Chapter 2

Sequencing and Extent of Integration in Asia: The Real Financial Dimensions

Tony Cavoli
School of Commerce, University of South Australia

Ramkishen S. Rajan
School of Public Policy, George Mason University

March 2010

This chapter should be cited as
Cavoli, T. and R. S. Rajan (2010), 'Sequencing and Extent of Integration in Asia: The Real Financial Dimensions', in Findlay, C., F. Parulian and J. Corbett (ed.), *Linkages between Real and Financial Aspects of Economic Integration in East Asia*. ERIA Research Project Report 2009-1, Jakarta: ERIA. pp.20-60.

Chapter 2

Sequencing and Extent of Integration in Asia: The Real Financial Dimensions

Tony Cavoli
School of Commerce
University of South Australia

Ramkishen S. Rajan
School of Public Policy
George Mason University

Abstract

This paper examines some of the salient issues surrounding the degree of economic integration among Asian countries with particular attention being paid to the nexus between real and financial integration. Using a novel and simple method, we derive some measures of price-based real and financial integration from the relative PPP and UIP relation. We then investigate the degree of integration between countries and groups of countries and analyze the sequence of integration – the extent to which the existence of one might cause the other. We find that, overall, integration is generally higher after the Asian crisis but the results are quite close. The original ASEAN nations – Indonesia, Malaysia, the Philippines, Singapore and Thailand – seem to be more integrated with rest of Asia than are other groups. The results of the dynamic estimations suggest that financial integration might lead real integration but not necessarily the opposite. This result may reflect the difference in the timing of adjustment of the respective markets. The paper concludes with some pertinent policy implications for the region.

Keywords: real integration, financial integration, Asia

JEL Classifications**:** F15, F36

1. Introduction

There has been a strong tendency in the literature to treat trade and monetary regionalism independently. Thus, the criteria for judging whether countries would be good partners within a customs union have focused on the size of the proposed union and the pre-union size of trade between potential partners (as indicating the likely extent of trade diversion), the degree of overlap in production (as a measure of the potential gains from specialization) and the cost differentials between prospective partners, the size of pre-union tariffs, the price elasticities of demand and supply for traded goods and services, and the scope for dynamic gains. Meanwhile, optimum currency area (OCA) criteria have focused on the degree of factor mobility between partners, size and openness, trade diversification, dissimilarity of commodity composition of production and trade baskets, macroeconomic trends and the synchronization of business cycles, the degree of labor market flexibility, the scope for regional transfers, and the strength of the financial sectors of potential members.

It is only more recently that the connections between trade and monetary integration have been examined, leading some analysts to claim, for example, that conventional OCA criteria are endogenous.[1] What are the connections and sequence between trade and financial integration? How financially integrated are the Asian economies? These are the two questions that this paper focuses on. The empirics in this paper will essentially be limited to countries that are the ASEAN plus Three economies for the period 1990–2009 subject to data availability.

As is shown in Section 5, the paper adopts a novel and very simple method of measuring real and financial market integration using the conventional parity conditions, relative PPP and UIP. To our knowledge, using the parity conditions in this manner to derive bilateral and regional integration has not been attempted in the literature. As such, we regard this as a significant addition to work on the topic of integration.

[1] Frankel and Rose (1998) suggest that intra-union trade is encouraged by reducing the risk of exchange rate changes and that this in turn increases the degree of synchronization between business cycles of countries comprising the union which is itself a criterion for an OCA. We return to this idea later.

To preview the results briefly, we find that, overall, integration is generally higher after the Asian crisis but the results are quite close. The original ASEAN nations – Indonesia, Malaysia, the Philippines, Singapore and Thailand – seem to be more integrated with rest of Asia than are other groups. This is the case for both real and financial integration and they appear to be especially well integrated with each other. We run some dynamic estimations to ascertain whether there is a possible sequence. There is evidence that financial integration might lead real integration but not necessarily the opposite. This result should be interpreted with some care as the causation might not reflect sequence, but rather the difference in timing of adjustment of the respective markets.

The paper is organized as follows. Sections 2 and 3 explore the economic and political economy issues surrounding the sequencing between trade and financial integration, respectively. Section 4 reviews some measures of integration that are commonly used in the literature.[2] Section 5 estimates the extent of financial and real integration in Asia. The final section concludes the paper.

