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THREE ESSAYS ON REGIONAL ECONOMIC INTEGRATION AND EXCHANGE RATE REGIMES

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ABSTRACT OF DISSERTATION

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2008

THREE ESSAYS ON REGIONAL ECONOMIC INTEGRATION AND EXCHANGE RATE REGIMES

ABSTRACT OF DISSERTATION

A dissertation submitted in partial fulfillment of the
requirements for the degree of Doctor of Philosophy in the
College of Business and Economics
at the University of Kentucky

By
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Lexington, Kentucky

Directors: Dr. Yoonbai Kim, Professor of Economics

Lexington, Kentucky

2008

ABSTRACT OF DISSERTATION

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This dissertation consists of three independent essays addressing several key issues related to the empirical application of optimum currency area. The first essay explores the features of the CFA franc zone by operationalizing Robert Mundell's (1952) criteria for an optimum currency area. A vector autoregression method is used in modeling national outputs as determined by global, regional and country-specific shocks. It finds that domestic outputs of the CFA franc zone countries are strongly influenced by country-specific shocks. These results suggest that the CFA franc zone countries are structurally different from each other and the monetary union may have been a costly arrangement for the member countries.

The second essay focuses on the Eastern Caribbean Currency Union (ECCU). A 2-vairable vector autoregressive model is estimated to investigate the extent of symmetric shocks in the small open economies of the ECCU. The paper finds that domestic outputs of the ECCU countries are strongly influenced by regional shocks. These results indicate that the ECCU countries are structurally similar to each other and exchange arrangements appear to have well served the region and the group of countries is more likely to be an optimum currency area.

The third essay explores the possibility of a currency union in East Asia. In this essay, the extent of global and regional integration in East Asia is investigated using the stock price index as a measure of economic performance. A similar VAR model is employed to separate the underlying shocks into global, regional and country-specific shocks. The estimation results show that country-specific shocks play a dominant role in East Asia although their role appears to have declined over time, especially after the 1997 financial crisis. Global and regional shocks are responsible for small but increasing shares of stock price fluctuations in most countries. The results indicate that, despite years of liberalization and regional integration, economies in East

Asia remain dissimilar and are subject to asymmetric shocks and it might be costly for East Asian countries to abandon monetary policy independence to form a monetary union and that a more flexible exchange rate regime might be desirable.

KEYWORDS: Optimum Currency Area; Country-specific shocks vs. regional shocks;
the CFA franc zone; the Eastern Caribbean Currency union;
Financial integration in East Asia

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THREE ESSAYS ON REGIONAL ECONOMIC INTEGRATION AND EXCHANGE RATE REGIMES

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To my parents

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Chapter One
Introduction

The theory of Optimum Currency Area (OCA) lists conditions regarded as crucial for the success of a common currency in a region. The conditions include the symmetry of shocks across countries (Mundell, 1961), openness of the economies (McKinnon, 1963), and well-diversified economies (Kenen, 1969), all of which tend to reduce the confusion and uncertainty in relative price changes and transaction costs among members of a currency area. In this dissertation, I devote three essays to explore the features of currently existing and proposed monetary union in the world: the CFA franc zone, the Eastern Caribbean Currency Union (ECCU) and the potential Asian Monetary Union (AMU). We compare the features of those monetary unions to those of the Economic and Monetary Union (EMU) by operationalizing the Optimum Currency Area (OCA) criteria. This dissertation asks the question: are those monetary unions satisfying OCA criteria or are the regions ready for a single currency?

In the first essay, I study features of the CFA franc zone. The CFA (French African Community in French) franc has been in use in the former French colonies of West and Central Africa since 1945. It was pegged to the French franc and after 1999 to the euro. The CFA franc zone is remarkably diverse ethnically, lingually, culturally, politically, and economically. The currency survived devaluations (by 50 percent in 1994), changes of regimes (from colonial to independent), the existence of two groups of members with two central banks (the West African Economic and Monetary Union and the Central African Economic and Monetary Community), controls of trade and capital flows. Although the monetary union has existed for nearly 60 years, there are only a few studies that exist to answer the question if the CFA franc zone forms an optimum currency area.

To answer the question, I operationalize the theory of optimum currency area with a model in which national output is determined by three types of shocks: global, regional, and country-specific. The relative role of regional shocks is taken as the key indicator of suitability for a country to join a common currency area with the regional neighbors. 12 CFA franc zone countries are chosen. (Chad and Equatorial Guinea are excluded for data inadequacy) Output is represented by value-added industrial production. Annual data are examined from 1970 to 2004. Forecast error variance decompositions are used to show

the relative importance of global, regional and country-specific shocks in explaining domestic output fluctuations. My results find that domestic outputs of the CFA franc zone countries are strongly influenced by country-specific shocks while regional shocks are far more important in European countries that have joined the EMU. The results suggest that the CFA franc zone countries are structurally different from each other and thus more likely to be subject to asymmetric shocks. They do not appear to form an optimum currency area and the monetary union may have been a costly arrangement for the member countries.

In the second essay, another long-lasting currency union, the Eastern Caribbean Currency Union (ECCU) is investigated. Throughout the turbulence in the international financial system, the Eastern Caribbean countries have enjoyed remarkable monetary and economic stability. There are two significant aspects of the ECCU countries: their very small size and the similar colonial background. The ECCU is a very small economy even taken as a whole. The total population of the ECCU is approximately half a million. The small market size of the ECCU limits opportunity for economies of scale, competition, and diversification of production and trade. The English-speaking ECCU members share a common colonial background. They were all British colonial territories before their independences were governed.

This essay attempts to characterize the types of structural shocks in the ECCU and other countries in the Caribbean region and to compare them with other currency unions such as the CFA franc zone and the EMU. Mundell's criteria on the OCA are examined by using a 2-variable structural vector autoregressive (SVAR) model and estimating the extent of symmetric shocks. Output is represented by real gross domestic production (constant 2000 US$). 8 ECCU member countries are chosen. In addition, another 8 non-ECCU Caribbean countries are selected for comparison. Annual data are examined from 1973 to 2005. Main findings are: domestic outputs of the ECCU countries are more strongly influenced by regional shocks compared to those of the CFA franc zone where country-specific shocks are dominant. The ECCU countries are structurally similar to each other and thus more likely to be subject to symmetric shocks. Their monetary and exchange arrangements appear to have well served the region and the group of countries is more likely to be an optimum currency area.

The third essay focuses on a recently proposed monetary union in East Asia. East Asia is a region with great potential for high economic growth given its excellent record of economic performance and has long been a focus of attention for economic research. Countries in East Asia have shown keen interest in regional integration in trade and financial matters. The purpose of this essay is to investigate the extent of global and regional integration in East Asia using the stock price index as a measure of economic performance. Stock price index is known as a good leading indicator of economic activity. The availability of high-frequency data is also a big advantage in our case where the sample period is short due to general data problems of developing countries and made even shorter as a result of the recent financial crisis and resulting structural breaks. A structural vector autoregressive model is used to estimate both East Asian stock markets and European stock markets. The essay chooses 12 major stock exchanges in East Asia and 16 European stock exchanges. Weekly data are examined from July 1, 1989 to December 31, 2006. Data from July 1, 1997 to December 31, 1998 are omitted because of large turmoil due to the financial crises in the region during the problem. We separate the selected periods into eight 2-year sub-periods. The estimation results show that country-specific shocks still play a dominant role in East Asia although their role appears to have declined over time, especially after the 1997 financial crisis. Global and regional shocks are responsible for small but increasing shares of stock price fluctuations in most countries. The results indicate that, despite years of liberalization and regional integration, economies in East Asia remain dissimilar and are subject to asymmetric shocks in comparison to European countries. This suggests that it might be costly to abandon monetary policy independence and that a more flexible exchange rate regime might be desirable.

Chapter Two

Is the CFA Franc Zone an Optimum Currency Area?

2.1 Introduction

The successful launch of the euro has stimulated interest in other current and potential monetary unions. Formed in 1948, the CFA franc zone has been a long-lasting monetary union with 14 member countries. Remarkably, the exchange rate vs. the French franc (the euro, now) – the anchor currency – was changed only once in 1994. Notwithstanding such longevity in maintaining a monetary union and a fixed exchange rate, the CFA franc zone has received scant attention. The purpose of this paper is to investigate the working of the monetary union in the CFA franc zone and test whether countries in the zone form an optimum currency area (OCA) in comparison to those of the Economic and Monetary Union (EMU).

Participating in a monetary union entails important benefits and costs. The benefits include lower transaction costs, reduced uncertainty about exchange rate variability and relative price changes and enhanced confidence in the direction of policies. The costs arise from the inability to use independent monetary policy and flexible nominal exchange rate. The OCA theory identifies conditions for successful operation of a common currency. They include the symmetry or similarity of shocks across countries (Mundell, 1961), openness of the economies (McKinnon, 1963), and well-diversified economies (Kenen, 1969). The costs from participating in a currency area are likely to be smaller the more similarly member countries are affected by exogenous shocks, and the more open and the better diversified their economies, the higher the degree of factor mobility among the countries, the greater the flexibility in their wages and prices, and the greater the similarity in their inflation preferences. See, inter alia, De Grauwe (2005) and Bayoumi and Eichengreen (1997).

Do the 14 countries of the CFA franc zone form an optimum currency area? Although the monetary union has existed for nearly 60 years, there are only a few studies that exist to answer the question and their verdicts are mixed. Hoffmaister, Roldos, and Wickham (1998) compare the nature and sources of shocks in the CFA franc countries with those of fifteen neighboring countries in the sub-Saharan Africa which maintain more flexible

exchange rates. They find that the franc zone countries are relatively more susceptible to external shocks such as changes in the terms of trade. They attribute the finding to the inability of the exchange rate to play any substantive role as a partial buffer for external shocks in the CFA countries. The finding is consistent with the evidence reported in Ghosh et al (1997), who find that countries with fixed exchange rate regimes face higher real volatility.[1] These studies tend to suggest that the CFA franc zone countries do not meet the conventional criteria for the formation of optimum currency area.[2]

Fielding and Shields (2001) find that the members of the CFA franc zone, with the exception of Niger, share positively correlated inflation shocks. They also find that there are two groups of countries within which shocks to output growth are strongly positively correlated, but between which they are negatively correlated. Regarding the long-run impact of shocks on the economy, their results suggest a considerable degree of heterogeneity across the zone. They conclude that "the CFA, on the whole and assuming that it has the ability to conduct timely stabilization policy, is homogenous enough for a monetary union to work." (p. 222)

In this paper, we operationalize the theory of optimum currency area with a model in which national output is determined by three types of shocks: global, regional, and country-specific. The relative role of regional shocks is taken as the key indicator of suitability for a country to join a common currency area with the regional neighbors. We find that domestic outputs of the CFA franc zone countries are strongly influenced by country-specific shocks while regional shocks are far more important in European countries that have joined the Economic and Monetary Union. The results suggest that the CFA franc zone countries are structurally different from each other and thus more likely to be subject to asymmetric shocks. It is not likely to be an optimum currency area and the monetary union may have been a costly arrangement for the member countries.

The balance of the paper is organized as follows: Section 2.2 discusses the institutional arrangement in the CFA franc zone and its performance. Section 2.3 describes the model and discusses the estimation method and Section 2.4 reports the

[1] In a similar context, Bleaney and Fielding (2002) report that the standard deviation of real GDP growth is significantly higher in the CFA franc zone countries than elsewhere.
[2] See M'Bet and Niamkey (1994) and Devarajan and Rodrik (1991) who make similar conclusions but using different methodologies.

estimation results. Robustness of the result is examined in Section 2.5. Section 2.6 concludes.

2.2 The CFA Franc Zone Arrangements: Institutional Aspects and Performance

The CFA franc zone consists of two currency areas: West African Economic and Monetary Union and Economic and Monetary Community of Central Africa.[3] The former consists of eight western African countries - Benin, Burkina-Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo. Their common currency is the "franc de la Communaute Financiere de l'Afrique" (CFA franc), which is issued by the Central Bank of the West African States (BCEAO) located in Dakar, Senegal. The latter comprises six countries -- Cameroon, the Central African Republic, Chad, the Republic of Congo, Equatorial Guinea, and Gabon – and also uses the CFA franc called "franc de la Cooperation Financiere Africaine" issued by the Bank of the Central African States (BEAC) located in Yaounde, Cameroon. France guarantees the convertibility of the CFA franc through an operations account that each of the central banks holds at the French Treasury. As a counterpart to the guarantee of the French Treasury, each central bank in the CFA franc zone is obliged to maintain 65 percent of its official reserves in the operations account and the CFA franc zone must allow France to participate in the decision-making process within the currency arrangements. The guaranteed convertibility is the main item that distinguishes the zone from other fixed rate arrangements. The CFA franc zone members agreed on rules to avoid excessive deficits. Once pooled, the reserves become less vulnerable to external shocks because the economies of the unions become more diversified than the economy of each member. France has imposed important restrictions on the guarantee of convertibility that lessen significantly its applicability. In particular, in order to prevent excessive recourse to central bank financing of budget deficits, both central banks of the BCEAO and BEAC are required to incorporate two monetary rules in their respective agreements. Neither central bank is allowed to contribute to the central government budget more than 20 percent of the value of the previous year's central government revenues. Monetary rules adopted by the CFA

[3] The composition of the CFA franc zone had changed over time with the departure (and subsequent reentry in the case of Mali) of some former French colonies and the entry in recent years of two sub-Saharan African countries that had no colonial relations with France and are not French-speaking (Equatorial Guinea in 1985 and Guinea-Bissau in 1997).

franc zone emphasize the maintenance of a positive balance of payments, with strict deflationary mechanisms and a tight control over credit policy to limit inflation as much as possible. The issue of full convertibility of the CFA franc through the French guarantee of the operations account minimizes some of the short term risks associated with current payment. However, the French attitude may change as the cost of maintaining the CFA franc zone climbs ever higher after the euro became the only legal tender and replaced the French franc on 30 June 2002.

The two CFA francs are legal tenders only in their respective regions. However, because of the guaranteed convertibility into French francs, the free capital mobility between each region and France, and the fact that the two CFA francs have the same parity against the French franc, the CFA franc zone has traditionally been considered as one currency area with a single currency. France is represented in the executive boards of the two regional central banks and has traditionally been the main trading partner and the provider of extensive technical and financial assistance to all member countries. The structure of the CFA franc zone, as a currency union with a fixed exchange rate and significant operational involvement of the anchor currency country in the functioning of the union, is fairly unique, even among monetary unions.

The CFA franc was issued initially by the central bank for France's overseas territories and the parity of CFA franc was set in October 1948 at 0.5 CFA franc per French franc. However, the responsibility for issuing currency and overseeing the functioning of the zone was shifted to two regional central banks with the independence of former colonies in the early 1960s. These banks had originally been dominated by France, but by the early 1970s their control shifted to the member countries.

Countries in the CFA franc zone had fairly limited degree of economic and financial integration and regional cooperation until 1994. A host of administrative restrictions, tax distortions and protectionist trade policies precluded the development of intra-regional trade of a single market. Preserving the special economic and political links to France appeared to have dominated decisions of policymakers in the CFA franc zone. During the period from the early 1950s to the mid-1980s, the economic performance of the CFA franc countries compared favorably with that of other sub-Saharan African countries with stronger GDP growth and lower inflation. However, during 1986-93, in the face of a

nearly 40 percent cumulative deterioration in the terms of trade, a strong French franc combined occasionally with deflationary pro-cyclical fiscal policies, the growth performance of the CFA franc zone weakened considerably, leading to a substantial depreciation of the CFA franc by 50 percent in January 1994.

Notwithstanding the considerable progress achieved since 1994, the CFA franc zone countries remain confronted with sizable domestic and external imbalances and continue to be subject to structural rigidities and vulnerable to exogenous shocks. It remains a fairly heterogeneous entity, composed of countries fairly open to international trade but with very limited intra-regional trade and highly dependent on the production and export of a limited number of primary commodities. The asymmetric economic development among the countries in the zone makes this situation even worse. The zone is dominated by Cameroon and Cote d'Ivoire, which account for about 43 percent and 36 percent of their regional output in 2004, respectively. The per capita GDP of the richest country, Equatorial Guinea, at US$ 3988 in 2004, was 29 times larger than that of the poorest country, Guinea-Bissau.

2.3 Model

We employ the model developed by Chow and Kim (2003), in which domestic output, y^d, is assumed to be affected by three kinds of shocks - global shock, regional shock and country-specific shock (u^g, u^r, *and* u^d):

$$\Delta y_t^d = \beta_0 + \beta_1(L)u_t^g + \beta_2(L)u_t^r + \beta_3(L)u_t^d \qquad (1)$$

where $\beta_i(L) = \beta_{i0} + \beta_{i1}L + \beta_{i2}L^2 + \beta_{i3}L^3 + \cdots$ is a polynomial function of the lag operator, L. We assume that global shocks affect economies both inside and outside the regional boundary. The two large oil crises of the 1970s may be a good example of the global nature. Regional shocks are assumed to affect the economies within the region. German unification of 1990 and the passage of the single European act in 1993 may be termed regional shocks for European countries. In the context of CFA countries, sharp changes in the commodity prices may qualify as a regional shock to the extent that the member countries are similarly affected by the shock. Country-specific shocks are defined as those that only affect a particular economy. It arises due to a change in fiscal or monetary policy or a change in productivity or the terms of trade.

Following Chow and Kim (2003), we assume that global, regional and local outputs, y_t^g, y_t^r and y_t^d, are related to the three structural shocks as follows:

$$\begin{pmatrix} \Delta y_t^g \\ \Delta y_t^r \\ \Delta y_t^d \end{pmatrix} = \begin{pmatrix} A_{11}(L) & A_{12}(L) & A_{13}(L) \\ A_{21}(L) & A_{22}(L) & A_{23}(L) \\ A_{31}(L) & A_{32}(L) & A_{33}(L) \end{pmatrix} \begin{pmatrix} u_t^g \\ u_t^y \\ u_t^d \end{pmatrix} \qquad (2)$$

where $A_{ij}(L) = a_{ij}^0 + a_{ij}^1 L + a_{ij}^2 L^2 + \cdots$ is a 3×3 matrix of polynomial functions of lag operators. We assume that the structural shocks are uncorrelated and of unit variance: $Var(u_t) = I$. Structural shocks are unobserved and the following three additional restrictions are employed to recover them from reduced-form innovations: (1) and (2) neither regional nor country-specific shocks have long-run effects on global output; (3) country-specific shocks have no long-run effects on regional output. In this model, the economy is considered to be small in a region and the region is only a small part of the global economy.[4] In terms of the coefficient matrix, these restrictions can be restated as:

$$A_{12}(1) = A_{13}(1) = A_{23}(1) = 0 \qquad \text{where } A_{ij}(1) = a_{ij}^0 + a_{ij}^1 + a_{ij}^2 + \cdots$$

In this model, the relative importance of regional shocks in the determination of the local output is considered the key indicator of suitability of the local economy for a common currency area with the regional neighbors. Since regional shocks, by construction, affect the economies in the region in a similar way, the importance of regional shocks implies that the local economy is dominated by symmetric shocks – shocks that affect the economies in the same region in a similar manner.[5]

The three structural shocks may mix various underlying shocks. Transitory global shocks that have no long-run effect on global output could be classified as regional or local shocks. Similarly, transitory regional shocks may be classified as local. It does not matter if we classify a shock as "regional" "global" or "country-specific." What we try to

[4] Blanchard and Quah (1989) originally develop a two-variable version of this identification method based on long-run restrictions. We employ the method since long-run restrictions allow freer estimation of short-run interactions and thus appear less restrictive than the identification methods that rely on contemporaneous relationships. The zero restriction employed here has a natural interpretation of the small economy assumption which is one of the most widely used assumptions in open-economy macroeconomic modeling.

[5] Thus the economy that has a high importance of regional shocks can be considered to pass the Mundell's test of OCA. We also expect regional shocks to be more important in a more open economy. The criterion thus incorporates the McKinnon's test of OCA as well.

investigate is whether outputs of individual countries move together as a result of the three shocks and how important they are relative to each other.

In a related study, Bayoumi and Eichengreen (1993) apply the aggregate demand-aggregate supply model. They maintain that demand disturbances reflect macroeconomic policy choices of the country including exchange rate policy and thus are not expected to be invariant with respect to the exchange rate regime. On the other hand, supply shocks are considered to be more structural and thus less sensitive to the choice of an exchange rate arrangement. If supply shocks across countries show high (low) correlations within the region, then the region would be a good (poor) candidate for a currency union.

One difficulty of the Bayoumi and Eichengreen model is that when supply shocks are correlated across countries, it cannot distinguish whether shocks are regional, global, or simply correlated local shocks. The prevalence of regional shocks or correlated local shocks may justify common monetary policy within the region. On the other hand, if global shocks are dominant and if they similarly affect all economies inside and outside the region, a more global arrangement might be necessary. Another problem is the assumption that supply shocks tend to be invariant with respect to changes in exchange rate regimes. Frankel and Rose (1998) argue that countries are likely to face more similar shocks as trade between them increases, implying that supply shocks will become more highly correlated as economic integration progresses. As a common currency reinforces and is reinforced by trade interdependence within the region, supply shocks are expected to become more correlated over time.[6]

2.4 Empirical results

Output is represented by valued-added industrial production (in constant 2000 US dollar). We choose 12 countries in the CFA franc zone. Chad and Equatorial Guinea are excluded due to inadequate data. In the benchmark model, we define regional output as the trade-weighted average of France and 3 major trade partners from the CFA franc zone. Global output is defined as the trade-weighted average of outputs of the US, Japan and 4 major trading partners (other than France) from the European Union. The weights

[6] Note that a similar critique applies to our model as well. For instance, increases in intra-regional trade are likely to increase the role of regional shocks relative to country-specific shocks. The moral is that no single classification scheme is optimal for all purposes and one needs to investigate various models.

are based on the sum of exports from and imports to each CFA country. For comparison, we also choose 10 EMU countries – Austria, Finland, France, Germany, Greece, Netherlands, Italy, Portugal and Spain – and 5 non-EMU countries – Denmark, Norway, Sweden, Switzerland, and the UK.[7] Data for the CFA countries are derived from World Development Index (World Bank). Those for the EMU and other developed countries are retrieved from the International Financial Statistics website (IMF). Both data are annual for 1970 to 2004. The trade weights are based on exports and imports data for 1990 to 1992 and obtained from Direction of Trade Statistics (IMF).

