence. If real exchange variability is low and currencies are stable with each other, then the cost of exchange rate flexibility is lower. Likewise, monthly market returns are included as a measure of financial integration. Under a high degree of financial integration, even modest changes in interest rates, would elicit equilibrating capital movements

² Brunei Darussalam has been a member of ASEAN since 1984. It has been excluded from the analysis due to data availability constraints. Hence, during the period 1969-1994, data from only the original member countries of ASEAN are included in the analysis.

³ Similarly, the third period (1995-2009) can be justified since the other members of ASEAN only became members in the late 1990s.

across partner counties. Also, interest rates are included as a measure of economic integration as they indicate the degree of similarity of the monetary policy stance across countries. Finally, this paper argues that economic integration enhances the convergence across countries in a region. Previous studies argue (Ben-David, 1993) that more integration and openness lead to more mobility of factors of production, which may result in convergence of income levels.

Data for the ASEAN economic integration analyses were obtained from the International Financial Statistics (IFS) published by the IMF and the statistical database Datastream.⁴ Annual gross domestic product (GDP) per capita, annual consumer price indices (CPI) and monthly real exchange rates in United States dollars were taken from IFS. Data on quarterly interest rates and monthly stock price indices have been collected from Datastream and Yahoo Finance, respectively. GDP per capita figures were converted into real GDP per capita in United States dollars⁵ at 2005 prices, annual inflation rates were calculated from the CPI, and quarterly percentage change in stock prices were derived from the stock price indices. Data on interest rates and stock prices were only available for the ASEAN-5 region, and only during the 1995-2009 period.

For each country, means and standard deviations are presented for the variables real GDP per capita in United States dollars, inflation, real exchange rates in United States dollars and stock market returns, in tables 1, 2, 3 and 4, respectively. Descriptive statistics for the ASEAN-5 countries are calculated for periods 1970-2009 (the entire sample period) and 1995-2009 (the period for which data from other countries are available). The descriptive statistics for the other countries are calculated only for the period 1995-2009.

Table 1 clearly shows that the mean per capita income of Singapore and Japan has been significantly higher than that of the other ASEAN members. Singapore has also had a low, stable rate of inflation over the period, and its real exchange rate has shown only small fluctuations although it has not been as steady as the exchange rates of some other countries whose currencies have been pegged to the United States dollar over the past three decades.

⁴ Accessed 2 April 2010 at the University of Western Sydney, Parramatta, Australia.

⁵ United States dollars have been chosen to standardize the data as most countries have traditionally pegged their currencies against the United States dollar. In addition to this, Lim (2005) finds that none of the East Asian currencies, except the Hong Kong dollar, have a long-run co-integrating relationship with the Japanese yen. The countries common to this paper and that of Lim include: Indonesia; Malaysia; Philippines; Singapore; Thailand; Japan; and the Republic of Korea.

**Table 1. Descriptive statistics for real GDP per capita
(United States dollars)***

Country	1969-2009		1995-2009	
	Mean	S.D.	Mean	S.D.
Indonesia	671.4252	459.3323	1 123.3038	444.1550
Malaysia	3 753.5965	1 394.8127	5 075.8275	1 084.2451
Philippines	3 718.8004	2 785.9190	1 380.5886	292.2147
Singapore	15 153.3297	9 931.1506	26 658.9676	4 901.5564
Thailand	2 233.7989	750.9448	2 796.7314	669.3222
Viet Nam			522.4436	95.7187
Lao People's Democratic Republic			418.1786	152.7752
Myanmar			293.3859	95.5625
Cambodia			421.1788	119.5418
Japan			34 983.6248	3 020.4518
China			1 372.3250	763.9754
Republic of Korea			13 919.1691	4 262.7407
Average	5 106.1901	3 064.4319	7 413.8104	1 325.1883

Note: *at constant 2005 prices (CPI 2005 = 100).

The global recession of the early 1970s had a considerable effect on ASEAN-5 countries. Inflation rates peaked at 40.6, 17.3, 34.2, 22.4 and 23.3 per cent in Indonesia, Malaysia, the Philippines, Singapore and Thailand, respectively. In spite of the high inflation rates, ASEAN-5, as a whole, was not as affected by the second economic downturn in the early 1980s. The Philippines, however, experienced a recession during the period 1984-1985, which resulted in per capita incomes and exchange rates plummeting by 104.4 and 77.9 per cent, respectively, over the two years, and inflation rates reaching 46.7 per cent in 1984. This was caused by political instability during the presidency of Ferdinand Marcos.