2. Connections between Trade and Financial Integration[3]

What are the connections between trade and financial integration? First, if exchange rate stability encourages trade, the formation of an exchange rate union will help establish the conditions for a welfare-generating trade agreement. By reducing transactions and information costs, a single currency may encourage further trade among partners in a regional trade agreement (RTA). By the same token, however, an RTA may be undermined by exchange rate instability amongst members. Currency misalignment or competitive devaluations may generate a protectionist backlash, which goes against the purpose of the RTA and possibly even threatens its existence, as the recent experience of the Mercosur seems to suggest. Most recently in South America, the Mercosur trading agreement designed to encourage trade between Brazil, Argentina, Paraguay and Uruguay has been severely undermined by an uncoordinated exchange rate policy between Brazil and Argentina.[4] The devaluation of the Brazilian real in 1999

[2] Keeping in mind our empirics are limited by the data availability for emerging Asian economies.
[3] Sections 2 and 3 build upon Bird and Rajan (2006).
[4] The member countries of Mercosur also used economic integration to lock-in structural reforms which is an important political economy benefit of RTAs involving developing and transition countries.

accentuated the overvaluation of the Argentine peso and contributed to the economic crisis in Argentina, which in turn had significant negative repercussions on the Uruguayan banking system.[5] Trading partners were in effect pursuing competitive exchange rate policies and, as noted earlier, the ramifications of exchange rate changes will be much greater for close trading partners – fellow members of an RTA – than for other countries. A similar concern about competitive devaluations appears to exist in Asia.

Fernandez-Arias et al. (2002) present evidence based on 37 countries and 6 RTAs to suggest that the adverse effects of uncoordinated exchange rate policy may be more pronounced within the context of an RTA. These adverse effects can be expected to be greater the deeper the real sector integration. This is because the cross-price elasticity of demand for similar goods and services produced within the integrated region may rise (so-called "knife-edge" comparative advantage). This is particularly so if, as Fernandez-Arias et al. (2002) suggest, intra-regional FDI is especially footloose and sensitive to exchange rate changes and misalignments.

Second, the increased openness and intra-union trade encouraged by forming an RTA makes flexible exchange rates less appropriate and monetary integration more appropriate amongst partner countries.

Third, while the increased factor mobility that may be associated with forming a common market may substitute to some extent for trade amongst partner countries (as suggested by conventional trade theory), it may also substitute for exchange rate adjustment and therefore help to meet the criteria for an OCA.

Fourth, to the extent that a monetary union encourages intra-industry trade within the union, it may help to not only enhance the welfare gains from regional trade integration but also encourage the closer synchronization of business cycles that then helps retrospectively to justify the formation of the monetary union. This particular dimension of the relationship between trade and monetary regionalism has been empirically

---

Concerns about the sustainability of Mercosur as only a regional trade agreement has given rise to suggestions in some policy circles that it be extended into a fully fledged regional monetary union (Fratianni, 2004; Levy Yeyati and Sturzenegger, 2000).

[5] A similar concern about competitive devaluations appears to exist in Asia.

investigated by Frankel and Rose (1998) using 30 years of data for 20 industrialized countries. They acknowledge that if RTAs or monetary unions encourage industrial specialization and inter-industry trade according to comparative advantage, this could reduce the correlation between business cycles in the member countries, which in turn could weaken the case for monetary integration since independent monetary tools, or a flexible exchange rate, may be needed to compensate for asymmetrical shocks (Krugman, 1993). It is therefore an empirical issue as to which of these effects – supply (asymmetry) or demand (symmetry) – will dominate.

Frankel and Rose (1998) claim that the empirical evidence that they examine suggests that closer economic integration has coincided with closer synchronization between business cycles – hence the argument that OCA criteria are endogenous. A study by Calderón et al. (2002) of 147 countries over the period 1960–1999 using annual data finds that the impact of trade integration among industrial country pairs on output fluctuations is 0.092, significantly higher than the impact among developing country pairs (0.019) or between industrial and developing country pairs (0.037). The authors conjecture that this is due to higher intra-industry trade (IIT) between industrial countries compared to inter-industry trade involving developing countries. More specific evidence to date for selected Asian economies suggests that the volume of intra-Asian trade does not necessarily lead to more symmetrical business cycles and could actually cause more idiosyncratic business cycles (Lee, 2004).