Table 2.1 reports the results of unit root and cointegration tests. Both the augmented Dickey Fuller (DF) tests and the Phillips-Perron (PP) unit root test are used with 4 lags. Y-G, Y-R, and Y-D denote global, regional, and country-specific output, respectively. The results indicate that the presence of unit roots is not rejected for most variables in most countries. In a small number of exceptional cases such as the DF unit root test for domestic industrial production in Niger, the unit root hypothesis is rejected at the 5 percent significance level. Cointegration tests based on the method proposed by Engle and Granger (1987) suggest that the null of non-cointegration of global, regional, and local outputs could not be rejected. We thus proceed with the assumption that all variables are nonstationary and noncointegrated with each other. The reduced-form model thus consists of first differences of the variables and does not contain the error-correction term.

Table 2.2 reports the variance decomposition of forecast errors at the 2- and 10-year forecast horizons for the European countries. Global, regional and local shocks are denoted by "U-G", "U-R" and "U-D", respectively. 2 (10) year responses are taken as short-term (long-term) effects. In all cases, the VAR model is estimated with 2 lags (which is optimal by lag length test). Variance decompositions are reported only for domestic output since both global and regional outputs are mainly explained by global and regional shocks, respectively. European countries are grouped into EMU and non-EMU countries.

[7] Belgium and Luxembourg are excluded due to data insufficiency. Regional output is defined as the trade-weighted average of 4 major trading partners within European Union. Global outputs are the trade-weighted average of the US and Japan.

In the EMU group, regional shocks are dominant in most countries. More than 40 percent of short-term and long-term output variations in domestic output are due to regional shocks. The importance of regional shocks is highest in Austria, France and Spain where they explain 60 percent or more of output variations in the short run and more than 50 percent in the long run. For those countries, the roles of global shocks seem minimal, explaining less than 20 percent in the long run in most cases. Finland, Ireland and Italy appear exceptions in this group where country-specific shocks are dominant and explain more than 70 percent of short-run and long-run fluctuations in output while regional shock explain 20 percent or less.

In the non-EMU countries, in sharp contrast, country-specific shocks are dominant over regional and global shocks. Regional shocks are much less important than for the EMU countries. With the exception of Sweden and Switzerland, regional shocks explain no more than 20 percent of output variations in the short-run and no more than 35 percent in the long-run.

Among the countries that joined the EMU, it had been known that the three countries – Finland, Ireland and Italy – might be less suitable than the others for various reasons. For instance, Finland's natural resource-rich economy or Ireland's dynamic growth was not considered to mix well with other countries within the single currency area. Interestingly, France, which is often considered too large to belong in a currency area with Germany, shows dominant regional effects both in the short run and in the long run. Among the non-EMU countries, it is well known that Switzerland has maintained a stable exchange rate against the German mark and, accordingly, monetary policy consistent with it. These suggest that, while applying absolute criteria based on the theory of OCA is difficult, the model employed here provides a sensible ranking of countries which can be used as an index of suitability to joining in a single currency area.

Table 2.3 reports variance decompositions for the CFA franc zone countries. Dominant shocks for domestic output are country-specific in all countries except Cameroon and, in both horizons, explain more than 50 percent in almost all cases. Regional shocks are far less important than in the EMU group reported in Table 2.2, explaining less than 10 percent of output variations in most CFA franc zone countries. Cameroon, Cote d'Ivoire, and Mali are somewhat exceptional in that regional shocks

show stronger effects on their economies than other countries in the monetary union. Regional shocks explain up to 57 percent of output variation in the short-run and 39 percent in the long-run in these three countries, which are a bit smaller but still comparable to those observed in the core of EMU countries.

The results are surprising. Given that all CFA countries in the sample have maintained a common currency 50 years or longer with the exception of Guinea-Bissau (joined in 1997) and Mali (exited from the CFA franc zone during 1962-84), one would have expected that, by now, they are similar and therefore common or regional shocks are dominant. One can find a clue to the question in Tables 1A and 2A in the appendix which shows the main export items of the CFA franc zone countries. In all countries with no exception, international trade and production consist of commodities such as cotton, mineral ores, and petroleum. The manufacturing sector takes less than 10 percent of the whole economy. Although openness as measured by the export/GDP ratio is high, reaching over 50 percent in many cases, the ratio has little changed or even declined as a result of trade growth slower than the growth of national output itself.

Rose (2000) and Frankel and Rose (2002) find that belonging to a currency union/board triples trade with other currency union members. In an earlier work, Frankel and Rose (1998) also report that business cycle correlation increases when countries trade more with each other. Our results suggest that the hypothesis that a common currency would promote international trade and international business cycle correlation may not hold for countries that specialize in commodities.

2.5 Robustness

Whether a shock can be classified "regional" or any other type depends on the identifying scheme. There are some elements of arbitrariness in defining regional and global outputs. In this section, therefore, we try various definitions of regional and global outputs for the identification of structural shocks. For the first alternative model, M1, we define regional output as the weighted average of outputs of three leading CFA franc zone countries only. French output is used as a proxy for global output. In M2, regional output is represented by a weighted average of three leading trade partners in the CFA franc zone and four from the European Union. Global output is the weighted average of

US and Japanese outputs. For M1 and M2, the weights are based on the sum of exports from and import to CFA franc zone countries from 1990 to 1992. In M3, we define regional output as the weighted average of France and 3 major CFA franc zone countries. Global output consists of the US, Japan and four EU countries. The difference between the benchmark model and M3 is that the 3 CFA countries are chosen and assigned weights based on bilateral trade for BM and the economic size for M3.

Table 2.4 shows that the results vary little under these various alternative specifications. In M1 and M2, the roles of regional shocks are uniformly lower in all cases than the benchmark case with the only exception of Niger for M1. Even though M2 has a much wider coverage of countries as "regional," no country shows a significant increase in the role of regional shocks. Reflecting the similarity between the BM and M3, the variance decompositions are hardly changed. The results thus seem fairly robust to the way the regional economy is defined.

2.6 Conclusion

In this paper, we operationalize the theory of optimum currency area with a model in which national output is determined by three types of shocks: global, regional, and country-specific. In this model, the relative role of regional shocks is taken as an indicator of suitability for a common currency area with the regional neighbors. Summarizing the main results of the study: in European countries, we find that regional shocks tend to be more dominant in EMU countries than in non-EMU countries. A careful examination of and the main results and exceptional cases reveals that the model generates a sensible ordering of countries in terms of their OCA "fitness." This supports the validity of the criterion employed in this study. When applied to the CFA franc zone, we find, in sharp contrast to the EMU group, dominant shocks are country-specific and regional shocks are far less important in most cases. Variations with the definitions of regional and global outputs produce make no qualitative differences.

Implications are significant. Having a common currency can deliver a low inflation environment when it is firmly pegged to a strong anchor currency. However, the case of CFA franc zone shows clearly that one should not expect more than that. Economic growth in the zone has been mediocre and heavily dependent on external shocks such as

wide variations in the terms of trade. International trade has not grown any faster than countries outside the union, intraregional trade still remains a small portion and nearly half of the countries remain the poorest in the world. Notwithstanding the remarkable longevity of the monetary union, we find in this paper that there is little convergence in the similarity of economic structure among the members. It suggests that the monetary union in the CFA franc zone should have been costly to maintain.

According to our results, the CFA franc zone may not conform to the OCA criteria. However, the fact that the currency union exists more than 50 years could attribute to the CFA franc zone's distinctive characteristic from its ties with France historically and economically. It is argued that the CFA franc zone is unique in postcolonial Africa in that France continues to exert considerable influence in its ex-colonies, and the latter in some sense have not gained full sovereignty as other countries colonized by other European powers. The CFA franc zone is treated as a set of instruments developed by France to regulate and shape economic relations with its ex-colonies. By the early 1970s, it was alleged that maintaining a currency link defined by the French Treasury perpetuates French neocolonialism, benefiting the French economy much more than the economies of the member states and it was argued that the conservative and monetarist rules did not adequately promote economic growth. As the African crisis has worsened in 1983, however the implicit critique of the French 'neocolonialism' has turned into something akin to praise for France's willingness to remain involved in Africa partly because the CFA franc zone seemed to have been somewhat sheltered from the economic crisis hitting the rest of the continent. Pegging to a single currency has been the option most favored by less developed countries at that time. In the early 1980s, the CFA franc zone was a 'zone of solidarity' and served as a potential model for relations between the developed north and developing countries in the south.

On the other hand, France's undeniable commitment to the CFA franc zone does not appear to have a distinctive impact on the economies of the member states. Economic comparisons between the CFA franc zone countries and the rest of Africa found few significant differences except a slightly larger tertiary sector, lower inflation and a more open trading regime in the franc zone. As the situation worsened considerably after 1985, countries in the CFA franc zone avoided adjustment and continued to live beyond

their means and accumulate debt while other African countries gave in to IMF pressures and exerted stringent fiscal and monetary discipline to adjust to changes in the international environment. In 1988 and 1989, the CFA franc zone as a whole experienced a double digit negative growth. Both operations accounts of CFA franc zone countries in French Treasury were rapidly accumulating deficits, putting a tremendous pressure on the French Treasury.

In 1994, France pushed for a devaluation of the CFA franc, but maintained its convertibility and most of the current structure. In brief, there might be many different factors that can explain why African states choose to remain in the CFA franc zone. The unlimited convertibility guarantee from the French Treasury is one of the necessary ingredients of the long-lasting arrangement in Africa. However, France may reconsider the conditions for its support when the cost of maintaining the CFA franc zone increases. How long will the CFA franc zone last in the future? Ironically, the member African states will probably not weigh that heavily in this decision as it will be made in France.

Table 2.1 Unit Root and Cointegration Tests

	Unit Root Tests						Cointegration Tests
	Y-G		Y-R		Y-D		
	DF	PP	DF	PP	DF	PP	
Benin	-0.25	-1.31	-2.64	-2.70	0.71	0.13	-2.26
Burkina Faso	-0.81	-1.66	-2.04	-2.31	-0.82	-1.14	-2.95
Cote d'Ivoire	-0.30	-1.53	-2.08	-2.47	-2.77	-2.48	-2.50
Guinea-Bissau	-1.42	-2.23	-2.82	-2.69	-1.39	-1.91	-2.09
Mali	-0.51	-1.45	-2.85	-2.74	1.42	1.06	-1.85
Niger	-1.80	-2.18	-2.21	-2.56	-3.73	-2.68	-4.11
Senegal	-0.77	-1.68	-2.86	-2.68	1.58	1.62	-1.71
Togo	-0.50	-1.56	-2.81	-2.73	-1.13	-1.80	-2.13
Cameroon	-0.36	-1.55	-1.59	-2.44	-2.51	-1.71	-4.21
Cent African Rep	-1.26	-1.93	-2.34	-1.92	-0.29	-1.41	-2.13
Chad	-0.71	-1.37	-2.79	-2.71	0.47	-0.49	-3.74
Rep of Congo	-0.10	-1.07	-1.19	-2.36	-2.26	-2.56	-4.09
Europe							
Austria	-1.30	-1.68	-0.15	-1.00	2.20	0.19	-2.28
Finland	-0.75	-1.32	-0.24	-1.27	0.77	-0.16	-2.35
France	-0.37	-1.07	-0.32	-1.25	-1.13	-2.87	-1.86
Germany	-0.84	-1.37	-0.78	-2.39	0.10	-0.53	-3.05
Greece	-1.45	-1.78	-0.47	-1.56	-2.44	-6.58	-2.04
Ireland	-0.20	-0.95	-0.40	-1.26	0.75	1.78	-2.14
Italy	-0.29	-1.01	-0.26	-1.45	-1.29	-2.14	-3.25
Netherlands	-0.32	-1.03	-0.27	-1.17	-0.07	-1.82	-2.18
Portugal	-0.75	-1.31	-0.43	-1.37	-2.42	-3.64	-2.62
Spain	-0.53	-1.17	-0.56	-1.79	-0.32	-2.86	-2.35
Denmark	-0.95	-1.45	-0.18	-1.19	-0.35	-0.72	-2.26
Norway	-0.55	-1.18	-0.26	-1.32	-1.77	-2.59	-2.41
Sweden	-0.40	-1.08	-0.23	-1.29	0.80	0.10	-2.44
Switzerland	-0.75	-1.31	-0.32	-1.34	0.77	0.08	-2.72
United Kingdom	-0.28	-1.00	-0.35	-1.71	-0.68	-0.99	-3.06

Table 2.2 Variance Decompositions for Europe

	Forecast Horizon	Y-D		
		U-G	U-R	U-D
EMU Countries				
Austria	2	23.5	70.6	5.9
	10	20.8	55.6	23.6
Finland	2	5.3	16.5	78.3
	10	6.4	23.8	69.8
France	2	8.4	70.5	21.1
	10	13.4	66.4	20.2
Germany	2	9.3	44.4	46.3
	10	8.7	45.8	45.5
Greece	2	24.3	41.7	34.0
	10	23.8	41.1	35.1
Ireland	2	7.2	9.8	83.0
	10	6.3	19.1	74.6
Italy	2	12.4	4.5	83.1
	10	14.6	11.2	74.3
Netherlands	2	6.9	31.2	61.8
	10	7.6	31.5	60.8
Portugal	2	2.2	49.7	48.1
	10	3.5	49.2	47.3
Spain	2	16.0	63.9	20.1
	10	13.7	54.4	31.9
Non-EMU Countries				
Denmark	2	24.5	18.3	57.2
	10	20.5	32.0	47.5
Norway	2	27.9	16.4	55.7
	10	35.3	16.2	48.6
Sweden	2	10.7	48.3	41.0
	10	15.7	43.2	41.1
Switzerland	2	25.2	23.8	51.0
	10	26.2	32.6	41.2
UK	2	57.7	18.4	23.9
	10	57.2	19.7	23.0

Table 2.3 Variance Decompositions for the CFA franc zone

	Years	U-G	Y-D U-R	U-D
Benin	2	42.2	6.7	51.1
	10	47.3	6.8	45.9
Burkina Faso	2	14.3	0.2	85.6
	10	23.8	2.4	73.8
Cote d'Ivoire	2	8.8	37.5	53.8
	10	11.8	36.4	51.8
Guinea-Bissau	2	6.5	13.3	80.3
	10	15.5	25.7	58.8
Mali	2	0.6	37.9	61.5
	10	4.5	39.0	56.5
Niger	2	18.0	2.0	80.0
	10	17.5	2.0	80.5
Senegal	2	1.3	8.3	90.3
	10	3.2	8.7	88.1
Togo	2	17.6	10.2	72.2
	10	21.9	10.2	67.9
Cameroon	2	27.9	56.9	15.2
	10	35.5	37.6	26.8
Cent Afr Rep	2	7.0	18.9	74.1
	10	18.7	16.3	64.9
Chad	2	1.7	2.0	96.2
	10	5.4	2.4	92.2
Rep of Congo	2	24.5	5.0	70.5
	10	31.2	6.3	62.4

Table 2.4 Variance Decompositions in Alternative Models for the CFA franc zone

		BM		M1		M2		M3	
		(2)	(10)	(2)	(10)	(2)	(10)	(2)	(10)
Benin	U-R	6.7	6.8	17.6	18.5	6.8	7.3	4.7	5.2
	U-D	51.1	45.9	76.0	73.0	41.4	38.0	52.6	47.1
Burkina Faso	U-R	0.2	2.4	3.4	6.2	2.1	5.9	0.7	1.4
	U-D	85.6	73.8	96.5	90.0	85.8	74.9	85.3	73.8
Cote d'Ivoire	U-R	37.5	36.4	7.0	7.3	5.8	6.9	16.6	17.8
	U-D	53.8	51.8	50.4	51.2	52.5	49.0	53.7	49.9
Guinea-Bissau	U-R	13.3	25.7	16.8	22.1	9.3	21.5	15.1	26.9
	U-D	80.3	58.8	78.9	65.7	84.6	67.9	80.0	59.4
Mali	U-R	37.9	39.0	12.3	12.2	41.6	44.6	39.6	40.5
	U-D	61.5	56.5	69.3	63.4	53.4	50.1	60.2	55.8
Niger	U-R	2.0	2.0	32.5	29.3	1.2	1.4	1.9	1.9
	U-D	80.0	80.5	58.9	62.6	73.2	74.0	80.0	80.5
Senegal	U-R	8.3	8.7	7.5	8.5	9.2	10.2	8.3	8.6
	U-D	90.3	88.1	91.8	90.0	88.1	84.7	90.4	88.3
Togo	U-R	10.2	10.2	0.7	1.9	1.7	1.9	10.1	10.1
	U-D	72.2	67.9	98.4	97.1	88.7	83.4	72.6	68.3
Cameroon	U-R	56.9	37.6	27.5	35.8	3.4	3.4	51.7	34.6
	U-D	15.2	26.8	71.4	62.4	92.4	94.0	21.0	32.0
Cent Afr Rep	U-R	18.9	16.3	7.2	7.7	23.0	20.1	24.6	22.0
	U-D	74.1	64.9	70.6	69.7	72.1	66.2	65.7	59.5
Chad	U-R	2.0	2.4	14.8	16.4	2.0	2.0	0.2	1.4
	U-D	96.2	92.2	76.5	66.2	95.9	94.3	98.8	95.4
Rep of Congo	U-R	5.0	6.3	0.6	5.3	2.2	7.6	4.2	5.6
	U-D	70.5	62.4	97.0	91.1	62.2	56.7	71.7	63.4

Table 2.5 Basic Statistics for the CFA franc zone countries
Source: World Development Indicators (2005, World Bank)

	Pop	**GNI pc / PPP GNI pc**	**GDP Growth Rate**	**Structure of Output**	**Growth of M'dise Exports**	**Inflation (GDP Deflator)**	**Goods Exports / GDP (%)**	**Growth in real Trade – Growth in real GDP**
	2006 (mil)	2003 (US$)	'80-90 / '90-03	2003	'80-90 / '90-02	'80-90 / '90-03	2003	'90-03
Benin	7.76	440 / 1110	2.5 / 5.0	36 8	0.8 / 2.4	1.7 / 7.0	37.4	-2.6
Burkina Faso	13.90	300 / 1170	3.6 / 4.2	31 13	11.3 / 10.0	3.3 / 4.7	28.0	-2.0
Cameroon	17.34	630 / 1990	3.4 / 2.7	44 9	2.1 / 0.3	5.6 / 4.3	36.6	2.2
Cent Afr Rep	4.30	260 / 1080	1.4 / 1.8	48 11[a]	16.9 / 2.4	7.9 / 3.9	20.4	--
Chad	9.94	260 / 1080	6.1 / 3.1	46 12	-0.2 / 1.5	1.4 / 6.7	42.6	3.8
Congo, Rep	4.70	650 / 730	3.3 / 1.8	6 6	5.6 / 7.7	0.5 / 7.9	19.4	2.7
Cote d'Ivoire	17.66	5370 / 10610	0.7 / 2.4	26 11	4.5 / 5.3	2.8 / 7.3	75.3	0.1
Equatorial Guinea	0.54	14153 / 50200						
Gabon	1.42	3340 / 5500	0.9 / 2.3	8 5	2.1 / 0.6	1.8 / 5.1	59.7	-1.6
Guinea-Bissau	1.44	140 / 680	4.0 / 0.4	69 10	13.1 / 12.2	57.4 / 22.8	87.6	4.0
Mali	11.72	187 / 960	0.8 / 4.9	38 3	11.1 / 7.6	4.5 / 6.0	50.4	2.2
Niger	12.53	197 / 830	-0.1 / 2.8	40 7	3.1 / 0.0	1.9 / 5.2	32.6	--
Senegal	11.99	540 / 1620	3.1 / 4.0	17 13	9.8 / 3.6	6.5 / 3.8	56.9	-0.9
Togo	5.55	310 / 1640	1.7 / 3.1	41 9	7.1 / 5.3	4.8 / 5.4	57.3	-1.5
World		5510 / 8190	3.3 / 2.8	4 18			41.5	--
Low Income		440 / 4877	4.4 / 4.7	24 14			34.9	--

GNI: the sum of value added by all resident producers plus any product taxes(less subsidies) not included in the valuation of output plus net receipt of primary income (compensation of employees and property income) from abroad.

PPP GNI: GNI converted to international dollars using purchasing power parity rates. [An international dollar has the same purchasing power over GNI as a US dollar has in the United States.]

Under the structure of output, the two numbers are for agriculture (including forestry and fishing) and manufacturing. The remainder are services, mining, construction, and utilities.

a. For 1990.

b. Population data for all countries and all data for Equatorial Guinea are obtained from Country Information page of CIA http://www.cia.gov/cia/publications/factbook/geos/ek.html for 2005.

Table 2.6 Major Export Items for the CFA franc zone countries
(Based on 2004 exports)

Benin	cotton, crude oil, palm products, cocoa
Burkina Faso	cotton, livestock, gold
Cameroon	crude oil and petroleum products, lumber, cocoa beans, aluminum, coffee, cotton
Cent Afr Rep	diamonds, timber, cotton, coffee, tobacco
Chad	cotton, cattle, gum arabic, oil
Congo, Rep	petroleum, lumber, plywood, sugar, cocoa, coffee, diamonds
Cote d'Ivoire	cocoa, coffee, timber, petroleum, cotton, bananas, pineapples, palm oil, fish
Equatorial Guinea	petroleum, methanol, timber, cocoa
Gabon	crude oil, timber, manganese, uranium (2001)
Guinea-Bissau	cashew nuts, shrimp, peanuts, palm kernels, sawn lumber
Mali	cotton, gold, livestock
Niger	uranium ore, livestock, cowpeas, onions
Senegal	fish, groundnuts (peanuts), petroleum products, phosphates, cotton
Togo	cotton, phosphates, coffee, cocoa

Source: Central Intelligence Agency (CIA) *World Factbook* (latest version)

Chapter Three

A Test of Optimal Currency Area for ECCU

3.1 Introduction

The establishment of European Monetary Union has renewed interest in currency unions and their effects. Fidrmuc and Horhonen (2006) examined the impact of exchange rate regimes on the magnitude of business cycle correlations. Engel and Rogers (2001) focused on the impact of the persistence of asymmetric shocks and Aggarwal and Simmons (2005) tested the persistence of deviations from purchasing power parity (PPP). Overall, there appears to be some evidence that sharing a common currency or adopting a hard exchange rate peg reduces international transaction costs and exchange rate risks, and promotes greater trade and hence business cycle synchronicity. This paper characterizes the nature of structural shocks affecting the Eastern Caribbean Currency Union (ECCU) and other non-ECCU Caribbean countries. In particular, we are interested in measuring the extent of symmetry or asymmetry in the shocks affecting the economies in the region.