Also of note are the particular trends in individual countries. Indonesia, the Philippines, the Lao People's Democratic Republic and Cambodia, for example, have all been experiencing lower growth of real GDP per capita over time, while Malaysia, Singapore, Thailand, Myanmar and China have seen increased growth in real GDP per capita during the period 1995-2009.

The Asian financial crisis in 1997 affected the ASEAN countries in varying degrees, but the predominant results have been lower incomes, higher inflation and weaker currencies. The countries most affected by the crisis were Indonesia, Malaysia, Thailand, the Lao People’s Democratic Republic and the Republic of Korea. The Philippines, Singapore, Viet Nam, Myanmar and Japan were affected to a lesser degree due to their respective Government policies, and in the case of the Philippines and Viet Nam, remittances from overseas workers and an inconvertible currency, respectively, served as a buffer against the adverse affects of the crisis. On the contrary, China has been virtually unaffected by the crisis due to the closed nature of its economy.

All these differences are factors when considering income, inflation and exchange rate convergence among the countries under study. Whether a region is converging is directly related to the policies of individual countries, and events, such as currency crises and political instability. These factors, therefore, need to be taken into account when assessing the results of the various tests.

Table 2. Descriptive statistics for inflation (percentage)*

Country	1969-2009		1995-2009	
	Mean	S.D.	Mean	S.D.
Indonesia	11.5694	8.0781	11.6829	10.5389
Malaysia	3.6161	2.8922	2.7341	1.3348
Philippines	10.0377	7.4865	5.8201	1.9850
Singapore	2.8695	4.2706	1.3392	1.6448
Thailand	5.1431	4.5167	3.5471	2.2631
Viet Nam			7.9827	9.6003
Lao People's Democratic Republic			20.8124	23.4296
Myanmar			21.6243	12.8533
Cambodia			5.7249	6.2221
Japan			0.0611	0.7635
China			3.4070	4.1147
Republic of Korea			3.5353	1.5524
Average	6.6472	5.4488	7.3559	6.3585

Note: *2005 CPI = 100.

**Table 3. Descriptive statistics for real exchange rates
(in United States dollars)**

Country	1969-2009		1995-2009	
	Mean	S.D.	Mean	S.D.
Indonesia	0.0010	0.0009	0.0002	0.0001
Malaysia	0.3579	0.0653	0.2876	0.0470
Philippines	0.0752	0.0587	0.0243	0.0073
Singapore	0.5199	0.1080	0.6242	0.0564
Thailand	0.0385	0.0091	0.0280	0.0057
Viet Nam			0.0001	0.0001
Lao People's Democratic Republic			0.0003	0.0004
Myanmar			0.1670	0.0110
Cambodia			0.0003	0.0001
Japan			0.0088	0.0008
China			0.1235	0.0066
Republic of Korea			0.0010	0.0008
Average	0.1985	0.0484	0.1054	0.0114

**Table 4. Descriptive statistics for monthly stock returns
(1995-2009)**

Country	1995-2009		
	STOCK INDEX	Mean	S.D.
Indonesia	JKSE	0.84	9.79
Malaysia	KLSE	0.15	8.12
Philippines	PSE	0.11	8.16
Singapore	STI	0.26	8.11
Thailand	SET	0.07	9.83
Average		0.28	8.80

To determine whether there is a natural grouping of countries present within the ASEAN, ASEAN+3 and ASEAN-5 regions, a hierarchical cluster analysis has been carried out. An agglomerative method is used in which the twelve countries are successively fused into groups (or clusters) until there is only one cluster

containing all the countries. The manner through which this fusion takes place is based on some distance formula, which combines the countries depending on their proximity to each other in terms of the series of selected economic integration variables discussed in the previous section. A further relevant issue is the normalization of the data. As a starting point, equal weight is given to each of the economic integration variables. Under the assumption that the variables are each distributed normally, the data are transformed to have the same mean and standard deviation. A mean of zero and a standard deviation of unity are selected. The cluster analysis is carried out for each of the three regions, and in regard to ASEAN-5, in each of the three time periods.

There are six common agglomerative methods that may be used to perform a hierarchical cluster analysis: The Single Linkage (Florek and others, 1951); the Complete Linkage (Sorensen, 1948); the Group Average Linkage and the Centroid Clustering (Sokal and Michener, 1958); the Median Linkage (Gower, 1967); and Ward's Method (Ward, 1963).