A number of implications follow from this analysis. If further EU enlargement encourages greater industrial specialization based on factor intensity-driven comparative advantage, it does not necessarily follow that the historical trend observed by Frankel and Rose will carry forward into the future. At the same time, however, the effects of industry-based asymmetrical shocks could be offset by the reduced incidence of demand-side shocks associated with the closer coordination of macroeconomic policy. The implication of this is that the effects of integration on the synchronization of business cycles within the integrated area are difficult to predict *a priori* and *ex ante*. Fortunately, the principal purpose of this paper is not to pursue this particular issue, but merely to observe that there will be inter-connections between trade and monetary integration, and that the direction of these connections may run both ways. Trade

integration and the formation of a common market may help to create conditions more suitable for monetary integration. Meanwhile, monetary integration may help to facilitate trade integration. It is in this context that some political actors and independent observers have been suggesting that monetary integration can take place in conjunction with or even precede trade regionalism.

3. The Political Economy of Sequencing Regional Trade and Monetary Arrangements

If the connection between regional trade agreements and regional monetary arrangements was simply that RTAs resulted in trade creation with partners and helped to establish the OCA criteria, it would be relatively easy to explain why historically RTAs tend to come first. However, the previous section identifies a much more complex and two-way relationship within which it is as easy to argue that exchange rate and even monetary union will help to maximize the benefits from RTAs. If there is this two-way relationship between trade and monetary integration, why is it that we observe a strong empirical tendency for trade agreements to come first? Why are they not preceded by exchange rate and monetary union; or why are regional trade and monetary arrangements not established simultaneously?

Conventional economic considerations on their own struggle to explain the observed trade-first strategy. One possibility is that the answer lies in the dynamics of integration, but this seems unlikely. As noted earlier, the dynamic effects of integration are difficult to pin down and quantify. In any case, there is a reasonable presumption that the dynamic effects of monetary integration on trade expansion will exceed the dynamic effects of trade integration on securing the conditions most suited for monetary union. At the very least, the dynamics do not conveniently explain the tendency for a “trade first” strategy toward integration. In terms of the economics of integration, it would be as easy to argue for a “monetary first” or a concurrent approach. So, again, why is this not what we observe?

RTAs and monetary unions are not just economic phenomena. Indeed, numerous studies emphasize the importance of political imperatives. Krugman (1996), for example, argues that many of the issues surrounding NAFTA at the time of its inception were of

little quantitative significance. From the viewpoint of the US there were never likely to be large gains in terms of increased trade or large costs in terms of unemployment amongst unskilled US workers or environmental degradation. Subsequent empirical studies appear to confirm this (Krueger, 1999). Instead, NAFTA offered the US a way of assisting Mexico at a time when it was anxious to strengthen Mexican democracy, encourage policy reform in Mexico and help Mexican economic development.

Similarly, Goodhart (1995) argues cogently that Economic and Monetary Union (EMU) in Europe reflects a political desire for closer integration. Strong and unambiguous justification is not to be found in the underlying economics. Emphasizing this point about the importance of politics, Eichengreen and Bayoumi (1999a,b) have concluded that from an economic standpoint East Asia may be as close to, or rather, as far away from being an optimum currency area (OCA) as Western Europe.[6] However, the authors go on to conclude that Asia is unlikely to move toward a European-type union anytime soon as

> there is little sign, comparable to the evidence which has existed in Europe for nearly 50 years, of a willingness to subordinate national prerogatives to some larger regional entity. There is no wider web of interlocking arrangements, as in the EU, which would be put at risk by a failure to follow through on promises of monetary and financial cooperation (Eichengreen and Bayoumi, 1999b, p. 11).[7]

If politics lies behind both trade and monetary agreements, it may be reasonable to assume that politics also helps explain the sequence in which RTAs and exchange rate and monetary unions occur. The short answer may simply be that the political rate of return to RTAs is higher than it is for monetary unions, so that it is rational for governments to pursue trade regionalism first.

---

[6] This conclusion is based on an OCA index that takes into account the costs associated with asymmetric region-wide shocks as well as the benefits from stabilizing exchange rates with trading partners.