Being one of the long-lasting currency unions in the world, the ECCU has been questioned about its rationale since its conception because of its small size of membership and geographical isolation of the member economies. Mundell (1961) and McKinnon (1963) argued that fixed exchange rates could be appropriate for a group of economies under certain conditions, which have been formulated into a set of optimum currency area (OCA) criteria.[8] In this paper, we explore the features of the East Caribbean Currency Union (ECCU) and compare it with other currency union such as the CFA franc zone and the Economic and Monetary Union (EMU) in Europe.

In this paper, we operationalize the theory of OCA with a model in which gross domestic product is determined by two types of shocks: regional and domestic shocks. The relative role of regional shocks is taken as the key indicator of suitability for a country to join a common currency union. We investigate the features of those shocks for 8 ECCU members and 8 non-ECCU Caribbean countries along with 13 CFA franc zone

[8] The Optimum Currency Area (OCA) criteria includes: openness to the area members (McKinnon, 1963), symmetry of shocks affecting the area members (Mundell, 1961), and well-diversified economies (Kenen, 1969). In addition, similarity of preferences over output-inflation tradeoffs and willingness to coordinate supporting policies such as fiscal transfers contribute to its smooth functioning.

countries, 9 EMU countries and 5 non-EMU European countries. We find that domestic outputs of the ECCU and EMU countries are strongly influenced by regional shocks while country-specific shocks are far more important in the CFA franc zone countries. In non-ECCU CARICOM countries and non-EMU European countries, the regional shocks and country-specific shocks have nearly equal importance explaining output fluctuations.

The organization of the paper is as follows: Section 3.2 discusses the economic integration in the Caribbean Basin area and provides some background information. Section 3.3 describes the model and discusses the estimation method. A 2-variable vector autoregressive (VAR) model is estimated to investigate the extent of symmetry in structural shocks affecting the economies. Section 3.4 reports the estimation results. Section 3.5 examines the robustness of the model and section 3.6 provides concluding remarks.

3.2 Economic integration in the Caribbean Basin: Background information

The Caribbean has long been considered a strategically important region based on its proximity and unique geographic features. The Caribbean region is mainly a chain of islands surrounding the Caribbean Sea. To the north is the Caribbean Sea bordered by the Gulf of Mexico, the Straits of Florida, and the Northern Atlantic Ocean. Straddling the divide between North and South America and to the east of Central America, the Caribbean is home to important sea-lanes, raw materials, trade and investment opportunities, and has been the first line of defense against the encroachment of the foreign powers.[9] Politically, the term "Caribbean" may be centered around socio-economic groupings found in the region. All islands in the Caribbean at some point were, and a few still are, colonies of European nations. And a few are overseas or dependent territories.[10] In this paper, we focus on the members in the Caribbean Community (CARICOM) and the eight countries which have adopted the East Caribbean dollar as their formal currency (ECCU countries) and investigate the rationality for the existence of the East Caribbean Currency Union.

The Caribbean Community (CARICOM) was established on August 1, 1973 by the Treaty of Chaguaramas and comprises a group of 12 island and 3 larger coastal nations in

[9] See Figure 3.1 for the map of Caribbean.
[10] See Table 3.1 for details.

and around the Caribbean Sea.[11] The majority of the members are very small and all members are classified by international organizations as developing countries. The CARICOM made special and differential treatment to some members by designating its members as less developed countries (LDCs) and more developed countries (MDCs).[12] In 1981, eight members of CARICOM plus British Virgin Islands established the Organization of Eastern Caribbean states (OECS) with the Treaty of Basseterre.[13] Two years later they replaced the Eastern Caribbean Currency Authority by setting up the Eastern Caribbean Central Bank (ECCB) and the Eastern Caribbean Currency Union (ECCU) was formally formed. Eight of the nine members of OECS[14] share a common currency, the Eastern Caribbean dollar, which has been pegged to US dollar at US$1 = EC$2.7 since 1976. (It was pegged to the British pound at £1 = EC$4.80 from 1950 to 1976) In order to deepen economic integration and advance beyond a custom union, the CARICOM Single Market and Economy (CSME) was implemented on January 1, 2006 with the signing of the document for its implementation by six original member states[15]. As of July 3, 2006, it has 12 members. CSME is expected to be fully implemented by 2008 and the fulfillment of its goal is likely to require the harmonization of economic policy and possibly a single currency.

Table 3.2 and Table 3.3 list vital statistics of the CARICOM members. Two aspects of the ECCU economies stand out – their very small size and similar colonial background. The ECCU is a very small economy even taken as a whole. The population (in 2008) ranges from 9,636 in Montserrat to 172,884 in Saint Lucia and the size ranges from 102

[11] The 12 island nations are: Antigua and Barbuda, Bahamas, Barbados, Dominica, Grenada, Haiti, Jamaica, Montserrat, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines and Trinidad and Tobago; 3 coastal nations are: Belize, Guyana and Suriname.

[12] The CARICOM Secretariat distinguishes between LDCs and MDCs as that the LDCs includes: Antigua and Barbuda, Belize, Dominica, Grenada, Montserrat, St. Kitts and Nevis, Saint Lucia and St. Vincent and the Grenadines; WDCs includes: Barbados, Guyana, Jamaica, Suriname and Trinidad and Tobago.

[13] Following the collapse of the West Indies Federation, and prior to the signing of the Treaty of Basseterre, two caretaker bodies were created: the West Indies Associated States Council of Ministers (WISA) in 1966 and the Eastern Caribbean Common Market (ECCM) in 1968.

[14] Six of the states using the Eastern Caribbean dollar are independent states: Antigua and Barbuda, Dominica, Grenada, Saint Kitts and Nevis, Saint Lucia, and Saint Vincent and Grenadines. The other two are British overseas territories: Anguilla and Montserrat. The only OECS member state not using the Eastern Caribbean dollar is British Virgin Islands, which uses the U.S. dollar.

[15] The first six to implement the CARICOM Single Market and Economy (CSME) were Barbados, Belize, Guyana, Jamaica, Suriname and Trinidad and Tobago. Antigua and Barbuda, Dominica, Grenada, St. Kitts and Nevis, St. Lucia and St. Vincent and Grenadines were the next batch of members that joined the CSME on July 3, 2006.

sq. km in Anguilla and Montserrat to 754 sq. km in Dominica. The total population of the ECCU is approximately half a million. It is smaller than any one of Guyana, Haiti, Jamaica and Trinidad and Tobago. The small market size of the ECCU limits opportunity for economies of scale, competition, and diversification of production and trade. The English-speaking ECCU members also share a common colonial background in that they were all British colonial territories before their independence were governed. Most ECCU countries gradually became politically independent and are able to pursue independent economic policies since late 1970s. Most non-ECCU CARICOM members became independent in the 1960s.

The ECCU members, although all small, exhibit interesting diversity in their major economic indicators[16]. For the independent ECCU countries, GDP (in PPP measure) ranges from $485 million in Dominica to $1,189 million in Antigua and Barbuda. Per capita GDP (PPP) ranges from $3,600 in St. Vincent and the Grenadines to $10,900 in Antigua and Barbuda in 2008. Real growth rate in GDP ranges from 0.9% in Grenada to 6% in St. Kitts and Nevis. Non-ECCU Caribbean countries share higher GDP (PPP) and per capita GDP (PPP) figures. Most of them have per capita GDP over $5,000 in 2008 and maintain a GDP growth rate higher than 3 percent. Except Haiti, most non-ECCU Caribbean countries also have lower unemployment rates and higher inflation rates than the ECCU countries in 2008. The ECCU members share a common currency – the East Caribbean dollar – while other non-ECCU members have their own currencies.

Until 1950s, the East Caribbean countries were overwhelmingly agricultural and mainly specializing in either bananas or sugar. The major industry in Caribbean has been steadily shifted from agriculture to tourism through the 1980s. The Caribbean countries have attributed their income increase to the change to tourism industry. Nowadays, tourism accounts a higher role than agriculture in most Caribbean countries[17].

The CARICOM countries inherited narrow production structures from their colonial economic heritage. As captive producers and consumers for the European states, Caribbean economies were developed to complement their counterparts across the Atlantic Ocean. Spawned by foreign investment and sustained by protected trade, plantation economies arose largely based on sugar and banana. Minerals extraction and

[16] See Table 3.2 for details.
[17] See Table 3.5 for details.

tourism came along much later[18]. The former colonies were dependent on European imports for manufactured goods and food. The relationship endured for centuries and carried forward into the post-independence period. Overall, the Caribbean trade regime remained relatively undiversified, sheltered from competition, and poorly linked to domestic food and manufacturing production.

The regional export and import as percentage to exports to and imports from the world market for CARICOM member is reported in table 3.8. The CARICOM trade patterns are evolving. For the ECCU countries, the exports within the ECCU increased from the 1980 to 2000. This trend stopped in 2006 when the intraregional export ratio had a decline to 9.6 percent. The intraregional imports of ECCU countries have been low since the 1980s and intraregional imports ratios counted less than 5 percent of total imports during the period 1980-2006. The intraregional exports ratios of non-ECCU CARICOM countries are typically less than 2 percent since 1980s. Intraregional imports ratios of non-ECCU CARICOM countries have slightly increased from 5.6 percent in 1980 to 6.8 percent in 2006. For all CARICOM countries, exports and imports within the region have stagnated across the decades. Particularly, the trade preference of the ECCU countries is with EU countries and the trade preference of the non-ECCU countries is with the United States. Significant changes in trade patterns have occurred as trade with EU and the United States declines and trade with Asia has significantly increases since 2000. The potential reason behind these changes may be caused by the fact that unilateral preferences with the EU are being replaced by a reciprocal Economic Partnership Agreement (EPA), while the relative benefit of unilateral trade preferences with the United States continues to erode as multilateral liberalization and U.S. reciprocal trade agreements, beginning with the North American Free Trade Agreement (NAFTA) in 1994. Intraregional CARICOM trade shows little promise for growth. It appears that Asia will be emerging as increasingly important trade partners in the future.

3.3 Model

We employ a simplified version of the model first developed by Chow and Kim (2003). In their original model, domestic output, y^d, is assumed to be affected by three

[18] See Table 3.6, Table 3.7 for details.

kinds of shocks - global shock, regional shock and country-specific shock (u^g, u^r, and u^d).

$$\Delta y_t^d = \beta_0 + \beta_1(L)u_t^d + \beta_2(L)u_t^r + \beta_3(L)u_t^g$$

where $\beta_i(L) = \beta_{i0} + \beta_{i1}L + \beta_{i2}L^2 + \beta_{i3}L^3 + \ldots$ is a polynomial function of the lag operator L. u_t^g, u_t^r and u_t^d represent the zero-mean mutually uncorrelated global shocks, regional and country-specific shocks, respectively. Global shocks can affect the economies both inside and outside the regional boundary such as world oil crises in 1970s. Regional shocks are common to the economies within the region. Regional shocks will not have persistent effect on global economy. Country-specific shocks are unique to a particular economy. They may be either from aggregate supply shocks on productivity or the terms of trade or from aggregate demand shocks associated with monetary or fiscal policies.

In this paper, we employ a 2-variable structural vector autoregressive model. In our model, domestic output, y^d, is assumed to be affected by only two kinds of shocks: regional and country-specific shocks. Country-specific shocks are defined as the shocks that only affect a particular economy for one country. Regional shocks in this paper refer to any shocks that affect the economies both inside and outside Caribbean area. In the case of the small economies of the ECCU members and other countries in the region, the United States plays a dominant role. A great majority of international trade of the small economies in the Caribbean is with the United States and European countries. Intraregional trade with Caribbean countries is trivial comparing with the trade with the United States and European countries. Moreover, the ECCU currency is tied to the US dollar. Thus, it is clear that the US economy plays a core of the regional economies. At the same time, the US economy is also a main part of the global economy as well. We thus combine both regional and global shocks in Chow and Kim (2003) model together and call the resulting shocks as regional shocks. They capture all external influences on domestic output. [19]

[19] Here the "regional shocks" actually are the shocks from changes in US, Japan and six major European trading partners of Caribbean countries. We adopted a 2-variable model because we believe the effect from ECCU or non-ECCU CARICOM countries is quite small.

In this paper, we shrink the model of Chow and Kim (2003) into a 2 x 2 vector autoregressive model. They are related to two structural shocks as follows:

$$\begin{pmatrix} \Delta y_t^r \\ \Delta y_t^d \end{pmatrix} = \begin{pmatrix} A_{11}(L) & A_{12}(L) \\ A_{21}(L) & A_{22}(L) \end{pmatrix} \begin{pmatrix} u_t^y \\ u_t^d \end{pmatrix}$$

where $A_{ij}(L) = a_{ij}^0 + a_{ij}^1 L + a_{ij}^2 L^2 + \ldots$ is a matrix of polynomial functions of the lag operator *L*. We assume that the structural shocks are uncorrelated and of unit variance: $Var(u_t) = I$. Structural shocks are unobserved and we have one restriction employed to recover them from reduced-form innovations: country-specific shocks have no long-run effects on regional output. So the economy is considered to be small part of the regional economy. In the coefficient matrix, these imply that:

$A_{12}(1) = 0$ where $A_{ij}(1) = a_{ij}^0 + a_{ij}^1 + a_{ij}^2 + \ldots$

The restriction implies that the cumulative effect of u_t^d on Δy_t^r is zero, and the shock u_t^d has only short-run effects on regional output. Note that there is no restriction on the effects of a regional shock on country's domestic output.

3.4 Empirical results

In this study, output is represented by real Gross Domestic Production (in constant 2000 US$ and seasonal adjusted). We choose 8 ECCU members[20]. For comparison, we also choose 8 non-ECCU CARICOM members in the same geographical area.[21] We defined regional output as trade-weighted average of outputs of the United States, Japan and 5 major trading partner countries[22] from Europe. The weights are based on the - exports and imports of Caribbean country with each developed country. Real GDP data for all the investigated countries are retrieved from WDI (World Development Indicator, *World Bank*) and we use some data from the IFS (International Financial Statistics, IMF) to justify and remedy the missing value which we need. Selected data are annual data ranging from 1973 to 2005. To form the regional output proxy, we also retrieve the

[20] The 8 ECCU members include: Antigua and Barbuda, Dominica, Grenada, St.Kitts and Nevis, St. Lucia, St. Vincent and Grenadines, Auguilla and Montserrat. Data for Auguilla starts from 1990.
[21] The 8 non-ECCU Caribbean countries include: the Bahamas, Barbados, Belize, Guyana, Haiti, Jamaica, Suriname, and Trinidad and Tobago.
[22] The 5 leading trade partners include: United Kingdom, France, Germany, Italy, and Netherlands

annual data of exports and imports from 1990 to 1992 for all Caribbean area countries with the US, Japan and selected European countries from DOTs (Direction of Trade statistics, June 2008).

Table 3.9 reports the results of unit root tests. We employed the augmented Dickey-Fuller (ADF) test, the Schmidt-Phillips (SP) test, and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. The null hypothesis for ADF and the SP tests is that the GDP is non-stationary. We assume that there is a nonzero mean for each series but there is no time trend. We use Akaike Information Criterion (AIC) to find the optimal lag length for our tests. The null hypothesis that GDP is non-stationary cannot be rejected for all CARICOM countries with the ADF and SP tests. For KPSS test, the null hypothesis is that the outputs are stationary. The results indicate that the null is rejected at the conventional significance level. When the same tests are applied to the first differences of the series, the unit-root null is rejected with the ADF and SP tests and stationary null is not rejected with the KPSS test. The results imply that each output series contains a unit root and thus should be first differenced to become stationary.

We estimate a structural vector autoregressive model for ECCU countries and non-ECCU CARICOM countries first. We also extend our model to CFA franc zone countries, EMU countries and non EMU European countries as well for comparison. The results of the forecast error variance decomposition at 2-year and 10-year forecast horizon are reported in table 3.10, table 3.11 and table 3.12. Regional and local shocks are denoted by "U-R" and "U-D" respectively. 2(10) year responses are taken as short-term (long-term) effects. In all cases, the VAR model are estimated with different optimal lags (which is determined by lag length tests). Blanchard-Quah variance decompositions are reported only for domestic output only since regional output are mainly explained by regional shocks itself.

We see some interesting outcome from the variance decomposition. ECCU countries show a dominant regional shock effect. In Antigua and Barbuda, St.Kitts and Nevis, regional shocks explain around 80 percent domestic output fluctuations in the long run and regional shocks explain more than 60 percent of domestic output changes in Anguilla in both short term and long term. In the rest of ECCU countries, there is a significant increase in the role of regional shocks from short term to the long term. In non-ECCU CARICOM countries, domestic shocks play a more important role. In Bahamas,

Barbados and Belize, domestic shocks explain more than 85 percent domestic output fluctuations in the short run. In the long run, there is a large increase in the role of regional shocks. In Barbados, Belize, Guyana, Suriname and Trinidad and Tobago, regional shocks can explain more than 40 percent domestic output fluctuations in the long term.

In CFA franc zone countries, dominant shocks for domestic output are country domestic shocks except Cote d'Ivoire and Guinea-Bissau. In both horizons, domestic shocks explain more than 70 percent in almost all cases. Regional shocks are far less important that ECCU countries. For Cote d'Ivoire and Guinea-Bissau, regional shocks explain more than 40 percent in the short term and more than 50 percent in the long term which are a bit smaller but comparable to those observed in the ECCU countries.

In the EMU group, regional shocks are dominant in most countries. More than 35 percent of short-term and 40 percent long-term output variations in domestic output are due to regional shocks. The importance of regional shocks is highest in Austria, Greece, and Spain where they explain 65 percent or more of output variations in the long term and 40 percent or more in the short term. Finland, Ireland, Italy, Netherland and Portugal seems appear exceptions in the group where country-specific shocks are dominant and explain more than 60 percent in both short and long term. In the non-EMU countries, however, regional shocks are equivalent to domestic shocks. In Sweden, regional shocks explain 93 percent domestic output variations in the short term and 80 percent in the long term. In Denmark and UK, regional shocks can explain 50 percent or more of domestic output variations.

One good reason why we find that most ECCB country will have an asymmetric regional shock and take advantage to be in this currency union may depend on the composition of their trading sector and economic structure. The fact that typical Caribbean country has a tradable sector which consists of tourism, agriculture staple, mineral and manufacture of beverages gives us the reason. The supply of each of them is constrained by domestic capacity due to very small economic size while the domestic demand absorbs a very small proportion of production. So the effect of changes in relative prices on net domestic supply is therefore negligible in the short run. And in the long run the effect of relative price changes should be considered along with other factors such as changes in technology, changes in taste and changes in international ownership.

The exchange rate instrument is not as important as big economy and these small size economies will benefit more from being in a currency union.

3.5 Robustness

Not until 1983 was the Eastern Caribbean Central Bank (ECCB) established to issue the common currency and administer the common reserve pool from ECCU member countries. The ECCB created an interbank market in 1986 to enable commercial banks with excess reserves at the central bank to make loans to banks with reserve deficiencies and established a rediscount window for treasury bills in 1988 as an inducement to commercial banks to invest in government securities. In this section, we try to investigate the structure of shocks in the period when ECCB was set up and we focus on the period from 1983 to 2005.

Table 3.13 reports the variance decomposition for ECCU and non-ECCU CARICOM countries at 2-year and 10-year forecast horizon during the period 1983 to 2005. Comparing to our benchmark model, we find for most ECCU countries, the regional shocks explain more variations on domestic output. In Antigua and Barbuda, Dominica, St.Vincent and the Grenadines, regional shocks explain more than 75 percent domestic output fluctuations in both short-term and long term. In St.Kitt and Nevis and St.Lucia, 60 percent domestic output variations can be explained by regional shocks in the long run. For most non-ECCU CARICOM countries, domestic shocks are still dominant in explaining domestic output variations in both short-term and long-term. In Guyana, domestic shocks explain 91 percent output variations in the short term and 76 percent in the long term. In general, the non-ECCU CARICOM members faced more asymmetric shocks than ECCU members after the Eastern Caribbean Central Bank (ECCB) was set up in 1983.

3.6 Conclusion

We employ a 2-variable vector autoregressive model in domestic output is determined by two types of shocks: regional and domestic. Summarizing the main result from the study, we find that domestic outputs of ECCU countries are strongly influenced by regional shocks comparing a dominant country-specific shock in CFA franc zone countries. The ECCU countries are structurally related to each other and thus more likely

to be subject to symmetric shocks. the monetary and exchange arrangements maintained by ECCB have served the region well and the Eastern Caribbean Currency Union is more likely to be an optimal currency area.

The ECCU countries have taken the lead in efforts to extend the success of monetary cooperation to the integration of national money and capital markets. In the meantime, the CARICOM committed themselves to progress economic integration in Eastern Caribbean by establishing the CARICOM Single Market and Economy recently and eventually to the formation of a single, regional, financial space in the area. However, to achieve the goal, it requires not only the deepening of the links among the member countries but also greater integration of labor and product markets in the region.