There is no specific process by which to identify the best method to use in a hierarchical cluster analysis. This study makes use of Ward's method, which is often considered the preferred method in the empirical literature (see for example Duflou and Maenhout, 1990; Baxter and Crucini, 1995; and Hands and Everitt, 1987).

Ward's method uses the error sum of squares to link clusters. Two clusters are fused together if this results in the smallest increase in the total error sum of squares (E) of all clusters,

$$E = \sum_{c=1}^m E_c \quad (1)$$

Where the total error sum of squares is the sum of the error sum of squares of all clusters $c = 1, \dots, m$, and

$$E_c = \sum_{i=1}^{n_c} \sum_{k=1}^p (x_{cik} - \bar{x}_{ck})^2 \quad (2)$$

Where the error sum of squares for cluster c (E_c) is the sum over all individuals in that cluster $i = 1, \dots, n_c$ and all variables $k = 1, \dots, p$, of the squared Euclidean distance between the mean of cluster c for variable k (\bar{x}_{ck}), and each individual's score for that variable (x_{cik}).

This study essentially follows Ward's method, except that the variables are first standardized to the range of 0 to 1 before calculating the distance between clusters. The distance metric used in this analysis is a revised squared Euclidean distance, whereby:

$$D(i, j) = \sum_{k=1}^p (x_{ik} - x_{jk})^2 \quad (3)$$

Where $D(i, j)$ measures the squared Euclidean distance between country i and country j for all economic integration variables $k = 1, \dots, p$. $D(i, j)$ may also be expressed as the dissimilarity between countries i and j .

The calculations were performed in statistical package for the social sciences (SPSS). This programme identifies which countries were fused together at each stage of the analysis. This fusion process continues until there is only one cluster containing all countries. While this provides some useful information regarding the similarities between countries, it is more within the objectives of this study for the analysis to stop at a certain "optimal" number of clusters. The decision on the numbers to proceed with must be determined in a transparent manner.

The simplest way of selecting the optimal number of clusters is to look at a dendrogram (a pictorial representation) of the results. By essentially "chopping" the dendrogram at a certain point, two or more clusters remain. Large changes in the fusion levels are a good indication of where the hierarchy should be cut. While this method is quick, it is very subjective and contains the inherent possibility of bias on the part of the researchers as expected results may cloud their vision.

An objective method of choosing the optimal number of clusters is the upper tail rule (Mojena, 1977), which is specified by the following inequality:

$$\alpha_{j+1} > \bar{\alpha} + ks_{\alpha} \quad (4)$$

Where fusion levels $\alpha = 0, \dots, n - 1$ correspond to stages with $c = n, \dots, 1$ clusters. The terms $\bar{\alpha}$ and s_{α} are respectively the mean and standard deviation of the j previous fusion levels, and k is a constant. A value of k of 1.25 is suggested (Everitt and others, 2001). The first stage of the dendrogram to satisfy equation (4) is an indication of the optimal number of clusters.

Table 5. Resulting clusters

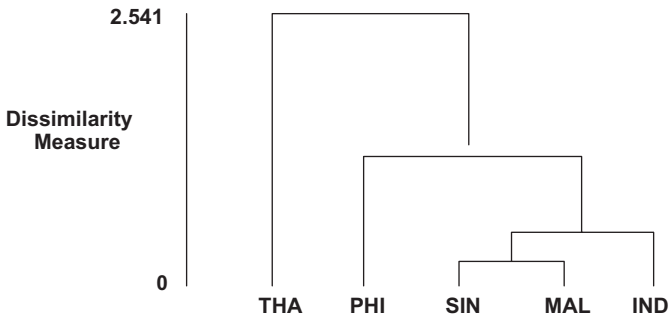
Region	Time period	Cluster one	Integration coefficient	Cluster two	Integration coefficient	Cluster three	Integration coefficient	Cluster four	Integration coefficient	Cluster five
ASEAN-5	1969-1984	Indonesia Malaysia Philippines Singapore	1.105	Thailand		-		-		-
	1985-1994	Malaysia Philippines Thailand Singapore	1.138	Indonesia		-		-		-
ASEAN	1995-2009	Indonesia Malaysia Philippines Thailand	0.165	Singapore				-		-
	1995-2009	Cambodia Indonesia Philippines Thailand Viet Nam	0.013	Malaysia	0.074	Lao People's Democratic Republic Myanmar	0.238	Singapore		
ASEAN+3	1995-2009	Cambodia China Indonesia Republic of Korea Philippines Thailand Viet Nam	0.012	Japan	0.604	Lao People's Democratic Republic Myanmar	0.217	Malaysia	0.071	Singapore

IV. RESULTS

The results of the hierarchical cluster analysis are presented in table 5. Additionally, figures 1 to 5 provide pictorial representations (dendrograms) of the resulting clusters.⁶ The results of the cluster analysis are fairly consistent across the different ASEAN regional subgroups under consideration. For instance, in the 1970-1984 period, the ASEAN-5 countries form two clusters, one containing only Thailand, with the remaining ASEAN-5 members in the other cluster. Despite the expectation that the region would form a cluster comprising all five countries, thus justifying the establishment of ASEAN, there are various reasons for this particular division.