Figure 3.1 Map of the Caribbean Region

Source: *GraphicMaps.com*

Table 3.1 Historical Groupings

Grouping	Current territories	Former territories
British West Indies / Anglophone Caribbean	Anguilla, British Virgin Islands, Cayman Islands, Montserrat, Turks and Caicos Islands	Antigua and Barbuda, The Bahamas, Barbados, Dominica, Grenada, Jamaica, Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Trinidad and Tobago
Danish West Indies		present-day United States Virgin Islands
Dutch West Indies		present-day Netherlands Antilles and Aruda, Virgin Islands, Saint Croix, Tobago and Bay Islands
French West Indies	Guadeloupe, Martinique, Saint Martin and Saint-Barthelemy	Hispaniola, Dominica, Grenada, The Grenadines, Saint Croix, Saint Kitts, Saint Lucia, Saint Vincent, Tobago
Portuguese West Indies		present-day Barbados
Spanish West Indies		Cuba, Hispaniola (Dominican Republic), Puerto Rico, Jamaica, Cayman Islands, Trinidad and Bay Islands
Swedish West Indies		French Saint-Barthelemy and Guadeloupe

Source: de Kadt (1972), Kurlansky (1992), Develtere (1994), Gowricharn (2006)

Table 3.2 Economic Integration in Caribbean

Countries	CARICOM	OECS	ECCU	CSME	LDCs	WDCs
Antigua and Barbuda	x	x	x	x	x	
Anguilla		x	x			
Bahamas	x					
Barbados	x			x		x
Belize	x			x	x	
British Virgin Islands		x				
Dominica	x	x	x	x	x	
Grenada	x	x	x	x	x	
Guyana	x			x		x
Haiti	x					
Jamaica	x			x		x
Montserrat	x	x	x		x	
St. Kitts and Nevis	x	x	x	x	x	
St. Lucia	x	x	x	x	x	
St. Vincent and the Grenadines	x	x	x	x	x	
Suriname	x			x		x
Trinidad and Tobago	x			x		x

Note: x represents the full membership of the relative grouping

Table 3.3 Country characteristic variables

	Total population	Area (sq. km)	Median age	Life expectancy	Languages	Literacy	Independence
ECCU members							
Antigua and Barbuda	69,842	443	30.5	72.7	English (official),local dialects	85.8%	November 1, 1981
Dominica	72,514	754	29.4	75.3	English (official), French patois	94.0%	November 3, 1978
Grenada	90,343	344	22.4	65.6	English (official), French patois	96.0%	February 7, 1974
Saint Kitts and Nevis	39,619	261	28.3	72.9	English	97.8%	September 19, 1983
Saint Lucia	172,884	616	26.0	74.3	English (official), French patois	90.1%	February 22, 1979
Saint Vincent and the Grenadines	118,432	389	28.0	74.3	English (official), French patois	96.0%	October 27, 1979
Anguilla	14,108	102	32.3	80.5	English	95.0%	April 1, 1982
Montserrat	9,638	102	29.7	79.2	English	97.0%	December 19, 1989
Non-ECCU CARICOM members							
Bahamas	307,451	13,940	28.4	65.7	English, Creole (among Haitian immigrants)	95.6%	July 10, 1973
Barbados	281,968	431	35.4	73.2	English	99.7%	November 30, 1966
Belize	301,270	22,966	20.1	68.2	Spanish, Creole, Mayan dialects, English, Garifuna, German, other	76.9%	September 21, 1981
Guyana	770,794	214,970	28.2	66.4	English, Amerindian dialects, Creole, Caribbean Hindustani, Urdu	98.8%	May 26, 1966
Haiti	8,924,553	27,750	18.5	57.6	French(official), Creole (official)	52.9%	January 1, 1804
Jamaica	2,804,332	10,991	23.4	73.6	English, English patois	87.9%	June 6, 1962
Suriname	475,996	163,270	27.5	73.5	Dutch (official), English,Sranang Tongo, Caribbean Hindustani, Javanese	89.6%	November 25, 1975
Trinidad and Tobago	1,047,366	5,128	32.3	67.0	English (official), Caribbean Hindustani, French, Spanish, Chinese	98.6%	August 31, 1962
Non-ECCU associate CARICOM members							
Bermuda	66,536	53	41.0	78.3	English(official), Portuguese	98.0%	June 8, 1968
British Virgin Islands	24,004	153	32.0	77.1	English	97.8%	June 13, 1956
Cayman Islands	47,862	262	37.8	80.3	English	98.0%	January 1, 1959
Turks and Caicos Islands	22,352	430	27.8	75.2	English	98.0%	August 30, 1976

Source: *Central Intelligence Agency (CIA) World Factbook (July 2008)*

Note: a. Definition of literacy: age 15 and over has ever attended school; b.Auguilla, Montserrat, Bermuda, British Virgin Islands, Cayman Islands and Turks and Caicos Islands are overseas territories of the UK, dates shown are constitution date.

Table 3.4 Country economic variables

	GDP (PPP) (million $)	GDP - real growth rate	GDP - per capita (PPP)	Unemployment rate	Inflation rate (consumer prices)	Currency (code)
ECCU members						
Antigua and Barbuda	1,189	3.8%	10,900	11.0%	2.8%	East Caribbean dollar (XCD)
Dominica	485	3.2%	3,800	23.0%	-0.1%	East Caribbean dollar (XCD)
Grenada	553	0.9%	3,900	12.5%	3.0%	East Caribbean dollar (XCD)
St. Kitts and Nevis	726	6.0%	8,200	4.5%	8.7%	East Caribbean dollar (XCD)
St. Lucia	1,179	5.1%	4,800	20.0%	2.9%	East Caribbean dollar (XCD)
St. Vincent and the Grenadines	902	4.4%	3,600	15.0%	1.0%	East Caribbean dollar (XCD)
Anguilla	109	10.2%	8,800	8.0%	5.3%	East Caribbean dollar (XCD)
Montserrat	29	-1.0%	3,400	6.0%	2.6%	East Caribbean dollar (XCD)
Non-ECCU CARICOM members						
Bahamas	6,925	2.8%	22,700	7.6%	2.4%	Bahamian dollar (BSD)
Barbados	5,530	4.0%	19,700	10.7%	5.5%	Barbadian dollar (BBD)
Belize	2,336	3.0%	7,800	9.4%	2.8%	Belizean dollar (BZD)
Guyana	4,057	4.5%	5,300	9.1%	10.4%	Guyanese dollar (GYD)
Haiti	15,820	3.5%	1,900	67.0%	8.9%	Gourde (HTG)
Jamaica	13,470	1.5%	4,800	10.2%	7.1%	Jamaican dollar (JMD)
Suriname	3,449	5.1%	7,800	9.5%	9.5%	Surinam dollar (SRD)
Trinidad and Tobago	22,930	5.5%	21,700	6.0%	7.6%	Trinidad and Tobago dollar (TTD)
Non-ECCU associate CARICOM members						
Bermuda	4,500	4.6%	69,900	2.1%	2.8%	Bermudian dollar (BMD)
British Virgin Islands	853	1.0%	38,500	3.6%	2.0%	US dollar (USD)
Cayman Islands	1,939	0.9%	43,800	4.4%	4.4%	Caymanian dollar (KYD)
Turks and Caicos Islands	216	4.9%	11,500	10.0%	4.0%	US dollar (USD)

Source: *Central Intelligence Agency (CIA) World Factbook (July 2008)*

Table 3.5 Major industries

ECCU members	
Antigua and Barbuda	tourism, construction, light manufacturing (clothing, alcohol, household appiance.
Dominica	soap, coconut oil, tourism, copra, furniture, cement blocks, shoes
Grenada	food and beverages, textiles, light assembly operations, tourism, construction
Saint Kitts and Nevis	tourism, cotton, salt, copra, clothing, footwear, beverages
Saint Lucia	clothing, assembly of electronic components, beverages, corrugated cardboard boxes, tourism, lime processing, coconut processing
Saint Vincent and the Grenadines	food processing, cement, furniture, clothing, starch
Anguilla	tourism, boat building, offshore financial services
Montserrat	tourism, rum, textiles, electronic appliances
Non-ECCU CARICOM members	
Bahamas	tourism, banking, cement, oil transshipment, salt, rum, aragonite, pharmaceuticals, spiral-welded steel pipe
Barbados	tourism, sugar, light manufacturing, component assembly for export
Belize	garment production, food processing, tourism, construction, oil
Guyana	bauxite, sugar, rice milling, timber, textiles, gold mining
Haiti	sugar refining, flour milling, textiles, cement, light assembly based on imported parts
Jamaica	tourism, bauxite/alumina, agro processing, light manufactures, rum, cement, metal, paper, chemical products, telecommunications
Suriname	bauxite and gold mining, alumina production, oil, lumbering, food processing, fishing
Trinidad and Tobago	petroleum, chemicals, tourism, food processing, cement, beverage, cotton textiles
Non-ECCU associate CARICOM members	
Bermuda	international business, tourism, light manufacturing
British Virgin Islands	tourism, light industry, construction, rum, concrete block, offshore financial center
Cayman Islands	tourism, banking, insurance and finance, construction, construction materials, furniture
Turks and Caicos Islands	tourism, offshore financial services

Source: *Central Intelligence Agency (CIA) World Factbook (July 2008)*

Table 3.6 Major Trading commodities

	Exports commodities	Imports commodities
ECCU members		
Antigua and Barbuda	petroleum products, bedding, handicrafts, electronic components, transport equipment, food and live animals	food and live animals, machinery and transport equipment, manufactures, chemicals, oil
Dominica	bananas, soap, bay oil, vegetables, grapefruit, oranges	manufactured goods, machinery and equipment, food, chemicals
Grenada	bananas, cocoa, nutmeg, fruit andvegetables, clothing, mace	food, manufactured goods, machinery, chemicals, fuel
Saint Kitts and Nevis	machinery, food, electronics, beverages, tobacco	machinery, manufactures, food, fuels
Saint Lucia	bananas, clothing, cocoa, vegetables, fruits, coconut oil	food, manufactured goods, machinery and transportation equipment, chemicals, fuels
Saint Vincent and the Grenadines	bananas, eddoes and dasheen, arrowroot starch, tennis racquets	foodstuffs, machinery and equipment, chemicals and fertilizers, minerals and fuels
Anguilla	lobster, fish, livestock, salt, concrete blocks, rum	fuels, foodstuffs, manufactures, chemicals, trucks, textiles
Montserrat	electronic components, plastic bags, apparel, hot peppers, limes, live plants, cattle	machinery and transportation equipment, foodstuffs, manufactured goods, fuels, lubricants, and related materials
Non-ECCU CARICOM members		
Bahamas	mineral products and salt, animal products, rum, chemicals, fruit and vegetables	machinery and transport equipment, manufactures, chemicals, mineral fuels, food and live animals
Barbados	manufactures, sugar and molasses, rum, other foods and beverages, chemicals, electrical components	consumer goods, machinery, foodstuffs, construction materials, chemicals, fuel, electrical components
Belize	sugar, bananas, citrus, clothing, fish products, molasses, wood	machinery and transport equipment, manufactured goods, fuels, chemicals, pharmaceuticals, food, beverages, tobacco
Guyana	sugar, gold, bauxites, alumina, rice, shrimp, molasses, rum, timber	manufactures, machinery, petroleum, food
Haiti	apparel, manufactures, oils, cocoa, mangoes, coffee	food, manufactured goods, machinery and transport equipment, fuels, raw materials
Jamaica	alumina, bauxite, sugar, bananas, rum, coffee, yams, beverages, chemicals, wearing apparel, mineral fuels	food and other consumer goods, industrial supplies, fuel, parts and accessories of capital goods, machinery and transport equipment, construction materials
Suriname	alumina, gold, crude oil, lumber, shrimp and fish, rice, bananas	capital equipment, petroleum, foodstuffs, cotton, consumer goods
Trinidad and Tobago	petroleum and petroleum products, liquefied natural gas, methanol, ammonia, urea, steel products, beverages, cereal and cereal products, sugar, cocoa, coffee, citrus fruit, vegetables, flowers	mineral fuels, lubricants, machinery, transportation equipment, manufactured goods, food, live animals, grain

Source: *Central Intelligence Agency (CIA) World Factbook (July 2008)*

Table 3.7 Major trading partners

	Exports partners	Imports partners
ECCU members		
Antigua and Barbuda	Spain 34%, Germany 20.7%, Italy 7.7%, Singapore 5.8%, UK 4.9%	US 21.1%, China 16.4%, Germany 13.3%, Singapore 12.7%, Spain 6.5%
Dominica	UK 24.8%, Jamaica 12.3%, Antigua and Barbuda 9.8%, Guyana 8.3%, China 7.9%, Trinidad and Tobago 5.4%, Saint Lucia 4.5%	US 25.3%, China 22.7%, Trinidad and Tobago 13.8%, South Korea 4.8%
Grenada	Saint Lucia 18.8%, Antigua and Barbuda 12.8%, Saint Kitts & Nevis 11.5%, Dominica 11.4%, US 11.4%	Trinidad and Tobago 33.7%, US 24.2%, UK 4.3%
Saint Kitts and Nevis	US 62%, Canada 9.4%, Netherlands 6.6%, Azerbaijan 5%	US 48.9%, Trinidad and Tobago 13.1%, Spain 4.6%, UK 4.5%
Saint Lucia	France 69.7%, US 10.2%, UK 8.8%	US 21.1%, Trinidad and Tobago 14.9%, Italy 12.3%, France 11.8%, Venezuela 7.2%, UK 6.9%, Netherlands 5.8%
Saint Vincent and the Grenadines	France 26.2%, Greece 21.3%, Italy 18.9%, Russia 7.2%, UK 6.8%	Singapore 17.3%, Trinidad and Tobago 12.1%, US 11.1%, Italy 11%, Spain 9.5%, Turkey 4.6%, Germany 4.4%
Anguilla	UK, US, Puerto Rico, Saint-Martin	US, Puerto Rico, UK
Montserrat	US, Antigua and Barbuda	US, UK, Trinidad and Tobago, Japan, Canada
Non-ECCU CARICOM members		
Bahamas	Spain 22.3%, US 19.8%, Poland 13.5%, Germany 13%, UK 5.7%, Guatemala 4.9%	US 24.7%, Brazil 15.7%, Japan 13.1%, South Korea 7.8%, Spain 6.2%
Barbados	US 27.6%, Trinidad and Tobago 15%, UK 10.2%, Saint Lucia 7%, Jamaica 6.2%, Saint Vincent and the Grenadines 4.3%	US 37.7%, Trinidad and Tobago 22.6%, UK 5.9%
Belize	US 33.9%, UK 33.6%, Cote d'Ivoire 3.7%	US 35.7%, Mexico 13%, Cuba 7.7%, Guatemala 7.2%, China 4.3%
Guyana	US 18.8%, Canada 18.4%, UK 8.7%, Portugal 6.5%, Trinidad and Tobago 4.9%, Netherlands 4.3%, Belgium 4.3%, Jamaica 4.1%	Trinidad and Tobago 23%, US 21.3%, China 9.7%, Cuba 6.3%, UK 4.5%
Haiti	US 79.8%, Dominican Republic 7.6%, Canada 3%	US 46.5%, Netherlands Antilles 11.9%, Brazil 3.8%
Jamaica	US 30.2%, Canada 15.6%, China 15.2%, UK 10.3%, Netherlands 7%, Norway 4.6%	US 39.3%, Trinidad and Tobago 13.6%, Venezuela 9.5%
Suriname	Norway 23%, Canada 15.5%, US 12.6%, Belgium 10.1%, France 8.5%, UAE 6.9%, Iceland 4.6%	US 29.4%, Netherlands 18.9%, Trinidad and Tobago 14.9%, Japan 5.1%, China 4.9%
Trinidad and Tobago	US 59.8%, Spain 5.3%, Jamaica 5.2%	US 30.6%, Brazil 12%, Venezuela 6.8%, Gabon 7.4%, Colombia 4.6%

Source: *Central Intelligence Agency (CIA) World Factbook (July 2008)*

Table 3.8 Regional trade patterns, 1981-2006 percentage of total exports/imports with the world

	1981-1985		1986-1990		1991-1995		1996-2000		2000-2005		2006	
	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
ECCU members												
Within ECCU	7.8	4.3	8.0	3.9	11.4	3.1	12.6	2.7	13.3	2.4	9.6	2.3
Within CARICOM	29.8	21.6	21.3	14.7	21.8	18.6	29.3	23.3	25.9	24.4	17.6	22.6
With USA	2.8	18.7	14.2	40.7	21.1	34.0	23.5	41.5	25.5	29.0	13.2	23.9
With Japan	0.2	7.6	0.1	5.9	0.2	3.7	0.2	4.6	0.9	3.3	0.4	2.9
With Asia	0.0	2.5	0.0	3.0	0.1	2.5	0.1	2.6	3.8	5.6	3.1	10.7
With European Union	64.2	32.2	61.4	24.6	50.3	29.5	41.1	17.0	33.9	16.4	59.8	27.1
Non-ECCU CARICOM member												
Within CARICOM	1.4	5.6	1.3	4.2	1.8	5.5	2.5	6.8	2.0	6.9	1.6	6.8
With USA	68.2	32.1	61.2	40.4	38.0	42.3	37.5	42.4	49.7	31.1	48.3	28.8
With Japan	0.7	4.3	2.1	4.5	1.6	8.0	1.1	6.2	0.8	4.9	1.5	6.4
With Asia	0.2	7.3	0.4	4.7	1.8	4.8	0.9	7.2	1.8	12.2	2.8	14.1
With European Union	12.7	13.8	15.4	15.1	22.0	20.6	22.9	16.9	17.0	17.2	19.3	12.1
All CARICOM member												
Within CARICOM	6.0	6.0	6.2	5.0	9.5	6.7	14.9	8.0	13.0	8.2	11.5	8.0
With USA	67.3	31.8	59.0	40.5	37.2	41.6	37.0	42.3	49.1	31.0	47.2	28.5
With Japan	0.7	4.4	2.0	4.6	1.5	7.6	1.1	6.0	0.8	4.8	1.5	6.1
With Asia	0.2	7.2	0.4	4.6	1.7	4.6	0.8	6.8	1.9	11.7	2.8	13.8
With European Union	13.4	14.2	17.5	15.8	23.3	21.4	23.5	16.9	17.5	17.1	20.6	13.2

Source: IMF Direction of Trade Statistics, *World Development Indicators June 2007*

Table 3.9 Unit Root Tests for CARICOM members

	lnY(t)			ΔlnY(t)		
	ADF	SP	KPSS	ADF	SP	KPSS
Antigua and Barbuda	2.47	-1.30	1.00	-1.25	-4.08	0.32
Dominica	3.20	-1.53	0.96	-1.95	-14.04	0.33
Grenada	2.17	-1.75	0.99	-1.16	-3.71	0.18
St.Kitts and Nevis	2.80	-2.00	1.06	-1.61	-3.74	0.14
St.Lucia	1.81	-1.50	1.00	-1.46	-6.19	0.18
St. Vincent and the Grenadines	2.05	-1.43	0.98	-0.84	-4.32	0.37
Anguilla	2.35	-2.29	0.61	-0.61	-3.28	0.09
Montserrat	-0.13	-2.16	0.39	-2.31	-3.26	0.11
Bahamas, The	-0.73	-2.03	0.21	-1.37	-5.53	0.33
Barbados	2.28	-1.47	1.00	-3.27	-4.37	0.44
Belize	1.97	-2.18	1.05	-1.92	-2.85	0.06
Guyana	0.28	-1.15	0.51	-2.17	-2.92	0.31
Haiti	-0.52	-1.48	0.59	-3.47	-4.65	0.16
Jamaica	1.54	-1.44	0.98	-2.17	-3.30	0.14
Suriname	0.65	-2.56	0.35	-2.06	-4.34	0.43
Trinidad and Tobago	0.56	-1.27	0.46	-1.95	-1.91	0.36
Asymptotic critical value						
ADF test:	1% -2.56 5% -1.94 10% -1.62					
SP test:	1% -3.56 5% -3.02 10% -2.75					
KPSS test:	1% 0.739 5% 0.463 10% 0.347					

Table 3.10 Variance Decompositions for ECCU and Non-ECCU CARICOM members

	Years	Y-D	
		U-R	U-D
ECCU members			
Antigua and Barbuda	2	0.59	0.41
	10	0.81	0.19
Dominica	2	0.14	0.86
	10	0.27	0.73
Grenada	2	0.35	0.65
	10	0.39	0.61
St.Kitts and Nevis	2	0.53	0.47
	10	0.79	0.21
St.Lucia	2	0.09	0.91
	10	0.23	0.77
St. Vincent and the Grenadines	2	0.40	0.60
	10	0.56	0.44
Anguilla	2	0.63	0.37
	10	0.65	0.35
Montserrat	2	0.21	0.79
	10	0.30	0.70
Non-ECCU CARICOM members			
Bahamas, The	2	0.11	0.89
	10	0.12	0.88
Barbados	2	0.10	0.90
	10	0.47	0.53
Belize	2	0.13	0.87
	10	0.42	0.58
Guyana	2	0.42	0.58
	10	0.22	0.78
Haiti	2	0.31	0.69
	10	0.38	0.62
Jamaica	2	0.20	0.80
	10	0.24	0.76
Suriname	2	0.71	0.29
	10	0.85	0.15
Trinidad and Tobago	2	0.44	0.56
	10	0.46	0.54

Table 3.11 Variance Decompositions for the CFA franc zone members

	Years	Y-D	
		U-R	U-D
CFA franc zone countries			
Benin	2	0.10	0.90
	10	0.11	0.89
Burkina Faso	2	0.03	0.97
	10	0.06	0.94
Cote d'Ivoire	2	0.44	0.56
	10	0.49	0.51
Guinea - Bissau	2	0.60	0.40
	10	0.61	0.39
Mali	2	0.26	0.74
	10	0.37	0.63
Niger	2	0.00	1.00
	10	0.01	0.99
Senegal	2	0.05	0.95
	10	0.07	0.93
Togo	2	0.11	0.89
	10	0.16	0.84
Cameroon	2	0.14	0.86
	10	0.29	0.71
Central African Republic	2	0.06	0.94
	10	0.06	0.94
Chad	2	0.03	0.97
	10	0.06	0.94
Congo, Republic	2	0.09	0.91
	10	0.08	0.92
Gabon	2	0.04	0.96
	10	0.23	0.77

Table 3.12 Variance Decompositions for EMU and Non-EMU European countries

	Years	Y-D	
		U-R	U-D
EMU Countries			
Austria	2	0.70	0.30
	10	0.71	0.29
Finland	2	0.15	0.85
	10	0.14	0.86
Germany	2	0.43	0.57
	10	0.44	0.58
Greece	2	0.77	0.23
	10	0.62	0.38
Ireland	2	0.14	0.86
	10	0.13	0.87
Italy	2	0.21	0.79
	10	0.21	0.79
Netherlands	2	0.38	0.62
	10	0.38	0.62
Portugal	2	0.35	0.65
	10	0.46	0.54
Spain	2	0.70	0.30
	10	0.69	0.31
Non-EMU Countries			
Denmark	2	0.52	0.48
	10	0.57	0.43
Norway	2	0.29	0.71
	10	0.35	0.65
Sweden	2	0.93	0.07
	10	0.80	0.20
Switzerland	2	0.34	0.66
	10	0.42	0.58
UK	2	0.58	0.42
	10	0.61	0.39

Table 3.13 Robustness Test for ECCU and Non-ECCU CARICOM members

	Years	Y-D	
		U-R	U-D
ECCU members			
Antigua and Barbuda	2	0.79	0.21
	10	0.85	0.15
Dominica	2	0.75	0.25
	10	0.82	0.18
Grenada	2	0.32	0.68
	10	0.45	0.55
St.Kitts and Nevis	2	0.60	0.40
	10	0.67	0.33
St.Lucia	2	0.50	0.50
	10	0.60	0.40
St. Vincent and the Grenadines	2	0.77	0.23
	10	0.82	0.18
Anguilla	2	0.71	0.29
	10	0.72	0.28
Montserrat	2	0.23	0.77
	10	0.24	0.76
Non-ECCU CARICOM members			
Bahamas, The	2	0.32	0.68
	10	0.36	0.64
Barbados	2	0.26	0.74
	10	0.28	0.72
Belize	2	0.19	0.81
	10	0.21	0.79
Guyana	2	0.09	0.91
	10	0.24	0.76
Haiti	2	0.17	0.83
	10	0.29	0.71
Jamaica	2	0.07	0.93
	10	0.26	0.74
Suriname	2	0.12	0.88
	10	0.22	0.78
Trinidad and Tobago	2	0.16	0.84
	10	0.40	0.60

Chapter Four
Liberalization and Economic Integration in East Asia
Evidence from Stock Prices

4.1 Introduction

East Asia is a region with great potential for high economic growth given its excellent record of economic performance and has long been a focus of attention for economic research. However, without a well-established financial infrastructure to support it, the economic growth cannot be continuous and progressive. The 1997 Asian financial crisis demonstrated both the vulnerability of the regional financial system and the possibility of contagion of crisis once it breaks out. The crisis has rekindled interest in the choice of exchange rate regimes and highlighted the necessity of strengthening regional economic integration and financial cooperation.