In the 1970s, the growth rate in Thailand was comparable to that of Malaysia. However, in 1981 and 1982, the country recorded negative growth rates, partially due to a global recession. In the early 1980s, Thailand's main trading partners were Japan, the United States, the European Union countries and Australia despite the preferential trade agreements with other ASEAN members. In addition, political instability stemming from a series of military coups in the late 1970s and early 1980s may also have contributed to the country's adverse economic situation.

Figure 1. Hierarchical cluster analysis – dendrogram for ASEAN-5
1970-1984

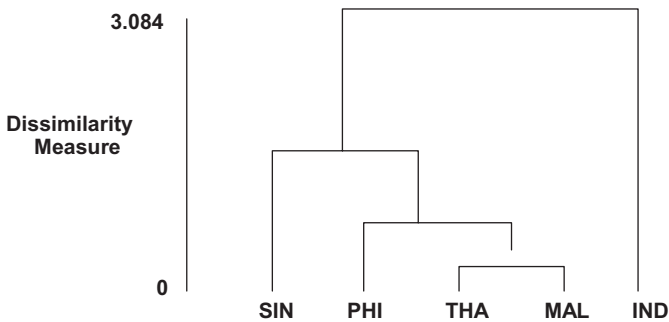


⁶ All dendrograms created with Microsoft Drawing following SPSS output.

Despite Thailand’s economic downturn, exchange rates during this period were particularly steady (real exchange rate variability was 0.274) as a result of the baht being pegged at a rate of 20 baht per United States dollar. On the contrary, the average exchange rate variability in the other ASEAN-5 members was 52.3 per cent higher over the period, thus providing a further reason for the low correlation observed between Thailand and the remaining ASEAN-5 during the period 1970-1984.

Similarly, ASEAN-5 is also separated into two clusters for the period 1985-1994. This time, Indonesia is in a cluster of its own. The Thai economy picked up in the late 1980s despite continued political instability as the Government led by General Chatichai Choonhavan implemented a series of policy changes in 1988, which fuelled a rapid increase in GDP. Growth rates exceeding an average of 10 per cent over the period, second in the region only to Singapore, were realized. The exchange rate was also revalued in 1985 to 25 baht per United States dollar and exchange rate variability during the decade was more in line with Malaysia, the Philippines and Singapore.

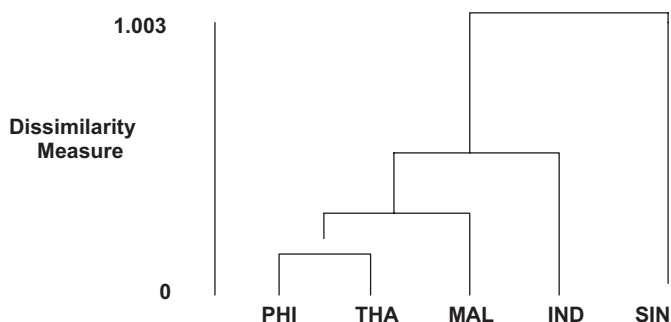
**Figure 2. Hierarchical cluster analysis – dendrogram for ASEAN-5
1985-1994**



By contrast, the Indonesian rupiah sustained two major devaluations in the period from 1985 to 1994, the first in 1983 and the second in 1986. Specifically, the exchange rate depreciated from 625 rupiah per United States dollar to 970 rupiah per United States dollar and 1,641 rupiah per United States dollar in 1983 and 1986, respectively. Financial market integration, when capital flows freely in the economy, was the lowest in the region, while inflation continued to be an issue for the troubled economy. Following a significant decline in petroleum prices in the mid-1980s, Indonesia realized the need to restructure its export market

away from oil and gas and towards manufacturing. As a result of these reforms, output in the manufacturing sector exceeded that of agriculture for the first time in 1991. This led to a sustained period of economic growth, although not at a level comparable to other countries in the region. Thus, it appears that high exchange rate variability, above average inflation rates and a low correlation of equity market returns, set Indonesia apart from the other ASEAN members in 1985-1994. The above average growth rates of Malaysia, Singapore and Thailand during this period were also a contributing factor.