East Asian nations work in earnest for regional economic integration in the past decades. To enhance the East Asian financing facilities in the aftermath of the financial crisis, the Chiang Mai Initiative was created by 10 member countries of the Association of Southeast Asian Nations (ASEAN) plus China, Japan, and Korea (ASEAN+3) in May 2000.[23] 16 bilateral swap arrangements have been successively concluded by the 10th ASEAN+3 Finance Ministers' Meeting in May 2007. The ASEAN+3 finance ministers also introduced a surveillance system to monitor the region's economies and to encourage good policies via peer pressure. In order to facilitate the channel for better utilization of Asian savings for Asian investments and enhance efficiency and liquidity in bonds market in Asia, a local currency-denominated bond market under the Asian Bond Markets Initiative (ABMI) has been developed. This initiative has produced some visible results, including the issuance of Korean Collateralized Bond Obligations (CBO) with a guarantee by the Japan Bank for International Cooperation (JBIC) and the Industrial Bank of Korea (IBK).[24]

[23] ASEAN consists of Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam.

[24] In addition to the ASEAN, the oldest bloc in Southeast Asia, Asia-Pacific Economic Cooperation (APEC) was set up in 1989 with 21 member economies. In 2005, the East Asia Summit (EAS) was established by ASEAN+3 plus Australia, New Zealand and India, for the total of 16 countries.

However there are still a number of issues to be addressed: including facilitating sound economic and financial development, increasing cooperation in the region and coordinating exchange rate policy. The financial crisis over 1997-1998 has rekindled interest in the choice of exchange rate regimes in the emerging market countries, including East Asia. One view blames the soft pegs to US dollar for the crises. Calvo and Reinhart (2002) analyzed the behavior of exchange rate, reserves and interest rate to assess whether there is evidence that country practice is moving to the corner solution – hard pegs or free float. They find that countries that claim that they allow their exchange rate to float mostly do not and there seems to be an epidemic case of "fear of floating". The East Asian financial crisis drove the currencies of most countries to float immediately afterwards. However, McKinnon and Schnabl (2002) showed that East Asian countries resume dollar pegging on high frequency after the crisis. The joint exchange rate stabilization of their currency against the dollar reduces payment risk and strengthens trade linkages in the region. However, it makes the East Asian economy more sensitive to global shocks that may require adjustment in the real exchange rate.

The success of North American Free Trade Agreement (NAFTA) and the initiatives to promote Free Trade Area of the Americas (FTAA) as well as far-reaching integration of European economies motivated the East Asian economies to pursue further intraregional economic integration. Many Free Trade Agreements (FTAs) and Economic Partnership Agreements (EPAs) have been initiated to facilitate intraregional trade in the past few years.[25] The governments in Asia fear that unless they form their own free trade areas, they would not be able to gain bargaining power vis-à-vis the European Union, the United States and other regional groups in multilateral negotiations.

Having realized the importance of more economic and financial regional integration, East Asian countries are looking forward to furthering cooperation in the region and seeking the feasibility of building an economic and monetary union[26]. Key policymakers are increasingly vocal about the need to establish a monetary union in the region or create a single currency. Inspired by the now defunct European Currency Unit, replaced by the

[25] According to the Asia-Pacific Economic Cooperation (APEC) report, there are 157 existing FTA/EPA initiatives within APEC member countries by 2007 and 207 additional FTA/EPAs are under negotiation and 6 more are under discussion among APEC countries. See Table 2 for details.

[26] According to Balassa (1960), the degree of economic integration can be categorized into six stages: 1. Preferential trading area; 2. Free trade area; 3. Customs union; 4. Common market; 5. Economic and monetary union; 6. Complete economic integration.

Euro, the Asian Development Bank (ADB) proposes the Asian Currency Unit (ACU) – a weighted index of currencies for ASEAN+3 – to promote regional monetary and financial integration. Despite numerous technical and political obstacles, the ACU has been moving forward from an "academic exercise" to "a real outcome, one that can be used in the market" amid a growing consensus among academic and policy practitioners that intraregional exchange rate stability is desirable for East Asia and a monetary union is the ultimate form to ensure it. [27]

The purpose of this paper is to seek the answer to a related question: Is East Asia ready for a regional single currency and does it satisfy optimum currency area (OCA) criteria? Friedman (1953) proposed that, without price and wage flexibility, flexible exchange rates usually ensure better macroeconomic outcomes than fixed exchange rates. However, Mundell (1961) and McKinnon (1963) argued that a fixed exchange rate can produce better outcomes for a group of economies that are closely integrated and subject to similar economic shocks. A high degree of the economic integration in the form of a currency union (or a fixed exchange rate), on the one hand, increases the monetary efficiency by reducing the transaction cost and avoiding uncertainty and confusion in calculation that can arise under floating exchange rate. On the other hand, joining in a currency union or maintaining a fixed exchange rate entails a cost in the form of the loss of monetary policy autonomy. The theory of optimum currency area identifies the conditions under which a group of economies are better off adopting permanently fixed exchange rates or forming a currency area. According to Mundell (1961), McKinnon (1963) and Kenen (1969), the OCA criteria can be summarized into the following groups: (i) the symmetry of shocks across economies, (ii) trading patterns – high intraregional trade, (iii) openness of economy – high capital and labor mobility between different economies, (iv) intensive financial market integration, and (v) coordination of monetary policies.

In this paper, we employ a structural vector autoregressive (VAR) method to investigate the extent of financial market integration in East Asia. Returns to investors in each country's market are affected by three types of underlying shocks: country-specific

[27] From the discussion in 39th Annual Meeting of Asian Development Bank. The Asian Development Bank was to announce the details of the ACU in March 2006. However external pressures delayed this announcement although the concept was still being studied in detail.

shocks, regional shocks and global shocks. These structural shocks are identified by a long-run restriction a la Blanchard and Quah (1979). To investigate the progress in financial integration, we also separate the sample into 8 non-overlapping 2-year subperiods before and after the crisis. We then compare the East Asian region with that of 15 European countries where the latter serves as a benchmark.

A comparison with the European benchmark estimates suggests that the model produces reasonable results. The empirical results show that, in all East Asian stock markets, country-specific shocks are dominant although they became less important in the post-crisis period than in the pre-crisis period.[28] Regional shocks play a minimal role in most cases while the importance of global shocks varies across countries depending on the extent of financial openness and development. In European countries, in marked contrast, external shocks that combine both global and regional shocks appear to take over the dominant position. This suggests that, despite years of efforts toward financial liberalization and cooperation in the region, the East Asian economies are subject to asymmetric shocks and far less integrated financially compared to the European countries. Theory of optimum currency area would predict that pegging to the same currency would be more costly in East Asia than it would be in European countries. The region seems sufficiently unique perhaps due to different resource endowments, growth experience or economic policies. The efforts for financial integration in the post-crisis period appear to have some effects on the economic and financial structure in the region. However, as the European experiences may suggest, economic integration is a long-run process that could take decades.

The rest of the paper is organized as follows. Section 4.2 reviews the current extent of trade and financial integration in East Asia. Section 4.3 illustrates the data and methodology used in our empirical analyses. Section 4.4 examines the degrees and patterns of regional shocks and country-specific shocks on domestic stock market by using forecast error variance decomposition. Section 4.5 investigates the robustness of the benchmark model. Section 4.6 provides concluding remarks.

[28] There are noticeable drops in the role of country-specific shocks in Korea, Hong Kong, Singapore, Malaysia, Taiwan and Australia. The decline is not uniform though. There are wide variations between periods. There are substantial increases in the role of global shocks in Korea, Hong Kong, Singapore, Malaysia, Indonesia, and Australia while little changes in China.

4.2 Economic Integration in East Asia

4.2.1 Trade Integration in East Asia

A high degree of intraregional trade can increase the efficiency gain by using a common currency and lower the cost of losing monetary policy autonomy.[29] There is some evidence that joining a currency union can increase trade among member countries, which will further strengthen the case for the formation of the currency union.[30] The extent of regional integration through trade in Asia has been rising fast over the last twenty years. Countries with close trade links are more likely to benefit from fixed exchange rates and monetary integration. Wyplosz (2001) used a gravity approach to determine a "normal level" of bilateral trade among Asian and European economies and found that Asia is more, while Europe is less, integrated than one would expect. Table 1 summarizes the changes in the share of intraregional trade for various regions in the world over the period of 1980-2006. The table demonstrates that the intraregional trade ratios among East Asian are still lower than those of European Monetary Union by more than 10 percent in 2006.[31] However, the intraregional export and import have risen dramatically from the 1980s through the 2000s. For instance, in 1980, 37 percent of total import and export were with the regional trading partners. By 2006, the figures rose to 48.6 percent and 51.9 percent, respectively.

The first part in Table 4.1 reports trade patterns in the ASEAN. Intraregional trade within the ASEAN increased steadily since 1980 except a slight downturn in intraregional exports after 1995, perhaps reflecting the recessionary consequences of the financial crisis that hit the region. The roles of the United States and Japan are still dominant but have declined over the whole period. In addition, there is a significant increase in intraregional trade ratio in a broader region. By adding China, Hong Kong, Japan and Korea to the region, we find that nearly half of international trade of the region is with regional partners in 2006. The United States is still the largest importer in East Asian trade, but it is no longer the largest exporter. Trade with the Euro area increased

[29] Lee and Barro (2007) find that a currency union can generate welfare gains from the additional trade with countries belonging to the same currency union, which in turn stimulates an increase in consumption growth rates.

[30] Rose (2000) reports that bilateral trade between countries that use the same currency is over 200 percent larger than otherwise, controlling for other effects.

[31] In the paper, the intra-regional trade ratio is defined as exports or imports within the region as a share of total exports or imports with the world.

early, peaked in 1990 at 17.9 percent for exports and 15.1 percent for imports. Since then, the trade preference of East Asia with Euro area has declined. Exports to the Euro area dropped to 15.4 percent and imports from Euro area dropped to 10.1 percent in 2006.

In the third panel, Australia and New Zealand are added to East Asia. Not surprisingly, the extent of intraregional trade increases even further and reaches 50 percent. With those two Pacific countries, intraregional trade becomes larger within the region and there is significant increase in trade between East Asian and United States and Euro area.

The fourth panel lists the trade pattern for the Euro area within the region and with the outside world. We find the intraregional trade in the Euro area is stable and maintained at around 65 percent. Regional trade integration in the Euro area is about 10 percent higher than that in East Asia in recent years.

4.2.2 Financial integration in East Asia and the Chiang Mai Initiative

Before the Asian financial crisis broke out in 1997, few would have seriously argued for the creation of a new regional financial cooperation system. Economic integration in the region had been mostly a market-led process. One of the most noteworthy outcomes of the financial crisis would be the initiation of regional financial cooperation by the East Asian economies. The financial crisis gave East Asia a strong impetus to search for a regional mechanism that could forestall future crisis. Japanese financial authorities proposed the creation of an Asian Monetary Fund (AMF) as a framework for promoting financial cooperation and policy coordination in the region at the G7-IMF meetings in Hong Kong during September 20-25, 1997.[32] The United States, EU and the IMF opposed the proposition on grounds of moral hazard and duplication. In November 1997 the East Asian economies, together with the United States, Canada, Australia and New Zealand, agreed to establish the so-called "Manila Framework Group (MFG)" in order to develop a concerted approach to restoring financial stability in the East Asia. The Manila

[32] The intrepid proposal for a regional alternative to the International Monetary Fund (IMF) seemed to arise without warning and at the worst possible moment. Both the Philippines and Indonesia had floated their currencies and the Asian Financial Crisis was increasingly showing signs of contagion at the time. The proposal raised temporary hopes among the crisis-ridden economies of Asia but elicited a stringent rebuke from the IMF and the US Treasury and ultimately fell to the wayside in favor of a more IMF-centered approach. See Phillip (2003).

Framework took an initiative to create a mechanism for regional surveillance complimentary to the global surveillance by the IMF.[33]

In October 1998, Japan pledged $30 billion to support the economic recovery of the crisis-affected countries. The initiative provided major assistance for restructuring corporate debt, reforming financial sectors, strengthening social safety nets, generating employment and addressing the credit crunch. The initiative was called "New Miyazawa Initiative" and was highly successful.[34] In November 1998, the United States and Japan jointly announced the Asia Growth and Recovery Initiative (AGRI), which was a multilateral effort to stimulate economic growth in Asia. With support from the World Bank and the Asian Development Bank (ADB), AGRI supported corporate restructuring and restored market to private capital. It also strengthened bond guarantee functions of the World Bank and the ADB.

The idea of an AMF was revived when the finance ministers of China, Japan and South Korea, along with the ten ASEAN members, agreed on May 6th, 2000 in Chiang Mai, Thailand to establish a system of swap arrangements within the group. The regional scheme for financial cooperation known as the Chiang Mai Initiative (CMI) is now gathering momentum and opening the doors to possibly significant policy-led integration in East Asia. The Chiang Mai Initiative (CMI) has two components: expanded ASEAN Swap Arrangements (ASA) encompassing the ten ASEAN countries; and a network of Bilateral Swap Arrangements (BSA) repurchasing arrangements basically encompassing the thirteen ASEAN + 3 countries.

[33] Manila Framework terminated its function in November 2004 after 12 meetings. The failure of the Manila Framework is said to be attributable to the lack of mutual trust and lack of a professional secretariat.

[34] The Japanese Ministry of Finance and the Ministry of Finance of Malaysia have reached an agreement regarding the basic features of the short-term financing facility under the framework of the "New Miyazawa Initiative". The facility is aimed at supporting credit-extending schemes which intend to promote economic activities in Malaysia, such as a trade financing facility, small and medium size enterprise credit line, etc. This will serve as a standby facility for the Malaysian Government should the need arise. In this short-term facility, the Japanese Ministry of Finance is committed to providing up to US$ 2.5 billion liquidity to Bank Negara Malaysia, if and when necessary, through swap transactions between the US dollar and the Ringgit.

At present, the total amount of BSAs covering all 13 countries is estimated to be around $83 billion.[35] The maximum amount that any individual country can draw varies a great deal. For instance, the maximum liquidity through the CMI to Thailand is about $12 billion while the BSA to Malaysia is $6.5 billion. Doubts have been raised as to whether the BSA system could truly be a credible and effective system of defense against future speculative attacks. The success of the CMI will depend on whether the surveillance system in East Asia can work as effectively as expected. A mechanism that enforces exchange of information and applies peer review and pressure through policy coordination is the right approach to boost the confidence of the countries in the region. It is expected that East Asia will reach deeper monetary and economic integration with gradual development of the CMI to a more effective and efficient regional arrangement.

4.2.3 Asian Bond Market Initiative (ABMI)

Because of the underdevelopment of capital markets, Asian countries have depended on short-term foreign currency-denominated financing. This causes "maturity" and "currency" mismatches which make the region vulnerable to volatility in short-term capital movements. For example, a bank that chose to borrow entirely in U.S. dollars and lend in Thai bahts would have a significant currency mismatch: if the value of the baht were to fall dramatically, the bank would lose a great deal of money. Similarly, a bank would have a maturity mismatch if it has substantial long term assets such as fixed rate mortgages but short-term liabilities such as deposits. The Asian financial crisis vividly illustrates the risks of the double mismatches. Developing bond markets in the region is very effective in regional financing. A well-functioning bond market sets the benchmark interest rates for all debts with varying maturities and risks which promote efficient uses of resources for economic growth. At the 6th ASEAN+3 Finance Ministers' Meeting in August 2003 at Manila, the Philippines, finance ministers agreed to promote Asian bond markets. The Asian Bond Market Initiative aims to develop efficient and liquid bond markets in Asia, enabling better utilization of Asian savings for Asian investment.

[35] Japan concluded six agreements with China, South Korea, Thailand, the Philippines, Indonesia and Malaysia: two-way arrangement with China, Korea, Thailand, and the Philippines and one-way arrangement with Indonesia and Malaysia. Korea concluded four agreements in addition to Japan-Korean BSA. China concluded four agreements in addition to its agreements with Japan and Korea except with Singapore. See Table 1 for details. Figure is from Ministry of Finance, Japan.

Activities of the ABMI focus on the following two areas: (1) facilitating access to the market through a wider variety of issuer and types of bonds, and (2) enhancing market infrastructure to foster bond markets in Asia. A robust primary and secondary bond market in Asia requires a wide variety of issuers and products that could be addressed by encouraging: (1) Sovereign bond issuance by Asian governments to establish benchmarks; (2) Asian government financial institutions to issue bonds in Asia to meet their financing requirements; (3) The creation of asset-backed securities markets, including collateralized debt obligations (CDOs); (4) Bond issuance in the region by multilateral development banks and government agencies; (5) Bond issuance in the region for funding foreign direct investment in Asian countries; and (6) The expansion of local currency-denominations of bonds and the introduction of currency-basket bonds.

At the ASEAN+3 Finance Ministers' Meeting (AFMM+3) on August 7, 2003, six voluntary working group (WG) on the ABMI have been established to address key areas of bond market development. Since the establishment of the six WGs, comprehensive efforts have been made to develop regional bond markets. [36] On May 15, 2004 in Jeju, Korea, AFMM+3 confirmed the establishment of a Focal Group (FG) to coordinate the work of ABMI working groups. The first FG meeting was held on March 19, 2004 in Manila and since then FG meetings have been held biannually. On May 4, 2005 in Istanbul, Turkey AFMM+3 endorsed the reorganization of the ABMI WGs and made changes accordingly. [37] Asian governments, central banks and the Asian Development Bank are keen to see the expansion of Asian bond markets in order to help provide finance for the large infrastructural development that the region needs over the next decade. Alongside the expansion of the bond markets, Asian governments and central banks are currently discussing the creation of an Asian Currency Unit. The ADB has suggested that bonds may also be issued in ACU over the next few years which would help lower the financing costs for Asian issuers who have substantial trade links with other countries in the region.

[36] See table 4 ABMI Working Groups for details
[37] See table 4 Changes for details

4.2.4 Stock Markets in East Asia

Stock exchanges in Asia developed much later than those in Europe or America. The first Asian market for securities trading was in Shanghai which began in the late 1860s. The first share list appeared in June 1866. The Bombay Stock Exchange, launched in 1875, was the oldest organized market in the region, followed by the Tokyo Stock Exchange (TSE) three years later. In 1891 during the boom in mining shares, foreign businessmen founded the "Shanghai Sharebrokers' Association" headquartered in Shanghai as China's first stock exchange.

Off to a late start amid dramatic historic events, Asian stock markets were quick to adopt cutting-edge strategies and have experienced rapid growth. They espoused technology, demutualized and listed their own shares long before U.S. markets did. The Tokyo Stock Exchange is the second stock exchange in the world by market value, second only to the New York Stock Exchange. It currently lists 2,271 domestic companies and 31 foreign companies, with a total market capitalization of over 5 trillion dollars[38]. The Tokyo Stock Exchange was established on May 15th, 1878 and in 1943, the exchange was combined with ten other stock exchanges in major Japanese cities to form a single exchange. Stocks listed on the TSE are separated into the first section (large companies), the second section (mid-sized companies) and the “mother” section (high-growth startup companies). The Tokyo Stock Exchange is also developing jointly traded products and sharing technology with London Stock Exchange, marking the latest cross-border deal among bourses as international competition heats up. It has also been looking for some partners in Asia as evidenced by the fact that, in June 2007, the TSE paid $303 million to acquire a 4.99% stake in the Singapore Exchange as the beginning of a bigger participation.

The Shanghai Stock Exchange was reestablished on November 26, 1990. A market capitalization of nearly $2.38 trillion makes it the fifth largest in the world. There are two types of stocks being issued in the Shanghai Stock Exchange: A shares and B shares. A shares are priced in the local Renminbi yuan currency, while B shares are quoted in U.S. dollars. Initially, trading in A shares is restricted to domestic investors only while B shares are available to both domestic (since 2001) and foreign investors. However, after

[38] Information from *Wikipedia.org*

reforms were implemented in December 2002, foreign investors are now allowed to trade in A shares with some restrictions under the Qualified Foreign Institutional Investor (QFII) system and there is a plan to eventually merge the two types of shares.

The stock price indices for East Asian stock markets and European stock markets are plotted in Figure 4.2 and Figure 4.3. Despite divulging economic and financial conditions in various countries, the stock prices seem to share similar movements. There is a steep decline after the 1997 financial crisis for most East Asian countries; the East Asian stock prices and European stock prices exhibit a common decline after 2002 in most countries presumably due to sharp increases in oil prices. As the economies recovered in 2003, the indices resumed the rising trend in these European countries.

In this paper we employ and focus on overall stock price indices as indicator of the overall performance of the economy. It is well known that stock prices are a good leading indicator of economic activity. In the past few decades, significant development of the stock market and real economic activity has been witnessed around the world. Traditional stock market valuation models suggest that there should be a close link between stock prices and real economic activity. The main argument comes from the belief that the price of a firm's stock equals the expected present value of the firm's future payouts or dividends. As long as these expectations reflect the underlying fundamental factors, they must ultimately also reflect the real economic activity as measured by industrial production or GDP. Under these assumptions, the stock market is a passive informant of future real activity as stock prices react immediately to new information about the future real activity well before it occurs.[39] Capital market integration provides an opportunity for better diversification as investors shift to higher

[39] Fama (1990) showed that stock returns are actually significant in explaining future real activity for the whole period from 1953 to 1987 in the United States stock market. Quarterly and annual stock returns are highly correlated with future production growth rates. According to the reported regressions past stock returns are significant in explaining current production growth rates and vice versa. Merton (1984) found that movements in the United States stock prices were positively correlated with real GNP. Schwert (1990) showed that Fama's results could be replicated by using data that goes back as far as to 1889. He finds the correlation between future production growth rates and current stock returns to be robust for the whole period from 1889 to 1988. However, Binswanger (2000) concluded that traditional links between stock market performance and two major macroeconomic indicators, production and GDP, broke down in the most recent United States bull market. Although the regressions of stock returns on measures of real activity in the United States over the period from 1953 to 1997 seem to confirm the findings of Fama (1990), stocks returns do not reflect real activity in the current stock market boom from 1984 to 1997. In recent research, Mao (2007) found the links between stock prices and industrial production or GDP remained strong during the high-growth phase since 1980s in the Australian stock market.

risk and expected return projects because they are able to diversify their overall risk. (Obtsfeld, 1994) The availability of high-frequency data is also a big advantage in our case where the sample period is short due to general data problems of developing countries and made even shorter as a result of the recent financial crisis and resulting structural breaks.

4.3 Data and Methodology

According to the theory of optimum currency area, joining a single currency area brings in costs and benefits. The benefits are from avoiding the uncertainty and confusion in calculation and transactions costs that can arise under floating exchange rates. At the same time, adopting a single currency can induce significant costs. The costs arise from the inability to use monetary and exchange rate policy for economic stabilization. If the business cycles in the member countries are closely correlated and their economic structures are similar, then costs are likely to be lower than otherwise. On the assumption that aggregate demand shocks are regime specific while aggregate supply shocks are likely not to vary with respect to changes in the exchange rate regime, Bayoumi and Eichengreen (1993) examined the correlation of aggregate supply shocks across potential member countries which are extracted applying a structural vector autoregressive model to real income and the price level data.

We separate shocks for product or factor markets into “global” shocks, “regional” shocks and “country specific” or “domestic” shocks. The importance of regional shocks is taken as the indicator of similarity of economic structure within the potential member countries. We employ the overall stock price index as an indicator of macroeconomic performance to identify the three underlying shocks. Table 5 lists the detailed information on the major stock price indices chosen for 12 major stock exchanges in East Asia: Japan, P.R. China, South Korea, Hong Kong, Singapore, Malaysia, Taiwan, Indonesia, Thailand, the Philippines, Australia and New Zealand. Data are from July 1, 1989 to December 31, 2006. Data from July 1, 1997 to December 31, 1998 are omitted because of large turmoil due to the financial crises in the region during that period. The model using the 16 European stock price indices is used as the benchmark. Table 6 reports the information for those European stock markets. The 16 European countries in the paper consist of 11 EMU countries – Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy,

Netherlands, Portugal, and Spain – and 5 non-EMU countries – Denmark, Norway, Sweden, Switzerland, and the United Kingdom. Stock price data are ideal for our purpose since the availability of high frequency data as a proxy for macroeconomic performance can overcome the serious problem of having to work with a short-time span such as the post-crisis period, for which at best 6-7 years of data are available.[40] All data are weekly[41].

In this model, stock market indices are affected by three different types of shocks. They arise from the global market, the regional markets and the domestic market and are denoted as u_t^g, u_t^r and u_t^d, respectively. Global, regional and domestic price indices – y_t^g, y_t^r, and y_t^d – are related to the three structural shocks as follows:

$$\begin{pmatrix} \Delta y_t^g \\ \Delta y_t^r \\ \Delta y_t^d \end{pmatrix} = \begin{pmatrix} A_{11}(L) & A_{12}(L) & A_{13}(L) \\ A_{21}(L) & A_{22}(L) & A_{23}(L) \\ A_{31}(L) & A_{32}(L) & A_{33}(L) \end{pmatrix} \begin{pmatrix} u_t^g \\ u_t^r \\ u_t^d \end{pmatrix}$$

where $A_{ij}(L) = a_{ij}^0 + a_{ij}^1 L + a_{ij}^2 L^2 + a_{ij}^3 L^3 + \ldots$ are polynomials of the lag operator L. For the identification of structural shocks, we employ the restrictions of the Blanchard-Quah (1989) type. In other words, 1) neither regional nor country-specific shocks have long-run effects on the global index; 2) country-specific shocks have no long-run effects on the regional index. The identifying assumptions imply that the cumulative effects of a u_t^d shock on y_t^r is equal to zero and so are the cumulative effect of the u_t^d or u_t^r shocks on y_t^g. More specifically, $\sum_{k=0}^{\infty} a_{23}^k = \sum_{k=0}^{\infty} a_{12}^k = \sum_{k=0}^{\infty} a_{13}^k = 0$. Finally, each structural shock has unit variance and is uncorrelated to other shocks.

[40] Kaminsky and Reinhart (1999) show that stock price indices are a significant predictor of currency crisis. As the crisis nears, changes in stock prices are about 40 percent below those observed in non-crisis periods. Weakening equity prices reflects both deteriorating cyclical position of the economy and reduced foreign demand as capital inflows are reversed and worsening balance sheets of firms. The beginning of a recession is also reflected in the stock market, which collapses a year before the crisis.

[41] Stock price index data in this study are retrieved from Data stream (Thompson Financial) and Yahoo Finance; the data for exchange rate are collected from PERS (Pacific Exchange Rate Service) from University of British Columbia, Sauder School of Business. GDP, PPP data are from WDI (World Development Indicator) online database.

We transform the stock price indices which are originally reported in local currency terms into US dollar terms by dividing by the exchange rate – defined as the local currency price of a unit of US dollar. So the stock price index is:

$$y_t^d = \frac{y_{t,lc}^d}{e_t}$$

The regional and global indices are defined as follows. For the benchmark European model, we use the U.S. stock market price index as the global index. The regional index is represented by the weighted average of stock price indices of the selected European countries excluding the target country's index. For the East Asian model, the regional index is the weighted average of indices of all East Asian stock markets excluding the target country's market index. The global index is the weighted average of stock prices from the U.S., Germany, Italy, France and the United Kingdom stock markets. The weights for the global and regional indices are based on constant PPP-value GDP estimates, averaged over the 1994 to 2006 period. Table 4.7 lists the weighting system employed for each country.

4.4 Empirical Results

The results of unit root tests are reported in Table 4.8. We employ the augmented Dickey-Fuller (ADF) test, the Schmidt-Phillips (SP) test, and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test. The null hypothesis for the ADF and the SP tests is that the stock price index is non-stationary. A time trend is included in all regressions; the number of lags used in the unit root tests is determined using the optimal lag length tests.[42] The null hypothesis that the stock market index is non-stationary cannot be

[42] Usually, we can use the Akaike Information Criterion (AIC), Hannan-Quinn Criterion (HQC), and Schwarz Criterion (SC) to determine the optimal lag length of autoregressive models. They are defined as:

$$AIC(n) = \log \tilde{\sigma}_u^2(n) + \frac{2}{T} n$$
$$HQ(n) = \log \tilde{\sigma}_u^2(n) + \frac{2 \log \log T}{T} n$$
$$SC(n) = \log \tilde{\sigma}_u^2(n) + \frac{\log T}{T} n$$

rejected for any East Asian countries with the ADF and SP tests. For the KPSS test, the null hypothesis is that the stock indices are stationary. The results indicate that the null is rejected at the conventional significance level. When the same tests are applied to the first differences of the series, the unit-root null is strongly rejected with the ADF and SP tests and the stationarity null is not rejected with the KPSS test. These results imply that each stock-index series contains a unit root and thus should be first differenced to achieve stationarity[43].

We estimate a structural vector autoregressive model for two groups of countries: East Asia and Europe. The results of the forecast error variance decomposition for East Asian countries at 10-week forecast horizon are reported in Table 4.9. Global shocks, regional shocks and country-specific shocks are denoted as 'U-G', 'U-R' and 'U-D' respectively. For brevity, we report only the variance decompositions of the domestic price index since the regional and global indices are mostly explained by regional and global shocks themselves.

Table 4.9 reports the forecast error variance decomposition for the European countries. Global shocks on average explain 25 percent of the variations in the domestic stock price index throughout all sample periods. About 26 percent of variations are due to regional shocks. Country-specific shocks explain averagely 49 percent of fluctuations in its price index. Table 9 also shows that the role of country-specific shocks declines over time in all countries. Thus, after period V, less than 35 percent of variations in the stock price can be explained by its own market shocks in all European countries comparing more than 50 percent before period V. It is also interesting that country-specific shocks have a smaller role in large economies in Europe. For instance, in period VI, they explain less than 10 percent of its price index variations in France and Germany.

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where $\tilde{\sigma}_u^2(n)$ is estimated by $\frac{\hat{u}'\hat{u}}{T}$, n is the number of lagged differences and T is the number of observations. The computation of $\hat{u}_t$ is always done with a regression model that is estimated with OLS. All models with 0 to n lagged differences are estimated. The lag length which minimizes the respective information criterion is presented. The sample length is determined by the maximum order. Typically for $T \geq 16$, $\hat{p}(SC) \leq \hat{p}(HQC) \leq \hat{p}(AIC)$ where $\hat{p}$ is the order selected by the three criteria.

[43] See Table 4.8 for details.

For most European countries, regional and global shocks play an increasingly important role over time. Global shocks explained less than 15 percent of most countries' domestic stock market price variations before the introduction of the euro in 1999. More than 35 percent of domestic price variations are explained by global shocks after period VI. In big economies such as Germany, France, and the U.K., global shocks are responsible for more than 60 percent of variations of the domestic price index in the period VI. Although there are some declines in recent years, global shocks explain more than 30 percent of domestic stock price variations in most European countries.

Another reason that we observe slight decreases in the role of global market shocks and diminishing roles in country-specific shocks is a rise in the role of regional shocks. Regional shocks play an increasingly more important role in recent years. In almost every European country except Finland, the regional shocks can explain more than 40 percent of domestic market price variations in period VIII (2005 - 2006).

These results are reasonable given the fact that financial market openings pursued in European countries beginning in the 1980s have caused the stock market in each country to be more exposed to external/global shocks. It is also interesting to note that the introduction of the euro has accelerated the globalization of each stock market whether the country has become a member of the EMU or not. At same time, the fixed exchange rate arrangement under the European Monetary System (EMS) and the efforts of individual countries to participate in the single currency area seem to have gradually increased the extent of financial integration among the EMU and non-EMU members alike as indicated by the increasing role of regional shocks in virtually all European countries in the recent periods.

Table 4.10 reports the variance decompositions of stock price indices in East Asian economies. One cannot fail to notice sharp contrasts between Tables 4.9 and 4.10. First of all, in most East Asian economies, country-specific shocks are dominant in the determination of domestic price index for all estimation periods. Country specific shocks are responsible for 90 percent or more of changes in the local stock price index for all periods in all countries except Thailand. With the financial crisis, the role of country-specific shocks seems to have declined in several countries including Japan, Hong Kong, Korea, Singapore, Malaysia and Australia. Nevertheless, they are still far more important than that can be observed in the European countries, explaining 70 percent or more

except Hong Kong and Australia.[44] China is also exceptional in that country-specific shocks continue to be dominant or appear to have become more important after the financial crisis. Before and after the crisis, more than 90 percent variations in China's stock prices are explained by its own domestic shocks.[45]

Regarding the role of external shocks, we find that there is a substantial increase in the role of global shocks in the post-crisis period in Korea, Hong Kong, Singapore, and Australia, and in subperiod VIII in Malaysia and Indonesia. For instance, 32 percent of variations in the domestic stock price are explained by global shocks in Singapore in the most recent period, up from about 6 percent in period IV. On the other hand, little change is observed in Thailand and the Philippines after the financial crisis. The two countries may have been highly open financially even before the crisis.

Another important difference between the European and the East Asian financial markets is the role of regional shocks. Compared to country-specific and global shocks, regional shocks seem to be negligible in the East Asia economies, explaining 5 percent or less of changes in the local stock price index in all cases except Singapore. In the post-crisis period, particularly in period VII, there were noticeable increases in their role in several countries including Malaysia, Taiwan, Thailand, Hong Kong and Singapore. However, the increases did not last and evaporated in period VIII. The lack of sustained increase in the importance of regional shocks in East Asian economies is surprising given the scope of liberalization of trade and financial markets, which is expected to make the countries more open and susceptible to increased capital flows and other external shocks.

4.5 Robustness

Japan has been the dominant economic power in East Asia. However, China, upon its rapid growth of the past several decades, has rapidly become a regional and global player.

[44] There are also sharp declines in the role of country-specific shocks in a few years after the crisis. For instance, from period V to period VI, fluctuations in the domestic stock price due to own shocks declined from 86 percent to 46 percent, 76 to 52 percent, and 84 to 47 percent in the three countries. The decline is probably due to the fact that stock markets in these economies were able to avoid the sharp falls followed by sharp recoveries instead of any other structural factors.

[45] The China stock exchange used to separate the market into A share and B share markets. Foreign investors, who were allowed to participate only in B shares, can invest in the A share market after December 2002. The results seem to suggest that numerous remaining restrictions might still limit the size and effect of external influences on the local stock market of China.

The emergence of China and the decade-long stagnation of Japan have complicated the leadership position in the region.[46] Any currency arrangement in the region is likely to involve the Japanese yen and the Chinese yuan as major components. We thus consider each of the two countries as an alternate global index and reestimate the extent of regional integration.

We build our alternative models by identifying various structural shocks with a more narrowly defined "global shocks". For the first alternative model, reported in Table 11, we define the global price index using the Japanese Stock price index only and the regional proxy as the output-weighted price indices of East countries excluding Japan. In the second alternative model, reported in Table 12, the Chinese stock price index is chosen as a proxy for the global index and all the rest of East Asian countries output-weighted stock price indices are used as the regional index.

Tables 4.11 and Table 4.12 report the forecast error variance decompositions for East Asian countries using alternative definitions of the regional and global indices. As can be seen, results are qualitatively similar to the benchmark. Country-specific shocks are still dominant in the determination of the domestic price index for all estimation periods. Their role declines in the post-crisis periods; however, the roles of global and regional shocks increase. In the case of Singapore, country-specific shocks became less influential than did global shocks by the 2005-2006 period. Only 38 percent of domestic stock price fluctuations can be explained by its own market shocks while 48 percent are due to global (Japanese) stock markets. On average, shocks from the Japanese market explain 11 percent of changes in East Asian stock price indices through all periods. Compared to the pre-crisis periods, regional shocks and global shocks play more important roles in the post-crisis periods.

Table 4.12 reports the results, with the Chinese stock price index as the global proxy. Country-specific shocks explain more than 80 percent domestic stock prices fluctuations throughout the sample period. However, in the post-crisis period, especially the most recent period, there is a significant increase in the role of global shocks and regional

[46] Several factors block the natural emergence of a leader country in East Asia similar to the United States in the Western Hemisphere or the Franco-German alliance in Western Europe.
Japan has been mired in economic stagnation over the last decade and China, while recently emerging as an economic power, has a long way to go to achieve fundamental transition to a market -based democratic economy.

shocks. In period VIII, the two types of shocks contribute nearly 30% of stock price variations. Reflecting rapid growth of China in the last few decades, its influence on other stock markets in the region is growing as well. Thus, in the most recent period, the Chinese market became more influential than regional markets such as Hong Kong and Malaysia, or nearly as influential as Australia and New Zealand markets.

In general, East Asia has become more similar after the financial crisis in the sense that global and regional shocks play more important roles. However, regional shocks still play far less important role than that can be observed in the European countries. This diversity and heterogeneity within East Asia could constitute a serious impediment to regional policy coordination and hinder economic and monetary integration in the near future.

4.6 Conclusion

In this paper, we investigate trade liberalization and financial integration in East Asia with the focus on the movements of stock prices. We apply the OCA theoretic criterion to examine whether pegging to a common currency is a desirable option in Asia. In our model, the stock price index is subject to three types of shocks: global, regional and country-specific shocks. We apply a structural VAR analysis to 8 non-overlapping sub-periods in the pre-crisis and post-crisis periods. Comparison with the European benchmark estimates suggests that the model produces reasonable results. The empirical results suggest that country-domestic shocks are still dominant in all East Asian stock markets whereas external shocks that combine both global and regional shocks appear to take over the dominant position in European countries. This suggests that, despite years of efforts toward liberalization and financial integration in the region, countries in East Asia are subject to asymmetric shocks. Theory of optimum currency area would predict that pegging to the same currency would be more costly in East Asia than would be the case in European countries. The region seems sufficiently unique perhaps due to different resource endowments, growth experiences or economic policies. The efforts for financial integration in the post-crisis period appear to have some effects on the economic and financial structures in the region. However, it is too soon to see lasting changes.

Our results also contradict the previous study by Eichengreen and Bayoumi (1999) who find that East Asian countries are almost as qualified as the EMU countries in terms

of OCA criteria. We find that regional shocks tend to play increasingly more important role in Asia as financial markets become more integrated with those of the United States and Japan. Nonetheless, our results indicate that there may be a general lack of similarity in shocks in the region. A more flexible exchange rate regime might be more desirable and a full-fledged monetary integration seems too early an option to consider in East Asia. The regional economies should strengthen information and resource coordination. Some sub-regional currency stabilization schemes that involve a smaller set of countries could be considered.

Frankel and Rose (1998) argued that the optimum currency area (OCA) criteria can be endogenous. According to this view, once a group of economies adopt a single currency or permanently fix their exchange rates, the degree of intraregional economic integration will become higher and the degree of symmetry of economic shocks will heighten. Essentially, a permanently fixed exchange rate promotes OCA conditions by encouraging trade of goods and services, capital flows and labor mobility and linking the economies more tightly. The view is based on the empirical findings that the act of one economy fixing its exchange rate against the currency of another does stimulate international trade and investment between the two. The impact is more pronounced if the economies adopt a common currency, the strongest form of permanently fixing the exchange rate.

It has been recognized that East Asia can sustain high economic growth rates if its economy is integrated as a region. An integrated economy would give East Asia more weight in international trade negotiations, largely in the World Trade Organization and in global financial discussions, as in the International Monetary Fund. The experience of the European Union (EU) has provided a lesson on this. From the start of the long process of the integration in 1958, the member states of the EU achieved rapid economic growth and gained considerable economic strength. Meanwhile, the process and achievement of integration have enabled Europe to transcend and relegate the past conflicts that had devastated the continent so many times in history.

The devastating effects of the 1997 financial crisis have spurred nations in East Asia to consider doing something similar to what Europe has accomplished. There are talks about a single regional currency in East Asia or Southeast Asia area. Although the idea of forming one community like the European Union seems too ambitious at first because of cultural and historical dissimilarities among East Asian countries, the obstacles and

differences do not seem insurmountable now. European integration was driven by the chastening experience of war and the necessity of Franco-German reconciliation. It was built upon Europe's traditions, the strong interdependence of the European economies and a common culture rooted in Christianity. However, it took almost half a century for the euro to go from an idea and ambition to reality and use. It took more than four decades for the EU to evolve from what was originally a much more limited coal and steel trading arrangement. For East Asia, one important lesson from the European experience is that the process of achievement of closer integration is a step-by-step approach. Mutual trust among member nations is essential for lasting stability of the integration. Although Europe and East Asia are different in many aspects culturally and economically, it does not mean that East Asia cannot be driven by similar economic imperatives of regional economic integration as Europe was. The European experience might be replicated to some significant extent in East Asia.

Table 4.1 Regional Trade Patterns, 1980 to 2007 (Percentage of Total Exports/Imports with the World)

	1980		1990		1995		2000		2006	
	Export	Import	Export	Import	Export	Import	Export	Import	Export	Import
ASEAN										
Within ASEAN	21.2	16.8	25.3	19.7	31.7	23.5	29.8	27.8	29.2	29.3
With USA	16.3	15.3	19.4	14.4	18.4	13.8	19.0	14.0	14.0	9.7
With Japan	29.5	22.1	18.9	23.1	14.3	23.7	13.4	19.1	10.4	12.1
With Euro Area	13.1	14.4	16.0	15.7	14.7	15.1	15.0	11.1	12.6	9.8
East Asia										
Within East Asia	33.6	31.2	36.5	38.8	44.6	45.7	42.5	48.0	46.0	48.8
With USA	21.1	17.0	25.4	17.5	22.0	16.2	23.7	14.1	18.1	9.1
With Japan	11.6	11.6	8.5	13.0	8.5	15.4	8.6	12.7	7.1	10.7
With Euro Area	16.0	10.0	17.9	15.0	15.1	14.3	15.8	11.5	15.4	10.1
East Asia/Pacific										
Within East Asia / Pacific	37.0	36.6	39.5	42.3	47.1	48.2	45.0	50.6	48.6	51.9
With USA	20.2	17.3	24.4	17.9	21.2	16.5	23.1	14.5	17.6	9.4
With Japan	11.1	11.0	8.4	12.4	8.6	14.9	8.6	12.3	7.1	10.3
With Euro Area	16.0	11.4	17.6	15.8	14.9	14.9	15.7	12.1	15.3	10.7
Euro Area										
Within Euro Area	61.3	54.2	66.9	64.0	66.4	64.4	67.7	62.5	67.7	63.1
With USA	5.3	8.2	6.9	7.3	6.5	7.2	9.1	7.9	7.5	4.8
With Asia	3.2	3.6	4.4	5.3	6.6	7.3	5.3	9.1	5.6	10.5

1 ASEAN: Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Vietnam

2 East Asia: ASEAN plus Japan, China, P.R.: mainland, China, P.R.: Hong Kong, Korea

3 East Asia and Pacific Area : East Asia plus Australia, New Zealand

4 Euro Area: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal Spain.

Source: IMF Direction of Trade Statistics, World Development Indicators *June 2007*

Table 4.2 FTA/EPA Initiatives between selected Asian countries

	Japan	*China*	*Korea*	*Singapore*	*Hong Kong*	*Taiwan*	*Malaysia*	*Indonesia*	*Thailand*	*Philippines*	*New Zealand*	*Australia*	*United States*
Japan	n.a.												
China	n.a.	n.a.											
Korea	+	n.a.	n.a.										
Singapore	**++	*+	*+	n.a.									
Hong Kong	n.a.	*	n.a.	n.a.	n.a.								
Taiwan	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.							
Malaysia	+++	*	+	*	n.a.	n.a.	n.a.						
Indonesia	++	*	+	*	n.a.	n.a.	*	n.a.					
Thailand	+++	*	+	*	n.a.	n.a.	*	*	n.a.				
Philippines	++++	*	+	*	n.a.	n.a.	*	*	*	n.a.			
New Zealand	n.a.	+	n.a.	****++	+	n.a.	+++	++	*++	++	n.a.		
Australia	-	+	n.a.	**++	n.a.	n.a.	+++	++	**++	+++	**	n.a.	
United States	n.a.	n.a.	+	**	n.a.	n.a.	+	n.a.	++	n.a.	n.a.	**	n.a.