Figure 3. Hierarchical cluster analysis – dendrogram for ASEAN-5 1995-2009

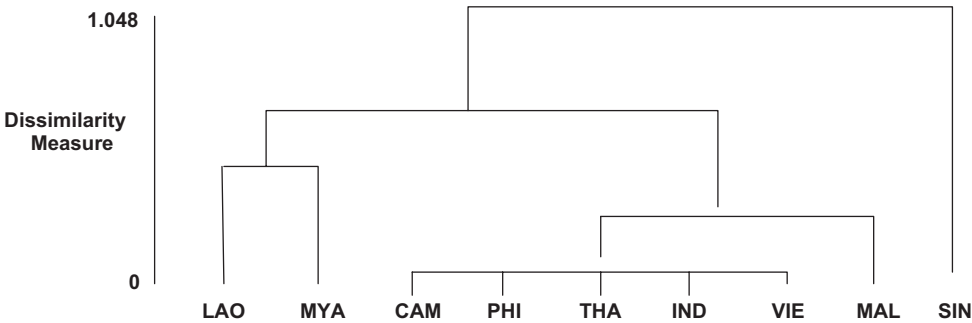


Due to similarities in the economic policies, Indonesia, the Philippines, Thailand and Malaysia are clustered together in the period 1995-2009, with Singapore forming its own individual cluster. In terms of real per capita GDP, Singapore has outperformed the main cluster by a considerable degree, in addition to sustaining a low, stable inflation rate and exchange rate.

On the contrary, Indonesia and Thailand were deeply affected by the financial crisis, which caused their GDP, inflation rates and exchange rates to suffer. The Philippines, although not as affected by the crisis, was still dealing with the repercussions of political instability in the 1980s, and a series of natural disasters in the 1990s further contributed to the country's poor economic situation. Malaysia, meanwhile, was significantly affected by the financial crisis, but the country recovered quickly with growth rates in 1999, almost reaching pre-crisis levels. Following the crisis, the Malaysian ringgit was pegged at a rate of 3.80 ringgits per United States dollar, creating a degree of exchange rate stability after a large currency depreciation in 1998. If not for the detrimental effect that the financial crisis had on the Malaysian economy, the country could have been clustered with Singapore.

The ASEAN region as a whole has been segregated into four clusters in the period 1995-2009. The groupings appear to have been determined along historical lines (at least for the three original ASEAN members), with Indonesia, the Philippines, Thailand, Viet Nam and Cambodia forming the first cluster. Viet Nam and Cambodia are two of the fastest growing economies in the Asian region. During

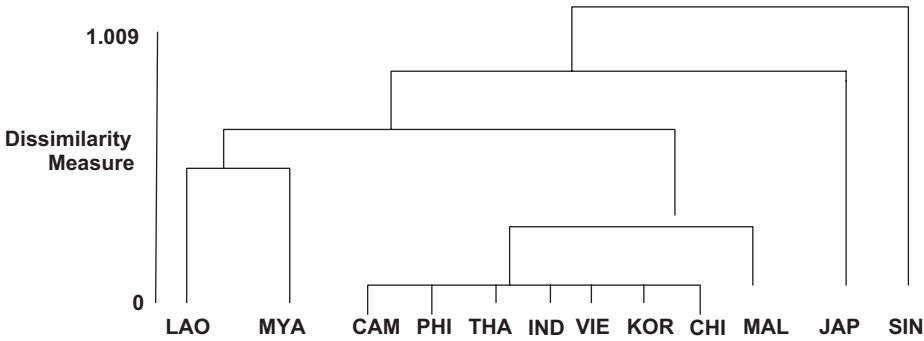
Figure 4. Hierarchical cluster analysis – dendrogram for ASEAN 1995-2009



2004-2007, Cambodia grew approximately 10 per cent per year, due largely to the export of garments. The Government of Viet Nam, on the other hand, continues to reaffirm its commitment to transforming the country into a market economy with a “socialist orientation”, since the launching in 1986-1992 of the reform programme, *Doi Moi*, which literally means renovation. Hence, it is not surprising that since 1995, the country has been in a cluster with market economies such as Indonesia, the Philippines and Thailand. Although Malaysia is in a cluster of its own, it is not very dissimilar to the members of the first cluster as the integration index suggests. The Lao People’s Democratic Republic and Myanmar form the third cluster most likely because both were ruled by military regimes, and have not fully adopted a market economy, but are catching up with the rest the ASEAN members. Singapore has again been separated from the ASEAN-5 to form its own individual cluster. The results show that although there are four clusters, the dissimilarity measure is very small.