Notes: * represents Existing FTA/RTA;
+ represents FTA/RTA under negotiation;
- represents FTA/RTA under discussion;
n.a. means currently there is no FTA/RTA between two countries
Source: from Asia-Pacific Economics Cooperation official sources

Figure 4.1

Network of Bilateral Swap Arrangements (BSAs) under the Chiang Mai Initiative (CMI) (after inurement of the 3rd BSA between Japan and Thailand)

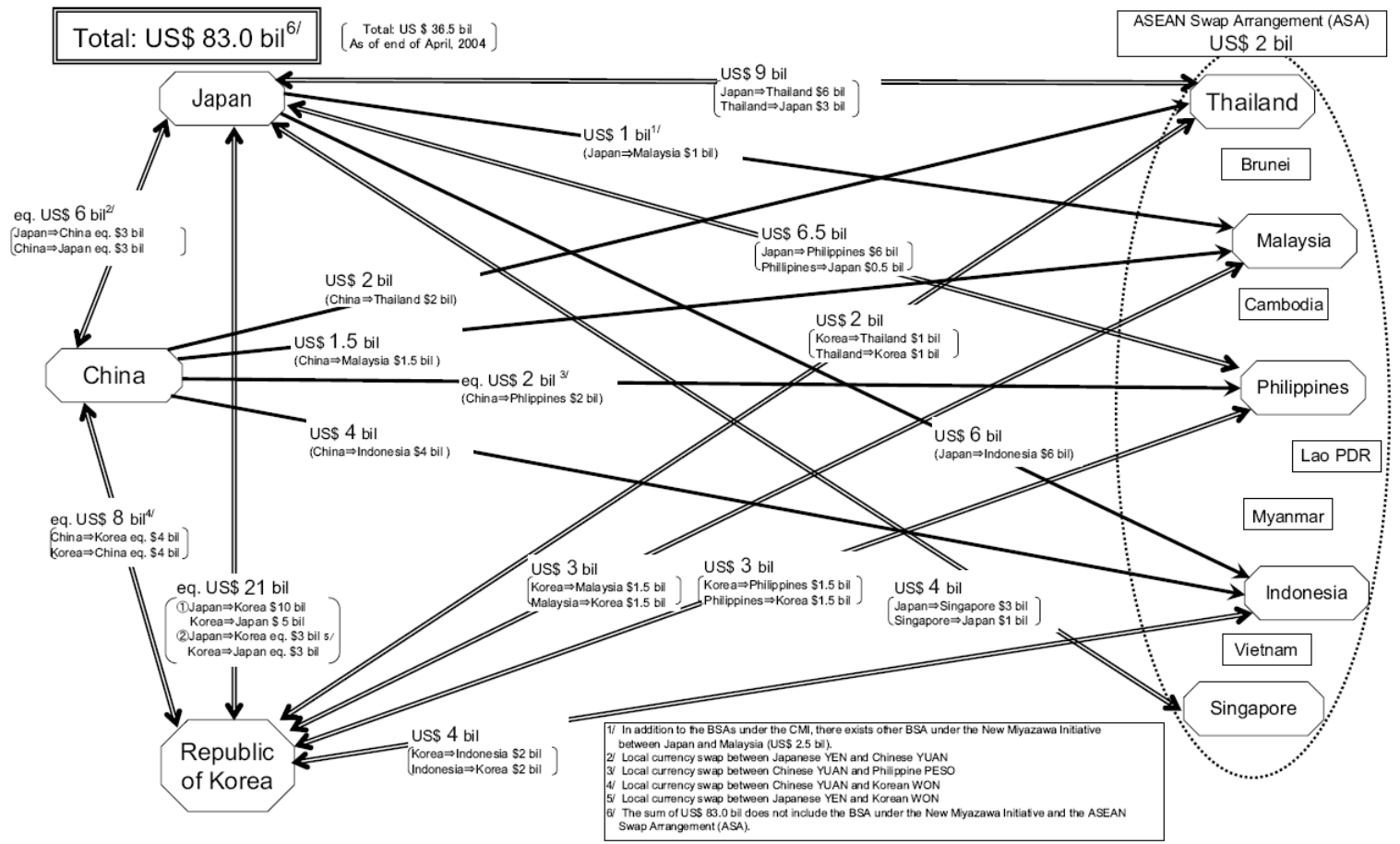

Table 4.3 Progress on BSAs under the Chiang Mai Initiative (as of October 10, 2007)

Countries	*Currencies*	*Conclusion Date*	*Size*
Japan-Korea	US$-Won	February 24, 2006	US$10 billion (two-way)
Korea-Japan	US$-Yen	February 24, 2006	US$5 billion (two-way)
Japan-Korea	Yen-Won	May 27, 2005	US$3 billion (two-way)
Japan-Thailand	US$-Baht	May 7, 2005	US$3 billion (two-way)
Thailand-Japan	US$-Yen	May 7, 2005	US$3 billion (two-way)
Japan-Thailand	US$-Baht	July 10, 2007	US$6 billion (two-way)
Thailand-Japan	US$-Yen	July 10, 2007	US$3 billion (two-way)
Japan-Philippines	US$-Peso	May 4, 2006	US$6 billion (two-way)
Philippines-Japan	US$-Yen	May 4, 2006	US$500 million (two-way)
Japan-Malaysia	US$-Ringgit	October 5, 2001	US$3.5 billiona (one-way)
Japan-China	Yen-Renminbi	March 28, 2002	US$3 billion (two-way)
Japan-Indonesia	US$-Rupiah	August 31, 2005	US$6 billion (one-way)
Japan-Singapore	US$-Singapore$	November 8, 2005	US$3 billion (two-way)
Singapore-Japan	US$-Yen	November 8, 2005	US$1 billion (two-way)
China-Korea	Yuan-Won	November 9, 2005	US$4 billion (two-way)
China-Thailand	US$-Baht	December 6, 2001	US$2 billion (one-way)
China-Philippines	Renminbi-Peso	August 9, 2003	US$1 billion (one-way)
China-Malaysia	US$-Ringgit	October 9, 2002	US$1.5 billion (one-way)
China-Indonesia	US$-Rupiah	November 9, 2005	US$2 billion (one-way)
Korea-Thailand	US$-Baht	June 25, 2002	US$1 billion (two-way)
Thailand-Korea	US$-Won	June 25, 2002	US$1 billion (two-way)
Korea-Philippines	US$-Peso	November 9, 2005	US$1.5 billion (two-way)
Philippines-Korea	US$-Won	November 9, 2005	US$1.5 billion (two-way)
Korea-Malaysia	US$-Ringgit	November 9, 2005	US$1.5 billion (two-way)
Malaysia-Korea	US$-Won	November 9, 2005	US$1.5 billion (two-way)
Korea-Indonesia	US$-Rupiah	November 9, 2005	US$1 billion (two-way)
Indonesia-Korea	US$-Won	November 9, 2005	US$1 billion (two-way)

Notes: a. the amount includes US$2.5 billion committed on August 18, 1999 under the New Miyazawa Initiative.
Source: Ministry of Finance Japan official resources

Table 4.4 Working Groups on the ABMI

ABMI Working Groups	**Chair**	**Changes**
WG1 New securitized debt instruments	Thailand	
WG2 Credit guarantee and investment mechanisms	Korea and PRC	
WG3 Foreign exchange transactions and settlement issues	Malaysia	
WG4 Issuance of bonds denominated in local currencies by Multilateral Development Banks (MDBs), foreign government agencies, and Asian multinational corporations	PRC	Conclusion of the operations upon completion of the mission
WG5 Rating systems and information dissemination on Asian bond markets	Singapore and Japan	Used to be Rating systems and information dissemination on Asian bond markets
WG6 Technical assistance coordination	Indonesia, Philippines and Malaysia	Converted to the TA Coordination Team for the Focal Group TACT

Source: Asian Development Bank: AsianBondsOnline

Table 4.5 Asia and Pacific Stock Market Price Indices

	Price index	Full name	Unit	Components	Starting date
Japan	Nikkei 225	Nikkei heikin kabuka	Yen	225 companies in 36 industries	September 7, 1950
	TOPIX	Tokyo stock Price Index	Yen	1700 domestic companies	January 4,1968
China	SSEC	Shanghai Stock Exchange Composite Index	Renminbi	Top 50 companies by market capitalization	December 19, 1990
Korea	KOSPI	Korea Composite Stock Price Index	Won	Over 700 components	January 4, 1980
Singapore	STI	Straits Times Index	SGD	50 representative companies	September 1, 1998[(a)]
Hong Kong	HSI	Hang Seng Index	HK$	40 largest companies	November 24, 1969
Taiwan	TAIEX	Taiwan Capitalization Weighted Stock Index	TW$	All listed common shares	February 9, 1962
Malaysia	KLCI	Kuala Lumpur Composite Index	Ringgit	100 companies from main board	December 14, 1976
Indonesia	IHSG/JSXC	Indeks Harga Saham Gabungan Jakarta Stock Exchange composite	Rupiah	336 companies	1977
Thailand	SETI	Stock Exchange of Thailand index	Baht	all common stocks [(b)]	April 30, 1975
Philippines	PSECI/PHISIX/PSEi	Philippine Stock Exchange Composite index	Peso	31 companies	August 8, 1927
New Zealand	NZSX50	New Zealand Stock Exchange index	NZD	50 companies	June 24 1991
Australia	AOI	All Ordinaries Index	AUD	all ordinary (or common) shares	January 1, 1980

Notes: (a) STI replaced the Straits Times Industrials Index (STII) after September 1, 1998; (b) including unit trusts of property funds

Table 4.6 European Stock Market Price Indices

	Price index	Full names	Unit	Components	Starting time
Austria	ATX	Austrian Traded Index	Austrian Schilling/Euro	21 continuously traded Austrian companies listed on the Vienna Stock Exchange	Jan 2, 1991
Belgium	Euronext 100	Euronext Brussels	Belgian Franc/Euro	Market capitalization index of the 150 next largest stocks	Sep 22, 2000
Denmark	KFX	Copenhagen Stock Exchange Index	Danish Krone	20 Danish companies	July 3, 1989
Finland	HEX-20	Helsinki Stock Exchange Index	Finnish Markka/Euro	Shares of the top 20 Finnish companies	Dec 28, 1990
France	CAC40	Compagnie des Agents de Change 40 index	French Franc/Euro	40 French companies listed on the Paris Stock Exchange that are also traded on the options market.	Dec 31, 1987
Germany	DAX	Deutscher Aktienindex	German Mark/Euro	30 German companies	Dec 30, 1987
Greece	FTSE/Athex 140	Athex Composite index 140	Greek Drachma/Euro	140 Greek companies	1996
Ireland	ISEQ	Irish Stock Exchange	Irish Pound/Euro	the index is complied as a stock capitalisation weighted average	Jan 4, 1988
Italy	MIB 30	Milano Italia Borsa Index 30	Italian Lira/Euro	30 Italian companies	Dec 31, 1992
Netherlands	AEX	European Options Exchange index	Dutch Gulden/Euro	25 leading Dutch companies representative for the general trend on the Amsterdam Stock Exchange	1983
Portugal	PSI-20	Portuguese Stock Index	Portuguese Escudo/Euro	20 Portuguese companies	Dec 31, 1992
Spain	IBEX 35	Lberia Index	Spanish Peseta/Euro	35 Spanish companies	Dec 29, 1989
Norway	OBX	Oslo Stock Exchange Index	Norwegian Krone	25 Norwegian companies	Jan 1, 1987
Sweden	SX-16	Stockholm Stock Exchange 16 Index	Swedish Krona	Shares of the top 16 Swedish companies	Dec 31, 1979
Switzerland	SMI	Swiss Market Index	Swiss Franc	21 Swiss companies	June 30, 1988
United Kingdom	FT-SE 100	Financial Times Stock Exchange 100 Index	Pound Sterling	Shares of the top 100 UK companies ranked by market capitalization	Dec 31, 1983

Source: Wikipedia, individual stock exchange websites

Figure 4.2 East Asia Stock Markets Price indices (1989:6 to 2007:7)

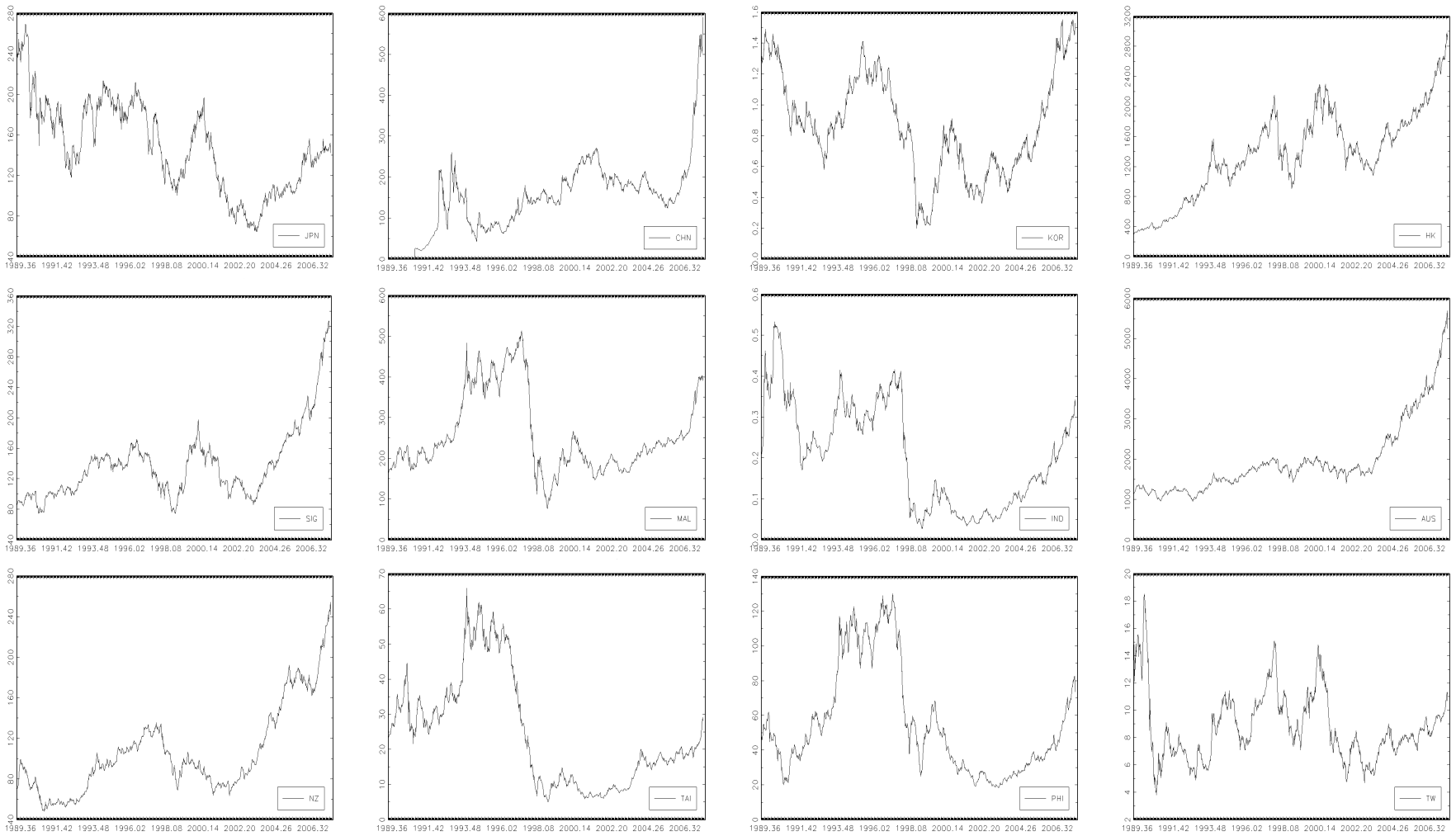

Figure 4.3 European Stock Market Price Indices (1989:6 to 2007:10)

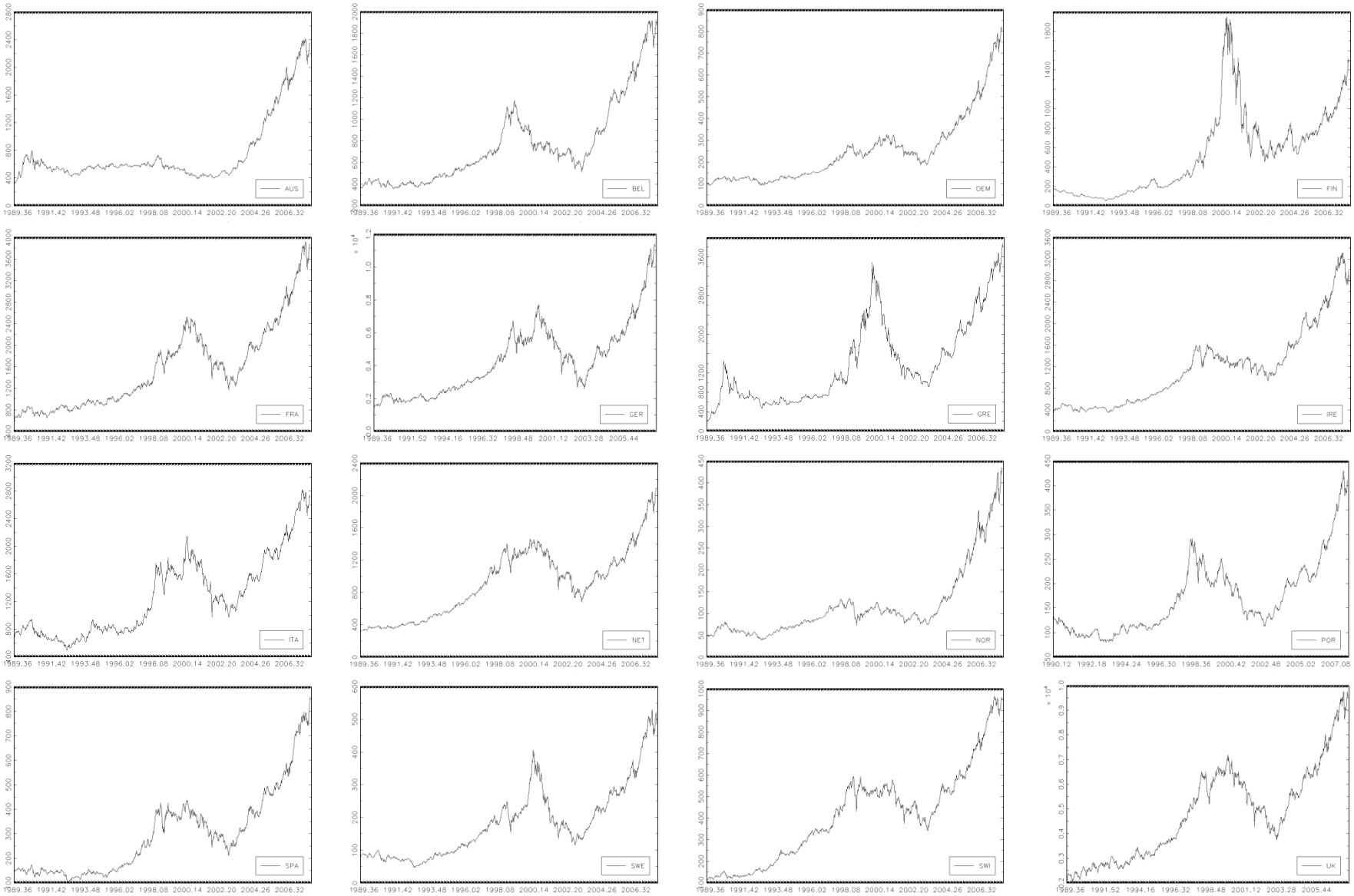

Table 4.7 Weights for building regional index proxy for East Asian countries, ω_k

COUNTRY	JPN	CHN	KOR	HK	SIG	MAL	IND	AUS	NZ	TAI	PHI	TW
JPN	0.00	0.72	0.64	0.61	0.61	0.61	0.61	0.63	0.60	0.61	0.60	0.60
CHN	0.43	0.00	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.17
KOR	0.17	0.08	0.00	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
HK	0.05	0.03	0.02	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
SIG	0.03	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01
MAL	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01
IND	0.06	0.03	0.02	0.02	0.02	0.01	0.00	0.02	0.02	0.02	0.02	0.02
AUS	0.13	0.06	0.06	0.05	0.05	0.05	0.05	0.00	0.05	0.05	0.05	0.05
NZ	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01
TAI	0.04	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.00	0.02	0.02
PHI	0.03	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01
TW	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Global index weights, ω_j

COUNTRY	WEIGHT
US	0.63
UK	0.09
GER	0.12
FRA	0.08
ITA	0.07

Weights for building regional index proxy for European countries, ω_k

COUNTRY	AUS	BEL	DEN	FIN	FRA	GRE	GER	IRE	ITA	NET	POR	SPA	NOR	SWE	SWI	UK
AUS	0.00	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.03
BEL	0.03	0.00	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
DEN	0.02	0.02	0.00	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
FIN	0.01	0.01	0.01	0.00	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.02
FRA	0.16	0.16	0.16	0.16	0.00	0.16	0.20	0.16	0.18	0.16	0.16	0.17	0.16	0.16	0.16	0.19
GRE	0.01	0.01	0.01	0.01	0.02	0.00	0.02	0.01	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.02
GER	0.23	0.23	0.23	0.23	0.27	0.23	0.00	0.23	0.26	0.23	0.23	0.24	0.23	0.23	0.23	0.27
IRE	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
ITA	0.13	0.13	0.13	0.13	0.15	0.13	0.17	0.13	0.00	0.14	0.13	0.14	0.13	0.13	0.13	0.16
NET	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.05	0.05	0.00	0.05	0.05	0.05	0.05	0.05	0.05
POR	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.02
SPA	0.07	0.07	0.07	0.07	0.08	0.07	0.09	0.07	0.08	0.07	0.07	0.00	0.07	0.07	0.07	0.09
NOR	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.02	0.02	0.00	0.02	0.02	0.02
SWE	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.00	0.03	0.03
SWI	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.00	0.04
UK	0.18	0.18	0.18	0.18	0.21	0.18	0.22	0.18	0.20	0.18	0.18	0.19	0.18	0.18	0.18	0.00