When Japan, China and the Republic of Korea are included in the analysis, a similar breakdown occurs. This time, the original ASEAN member countries (except Singapore and Malaysia) are joined by Cambodia, China, the Republic of Korea and Viet Nam in the first cluster. It may appear surprising at first to see the Republic of Korea in this cluster, however, this is perhaps an after-affect of the

**Figure 5. Hierarchical cluster analysis – dendrogram ASEAN+3
1995-2009**



Legend:

CAM	Cambodia
LAO	Lao People's Democratic Republic
MYA	Myanmar
IND	Indonesia
VIE	Viet Nam
PHI	Philippines
THA	Thailand
CHI	China
KOR	Republic of Korea
MAL	Malaysia
JAP	Japan
SIN	Singapore

Asian financial crisis, which resulted in a sharp drop in the country’s growth rate. Japan’s economic performance since the early 1990s has been sluggish due to the bursting of asset and housing bubbles, making it logical that the country is in a cluster of its own. The Lao People’s Democratic Republic and Myanmar again form a cluster together, while Malaysia and Singapore each form a cluster of their own. Although there are more clusters, the results still suggest that there is movement towards integration as the integration index has become much smaller through the years.

Table 6 reports the measure of the dissimilarity of each region obtained from the hierarchical cluster analysis. These results may be used as an informal indication of the depth of economic integration. From the table, it is clear that the dissimilarity between the ASEAN–5 countries has increased over the three decades in question. During the period 1995-2009, the ASEAN region as a whole possessed the least dissimilarities of the three regions examined.

Table 6. Measuring economic integration in ASEAN

Time Period	ASEAN-5	ASEAN	ASEAN+3
1970-1984	2.541	–	–
1985-1994	3.084	–	–
1995-2009	1.003	1.048	1.009

V. SUMMARY AND CONCLUSIONS

The hierarchical cluster analysis does not group the ASEAN-5 countries together in any time period. However, the establishment of ASEAN appears to be reasonable, as only Thailand is placed in an individual cluster during 1970-1984. The Thai baht was pegged to the U.S. dollar during this period, thus the nation exhibited very low exchange rate variability compared to the remaining ASEAN-5 countries. This is a key reason for the resultant division in countries. In all, political instability and the Asian financial crisis appear to be the predominant factors in explaining the resultant cluster compositions.

The hierarchical cluster analysis indicates that in the present period, ASEAN possesses a greater degree of economic integration than both ASEAN-5 and ASEAN+3. However, contrary to expectations, ASEAN-5 has become slightly less economically integrated over the past four decades (from 1969 to 2009), in particular with respect to Singapore, and to a much lesser extent, Malaysia. Again, this may be partly attributed to the unequal growth rates of member countries, with Singapore registering the highest growth rate over the period. Other factors that may have contributed to the slight decline in economic integration include: the 1970s global recession; extended periods of political instability within countries (particularly in the Philippines in the 1980s); and, the Asian financial crisis in 1997, which affected the member countries in varying degrees. The results suggest that there is a need for better cooperation among the original member countries in terms of aligning their economic policies, and perhaps a more cohesive regional plan of action, especially when facing a financial crisis. The crisis spread like a contagion in Asia, with many of the ASEAN members suffering, some more than others. Although the affected countries were able to rebound from this crisis rather quickly, within one to two years, perhaps a more coordinated regional effort, for example coming up with uniform banking transparency laws across the region, careful monitoring of macroeconomic variables, such as interest rates, private and government debt levels, exchange rates and inflation rates, could have helped prevent the crisis. An agreement, similar to the Stability and Growth Pact that Euro members adhere to,

could be drafted for ASEAN member countries. This would force member countries to keep their macroeconomic fundamentals aligned with each other, and if any of the countries were to stray out of line, other member countries could quickly give the erring country a warning before the problem escalates.

The division of the ASEAN region along historical lines in the 1995-2009 period suggests that Viet Nam and Cambodia are already integrated with the original members, while the Lao People's Democratic Republic and Myanmar have yet to be completely assimilated into the Association. This indicates that further effort from both the original and newer members of ASEAN to reaffirm their resolve to implement initiatives towards regional cooperation is imperative.

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