Table 4.8 Unit Root Tests

	lnY(t)			ΔlnY(t)		
	ADF	SP	KPSS	ADF	SP	KPSS
Austria	2.12	-0.94	14.47	-17.38	-24.73	0.38
Belgium	2.41	-1.60	24.65	-17.93	-28.87	0.18
Denmark	2.80	-1.77	27.61	-17.27	-24.73	0.21
Finland	1.37	-1.44	26.31	-16.12	-30.79	0.18
France	2.36	-1.99	27.56	-17.27	-29.00	0.09
Germany	2.12	-1.62	24.33	-18.58	-30.38	0.10
Greece	1.81	-1.32	21.30	-16.16	-29.27	0.18
Ireland	2.35	-2.05	28.68	-16.96	-30.50	0.06
Italy	1.34	-2.17	25.41	-16.91	-30.37	0.09
Netherlands	2.56	-1.36	25.30	-18.98	-30.64	0.13
Portugal	1.46	-1.57	19.72	-16.76	-29.07	0.37
Spain	1.92	-1.91	25.97	-16.63	-27.70	0.20
Norway	2.17	-1.52	22.85	-17.17	-30.30	0.26
Sweden	1.66	-1.85	25.00	-16.82	-22.60	0.13
Switzerland	2.95	-1.49	27.61	-18.24	-30.41	0.12
United Kingdom	2.18	-1.69	25.70	-18.22	-31.90	0.09
Japan	-0.63	-2.25	17.18	-21.73	-28.00	0.11
China	0.74	-1.36	14.65	-20.90	-29.70	0.26
Korea, Rep	0.12	-1.99	17.84	-20.84	-31.25	0.06
Hong Kong	1.96	-1.42	21.57	-19.86	-30.41	0.19
Singapore	1.44	-1.44	10.61	-20.70	-26.74	0.20
Malaysia	0.58	-1.29	3.35	-19.57	-27.21	0.15
Taiwan	-0.48	-2.40	1.46	-20.22	-32.95	0.13
Indonesia	-0.62	-1.19	13.44	-18.68	-25.41	0.24
Australia	2.22	-1.76	23.97	-19.99	-18.25	0.28
New Zealand	1.42	-1.53	16.38	-18.95	-20.38	0.23
Thailand	-0.12	-1.04	14.85	-18.23	-27.11	0.27
Philippines	0.14	-1.17	9.06	-17.70	-26.20	0.20

Asymptotic critical value

ADF test:	1% -2.56	5% -1.94	10% -1.62
SP test:	1% -3.56	5% -3.02	10% -2.75
KPSS test:	1% 0.739	5% 0.463	10% 0.347

Table 4.9 Variance Decomposition of domestic index in sub-periods for European countries

		Per I	Per II	Per III	Per IV	Per V	Per VI	Per VII	Per VIII	Average
Austria	U-G	0.17	0.06	0.07	0.13	0.11	0.02	0.04	0.33	0.12
	U-R	0.24	0.27	0.15	0.18	0.11	0.39	0.37	0.38	0.26
	U-D	0.58	0.67	0.78	0.69	0.78	0.59	0.59	0.29	0.62
Belgium	U-G	0.33	0.02	0.14	0.08	0.11	0.45	0.41	0.37	0.24
	U-R	0.46	0.24	0.26	0.18	0.10	0.29	0.45	0.55	0.32
	U-D	0.21	0.74	0.60	0.74	0.79	0.26	0.14	0.09	0.45
Denmark	U-G	0.31	0.00	0.16	0.21	0.23	0.41	0.33	0.25	0.24
	U-R	0.33	0.23	0.20	0.25	0.11	0.19	0.12	0.53	0.25
	U-D	0.36	0.76	0.64	0.54	0.65	0.40	0.54	0.23	0.52
Finland	U-G	0.10	0.01	0.13	0.19	0.38	0.36	0.50	0.48	0.27
	U-R	0.20	0.09	0.24	0.02	0.10	0.01	0.02	0.20	0.11
	U-D	0.70	0.89	0.63	0.79	0.53	0.63	0.47	0.31	0.62
France	U-G	0.29	0.03	0.20	0.18	0.48	0.75	0.63	0.45	0.38
	U-R	0.55	0.54	0.45	0.41	0.30	0.22	0.33	0.41	0.40
	U-D	0.17	0.42	0.35	0.41	0.22	0.03	0.04	0.14	0.22
Germany	U-G	0.26	0.01	0.08	0.17	0.42	0.75	0.47	0.52	0.34
	U-R	0.44	0.39	0.26	0.42	0.40	0.17	0.13	0.33	0.32
	U-D	0.31	0.60	0.66	0.41	0.18	0.08	0.41	0.14	0.35
Greece	U-G	0.01	0.01	0.06	0.00	0.01	0.17	0.14	0.20	0.08
	U-R	0.09	0.15	0.08	0.13	0.08	0.21	0.34	0.32	0.18
	U-D	0.89	0.84	0.87	0.87	0.91	0.61	0.52	0.48	0.75
Ireland	U-G	0.12	0.05	0.25	0.17	0.18	0.31	0.38	0.24	0.21
	U-R	0.25	0.30	0.15	0.29	0.08	0.07	0.14	0.41	0.21
	U-D	0.63	0.65	0.60	0.54	0.73	0.62	0.48	0.35	0.58
Italy	U-G	0.16	0.02	0.00	0.08	0.16	0.44	0.38	0.39	0.20
	U-R	0.19	0.10	0.39	0.10	0.52	0.17	0.44	0.34	0.28
	U-D	0.64	0.88	0.61	0.82	0.32	0.39	0.18	0.28	0.52
Netherlands	U-G	0.25	0.01	0.35	0.29	0.40	0.66	0.68	0.49	0.39
	U-R	0.29	0.45	0.46	0.30	0.31	0.15	0.26	0.38	0.33
	U-D	0.46	0.54	0.19	0.41	0.29	0.19	0.06	0.14	0.29
Portugal	U-G	0.21	0.01	0.09	0.08	0.06	0.26	0.14	0.26	0.14
	U-R	0.10	0.26	0.15	0.37	0.41	0.57	0.38	0.32	0.32
	U-D	0.69	0.73	0.76	0.54	0.52	0.17	0.48	0.42	0.54
Spain	U-G	0.20	0.15	0.20	0.09	0.35	0.43	0.38	0.50	0.29
	U-R	0.36	0.31	0.18	0.25	0.38	0.28	0.25	0.29	0.29
	U-D	0.45	0.54	0.62	0.66	0.27	0.29	0.37	0.21	0.43
Norway	U-G	0.08	0.05	0.16	0.13	0.22	0.26	0.18	0.19	0.16
	U-R	0.10	0.16	0.17	0.21	0.06	0.14	0.33	0.38	0.19
	U-D	0.82	0.79	0.66	0.66	0.72	0.60	0.48	0.43	0.65
Sweden	U-G	0.29	0.03	0.13	0.17	0.31	0.55	0.49	0.42	0.30
	U-R	0.29	0.28	0.18	0.16	0.25	0.09	0.28	0.44	0.25
	U-D	0.42	0.70	0.69	0.67	0.44	0.36	0.22	0.14	0.46
Switzerland	U-G	0.31	0.02	0.14	0.06	0.18	0.62	0.47	0.42	0.28
	U-R	0.37	0.43	0.20	0.18	0.18	0.21	0.17	0.33	0.26
	U-D	0.32	0.54	0.66	0.75	0.64	0.17	0.36	0.26	0.46
United Kingdom	U-G	0.17	0.04	0.35	0.18	0.49	0.68	0.56	0.44	0.36
	U-R	0.42	0.41	0.33	0.25	0.05	0.11	0.12	0.30	0.25
	U-D	0.41	0.55	0.32	0.57	0.46	0.22	0.31	0.26	0.39
Average	U-G	0.20	0.03	0.16	0.14	0.26	0.45	0.39	0.37	0.25
	U-R	0.29	0.29	0.24	0.23	0.22	0.20	0.26	0.37	0.26
	U-D	0.50	0.68	0.60	0.63	0.53	0.35	0.35	0.26	0.49

Notes: Per I: 1989:7:1 - 1991:6:30; Per II: 1991:7:1 - 1993:6:30; Per III: 1993:7:1 - 1995:6:30; Per IV: 1995:7:1 - 1997:6:30;
Per V: 1999:1:1 - 2000:12:31; Per VI: 2001:1:1 - 2002:12:31; Per VII: 2003:1:1 - 2004:12:31; Per VIII: 2005:1:1 - 2006:12:31

Table 4.10 Variance Decomposition of domestic index in sub-periods for Asian countries

		Per I	Per II	Per III	Per IV	Per V	Per VI	Per VII	Per VIII	Average
Japan	**U-G**	0.19	0.07	0.05	0.11	0.22	0.18	0.14	0.18	0.14
	U-R	0.01	0.00	0.05	0.02	0.02	0.05	0.05	0.05	0.03
	U-D	0.79	0.93	0.90	0.87	0.75	0.78	0.81	0.77	0.83
China	**U-G**	0.01	0.01	0.01	0.13	0.01	0.01	0.03	0.09	0.04
	U-R	0.10	0.01	0.07	0.05	0.04	0.04	0.02	0.00	0.04
	U-D	0.88	0.98	0.92	0.82	0.95	0.95	0.95	0.91	0.92
Korea	**U-G**	0.05	0.01	0.02	0.04	0.25	0.34	0.21	0.18	0.14
	U-R	0.01	0.01	0.02	0.03	0.05	0.07	0.00	0.08	0.03
	U-D	0.94	0.97	0.96	0.93	0.71	0.59	0.78	0.75	0.83
Hong Kong	**U-G**	0.24	0.03	0.19	0.22	0.43	0.39	0.33	0.35	0.27
	U-R	0.02	0.01	0.01	0.03	0.07	0.07	0.09	0.03	0.04
	U-D	0.74	0.95	0.79	0.75	0.50	0.53	0.58	0.61	0.68
Singapore	**U-G**	0.42	0.07	0.14	0.06	0.23	0.33	0.18	0.32	0.22
	U-R	0.03	0.08	0.02	0.01	0.06	0.01	0.14	0.22	0.07
	U-D	0.55	0.85	0.84	0.93	0.70	0.67	0.68	0.45	0.71
Malaysia	**U-G**	0.17	0.01	0.18	0.09	0.08	0.07	0.04	0.30	0.12
	U-R	0.01	0.00	0.00	0.05	0.01	0.01	0.22	0.05	0.04
	U-D	0.82	0.98	0.82	0.86	0.91	0.91	0.74	0.66	0.84
Taiwan	**U-G**	0.01	0.01	0.02	0.01	0.09	0.25	0.17	0.19	0.09
	U-R	0.01	0.00	0.00	0.03	0.15	0.02	0.06	0.06	0.04
	U-D	0.98	0.99	0.97	0.96	0.76	0.72	0.77	0.75	0.86
Indonesia	**U-G**	0.01	0.02	0.09	0.06	0.06	0.01	0.10	0.16	0.06
	U-R	0.01	0.02	0.00	0.01	0.03	0.01	0.05	0.06	0.02
	U-D	0.99	0.96	0.91	0.93	0.91	0.98	0.85	0.78	0.91
Thailand	**U-G**	0.28	0.09	0.21	0.02	0.26	0.16	0.14	0.17	0.17
	U-R	0.01	0.05	0.00	0.02	0.02	0.08	0.11	0.13	0.05
	U-D	0.71	0.86	0.79	0.95	0.72	0.76	0.75	0.71	0.78
Philippines	**U-G**	0.19	0.10	0.22	0.09	0.29	0.08	0.17	0.21	0.17
	U-R	0.00	0.01	0.01	0.08	0.01	0.01	0.03	0.11	0.03
	U-D	0.81	0.89	0.77	0.83	0.70	0.91	0.80	0.67	0.80
Australia	**U-G**	0.05	0.04	0.11	0.09	0.18	0.29	0.17	0.34	0.16
	U-R	0.02	0.09	0.00	0.03	0.02	0.03	0.02	0.05	0.03
	U-D	0.93	0.87	0.89	0.89	0.81	0.68	0.81	0.61	0.81
New Zealand	**U-G**	0.12	0.03	0.21	0.02	0.09	0.31	0.07	0.14	0.12
	U-R	0.03	0.13	0.01	0.02	0.04	0.01	0.04	0.10	0.05
	U-D	0.84	0.84	0.79	0.96	0.81	0.69	0.89	0.76	0.82
Average	**U-G**	0.15	0.04	0.12	0.08	0.18	0.20	0.15	0.22	0.14
	U-R	0.02	0.03	0.02	0.03	0.04	0.03	0.07	0.08	0.04
	U-D	0.83	0.92	0.86	0.89	0.77	0.76	0.78	0.70	0.82

Notes: Per I: 1989:7:1 - 1991:6:30; Per II: 1991:7:1 - 1993:6:30; Per III: 1993:7:1 - 1995:6:30; Per IV: 1995:7:1 - 1997:6:30;
Per V: 1999:1:1 - 2000:12:31; Per VI: 2001:1:1 - 2002:12:31; Per VII: 2003:1:1 - 2004:12:31; Per VIII: 2005:1:1 - 2006:12:31

Table 4.11 Robustness test 1: Variance Decomposition of domestic index in sub-periods for Asian countries

		Per I	Per II	Per III	Per IV	Per V	Per VI	Per VII	Per VIII	Average
China	**U-G**	0.00	0.01	0.05	0.01	0.02	0.03	0.03	0.06	0.03
	U-R	0.00	0.01	0.03	0.11	0.00	0.00	0.08	0.10	0.04
	U-D	0.99	0.97	0.92	0.88	0.98	0.96	0.90	0.84	0.93
Korea	**U-G**	0.13	0.07	0.01	0.05	0.15	0.21	0.10	0.27	0.12
	U-R	0.00	0.07	0.02	0.03	0.04	0.07	0.06	0.06	0.04
	U-D	0.87	0.87	0.97	0.92	0.82	0.72	0.84	0.67	0.84
Hong Kong	**U-G**	0.23	0.00	0.01	0.14	0.30	0.26	0.26	0.13	0.17
	U-R	0.00	0.01	0.04	0.03	0.18	0.15	0.06	0.26	0.09
	U-D	0.77	0.99	0.95	0.83	0.52	0.59	0.68	0.61	0.74
Singapore	**U-G**	0.37	0.12	0.08	0.05	0.12	0.17	0.31	0.48	0.21
	U-R	0.00	0.04	0.00	0.04	0.23	0.15	0.16	0.15	0.10
	U-D	0.63	0.84	0.92	0.91	0.65	0.68	0.53	0.38	0.69
Malaysia	**U-G**	0.17	0.04	0.01	0.09	0.04	0.07	0.24	0.12	0.10
	U-R	0.00	0.03	0.05	0.04	0.11	0.20	0.16	0.26	0.11
	U-D	0.83	0.93	0.94	0.87	0.85	0.73	0.59	0.62	0.80
Taiwan	**U-G**	0.01	0.03	0.02	0.01	0.17	0.06	0.12	0.21	0.08
	U-R	0.00	0.01	0.00	0.06	0.08	0.07	0.05	0.05	0.04
	U-D	0.98	0.96	0.97	0.93	0.75	0.87	0.83	0.74	0.88
Indonesia	**U-G**	0.05	0.05	0.00	0.02	0.03	0.03	0.12	0.12	0.05
	U-R	0.04	0.00	0.02	0.04	0.09	0.01	0.13	0.06	0.05
	U-D	0.92	0.94	0.98	0.95	0.88	0.96	0.75	0.83	0.90
Thailand	**U-G**	0.09	0.05	0.03	0.01	0.12	0.22	0.21	0.19	0.12
	U-R	0.00	0.00	0.03	0.05	0.22	0.13	0.14	0.07	0.08
	U-D	0.90	0.94	0.94	0.94	0.66	0.66	0.65	0.74	0.80
Philippines	**U-G**	0.06	0.01	0.00	0.02	0.05	0.06	0.08	0.29	0.07
	U-R	0.01	0.09	0.00	0.11	0.23	0.10	0.03	0.16	0.09
	U-D	0.93	0.90	1.00	0.86	0.72	0.84	0.88	0.55	0.84
Australia	**U-G**	0.03	0.07	0.21	0.06	0.09	0.08	0.12	0.21	0.11
	U-R	0.01	0.04	0.02	0.10	0.03	0.07	0.19	0.11	0.07
	U-D	0.96	0.89	0.77	0.84	0.88	0.85	0.70	0.68	0.82
New Zealand	**U-G**	0.13	0.10	0.20	0.02	0.04	0.11	0.08	0.14	0.10
	U-R	0.00	0.07	0.00	0.00	0.04	0.08	0.26	0.14	0.07
	U-D	0.87	0.82	0.79	0.98	0.92	0.81	0.66	0.72	0.82
Average	**U-G**	0.12	0.05	0.06	0.04	0.10	0.12	0.15	0.20	0.11
	U-R	0.01	0.03	0.02	0.06	0.11	0.09	0.12	0.13	0.07
	U-D	0.88	0.91	0.92	0.90	0.78	0.79	0.73	0.67	0.82

Notes: Per I: 1989:7:1 - 1991:6:30; Per II: 1991:7:1 - 1993:6:30; Per III: 1993:7:1 - 1995:6:30; Per IV: 1995:7:1 - 1997:6:30;
Per V: 1999:1:1 - 2000:12:31; Per VI: 2001:1:1 - 2002:12:31; Per VII: 2003:1:1 - 2004:12:31; Per VIII: 2005:1:1 - 2006:12:31

Table 4.12 Robustness test 2: Variance Decomposition of domestic index in sub-periods for Asian countries

		Per I	Per II	Per III	Per IV	Per V	Per VI	Per VII	Per VIII	Average
Japan	**U-G**	0.00	0.01	0.04	0.00	0.00	0.01	0.00	0.04	0.01
	U-R	0.07	0.24	0.00	0.16	0.19	0.22	0.22	0.28	0.17
	U-D	0.93	0.75	0.95	0.84	0.81	0.77	0.78	0.68	0.81
Korea	**U-G**	0.00	0.08	0.01	0.03	0.00	0.03	0.02	0.04	0.03
	U-R	0.13	0.07	0.02	0.06	0.20	0.31	0.12	0.24	0.14
	U-D	0.87	0.85	0.97	0.91	0.80	0.67	0.86	0.72	0.83
Hong Kong	**U-G**	0.01	0.02	0.02	0.07	0.03	0.01	0.01	0.19	0.05
	U-R	0.31	0.00	0.02	0.17	0.37	0.30	0.27	0.09	0.19
	U-D	0.68	0.98	0.97	0.76	0.60	0.69	0.72	0.71	0.76
Singapore	**U-G**	0.01	0.02	0.00	0.04	0.01	0.01	0.10	0.15	0.04
	U-R	0.46	0.15	0.03	0.06	0.23	0.25	0.30	0.42	0.24
	U-D	0.53	0.83	0.96	0.90	0.76	0.74	0.60	0.44	0.72
Malaysia	**U-G**	0.00	0.07	0.09	0.06	0.01	0.00	0.10	0.18	0.06
	U-R	0.23	0.05	0.01	0.10	0.09	0.11	0.24	0.07	0.11
	U-D	0.77	0.88	0.90	0.84	0.91	0.88	0.67	0.75	0.83
Taiwan	**U-G**	0.00	0.01	0.02	0.03	0.09	0.01	0.00	0.06	0.03
	U-R	0.02	0.03	0.00	0.01	0.18	0.11	0.16	0.21	0.09
	U-D	0.98	0.97	0.97	0.96	0.73	0.88	0.84	0.73	0.88
Indonesia	**U-G**	0.03	0.00	0.08	0.03	0.01	0.01	0.05	0.03	0.03
	U-R	0.03	0.05	0.00	0.03	0.06	0.03	0.12	0.11	0.05
	U-D	0.94	0.95	0.92	0.94	0.94	0.96	0.83	0.86	0.92
Thailand	**U-G**	0.00	0.01	0.01	0.03	0.01	0.00	0.07	0.06	0.02
	U-R	0.13	0.05	0.02	0.01	0.19	0.34	0.19	0.20	0.14
	U-D	0.86	0.95	0.97	0.96	0.80	0.66	0.74	0.74	0.84
Philippines	**U-G**	0.02	0.07	0.04	0.15	0.01	0.01	0.01	0.11	0.05
	U-R	0.08	0.01	0.00	0.03	0.13	0.10	0.07	0.25	0.08
	U-D	0.90	0.93	0.96	0.83	0.85	0.89	0.92	0.64	0.87
Australia	**U-G**	0.02	0.06	0.02	0.12	0.04	0.00	0.04	0.14	0.06
	U-R	0.04	0.07	0.02	0.09	0.17	0.14	0.12	0.15	0.10
	U-D	0.94	0.88	0.96	0.79	0.79	0.85	0.84	0.71	0.85
New Zealand	**U-G**	0.00	0.07	0.01	0.00	0.06	0.02	0.06	0.13	0.04
	U-R	0.18	0.09	0.06	0.02	0.06	0.22	0.06	0.12	0.10
	U-D	0.82	0.84	0.93	0.98	0.87	0.76	0.87	0.75	0.85
Average	**U-G**	0.01	0.04	0.03	0.05	0.02	0.01	0.04	0.10	0.04
	U-R	0.15	0.07	0.02	0.07	0.17	0.19	0.17	0.19	0.13
	U-D	0.84	0.89	0.95	0.88	0.81	0.80	0.79	0.70	0.83

Notes: Per I: 1989:7:1 - 1991:6:30; Per II: 1991:7:1 - 1993:6:30; Per III: 1993:7:1 - 1995:6:30; Per IV: 1995:7:1 - 1997:6:30;
Per V: 1999:1:1 - 2000:12:31; Per VI: 2001:1:1 - 2002:12:31; Per VII: 2003:1:1 - 2004:12:31; Per VIII: 2005:1:1 - 2006:12:31

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