[7] In addition, substantial asymmetries in the sizes and levels and stages of economic development of the countries in Asia, on the one hand, and the *de facto* policy of strict non-intervention in one another's affairs (economic and particularly political) on the other, makes it extremely difficult to envisage the successful introduction of "tie-in" clauses to create punishment mechanisms to ensure conformity of economic policies as done in Europe.

Let us consider the options facing governments of geographically proximate states that are anxious to develop a closer relationship for political (military or security) reasons. A closer relationship can, in principle, extend to a full economic union but can be sub-divided into trade integration and monetary integration. Economic analysis suggests that there are probably small welfare benefits from trade liberalization within the context of an RTA. But the domestic political costs are probably even smaller and may indeed be outweighed by domestic political benefits. There are a number of elements to this.

First, the gainers will be those sectors of the economy that benefit from trade expansion and trade diversion. In the case of the European Union, for example, it has been the manufacturing sector that has gained from trade creation and the politically powerful agricultural sector that has gained from trade diversion (Sapir, 2000). An analytically strategic component of a customs union is the common external tariff. It is this tariff on imports from the rest of the world that generates trade diversion and the protectionism involved in RTAs (Krueger, 1999, 2000). The domestic political importance of trade diversion is revealed by the preference governments often show for RTAs as opposed to multilateral free trade. In the latter case, trade creation would be greater and trade diversion (except via non-tariff barriers) would be eliminated. In terms of basic economic analysis, the gains from multilateral trade integration would generally be higher. It is therefore the domestic politics of protectionism that tends to get in the way.

Trade policy tends to be more heavily driven by producer interests that may benefit from protectionism than by consumer interests where there would be a gain from cheaper imports, since producers represent a more coherent and better-organized political lobby. Consumers are probably ill informed about the effects of protectionism and are, in any case, poorly organized. Against this background, RTAs offer governments the closer regional relationships that they are anxious to establish at relatively little, if any, net domestic political cost. They may also offer the prospect of higher tax revenue than multilateral free trade. In this context, it is easy to see why they have been so widely pursued.[8]

[8] Of course, the suggestion that RTAs are pursued as a protectionist device is less relevant to some recent enthusiasts of regionalism like the small city state of Singapore which is already highly open to trade and

The matrix of costs and benefits is much different for monetary unions. Here there is less unanimity of view about the benefits. At least in the case of trade integration there is a consensus around the view that there will be some small benefit via trade creation. Not so in the case of monetary unions. Governments therefore encounter significant uncertainty surrounding the benefits from a fully fledged monetary union. The claim that monetary unions will exert a counter-inflationary effect also becomes less compelling in an environment in which inflation is no longer perceived as a problem.[9] Moreover, while monetary unions may offer a pro-trade benefit, they do not offer the protectionist pay-off that is a feature of many RTAs.

Lodged against the uncertain benefits from regional monetary arrangements is an array of potential political costs. First, there is the implication that exchange rate unions require enhanced labor market flexibility or intra-regional labor mobility. Establishing this risks domestic political opposition if powerful trades unions are to be confronted. Second, as the recent debt crisis in Greece, Portugal and Spain and their impact on the rest of Euroland has shown, exchange rate unions imply a need for fiscal transfers within the union and this may encounter political resistance especially amongst the probable creditor nations. Third, and perhaps most significantly, there is the whole notion of "national sovereignty" over domestic macroeconomic policy culminating, in the context of Euroland, in the abandonment of national currencies. This will carry a particularly high cost for countries that possess a strong feeling of national identity or whose monetary authorities are concerned about forsaking hard-earned credibility. Clearly, from a political perspective it is irrelevant whether there is a real loss of sovereignty or not. It is the perception that counts. In addition to the above, the political benefits from incremental regional integration may be subject to diminishing returns. What is the political value-added from the greater integration that monetary union brings? Against this background it is easy to see why governments may pursue regional trade integration but may pause before they embark on monetary integration.

---

investment flows. Pursuit of trade agreements by such economies is driven by other economic considerations, though security and political reasons also play a significant role (Rajan and Sen, 2002).

[9] It was possibly the attractions of the counter-inflationary effects of an exchange rate union that encouraged the UK to join the Exchange Rate Mechanism of the European Monetary System in the early 1990s.

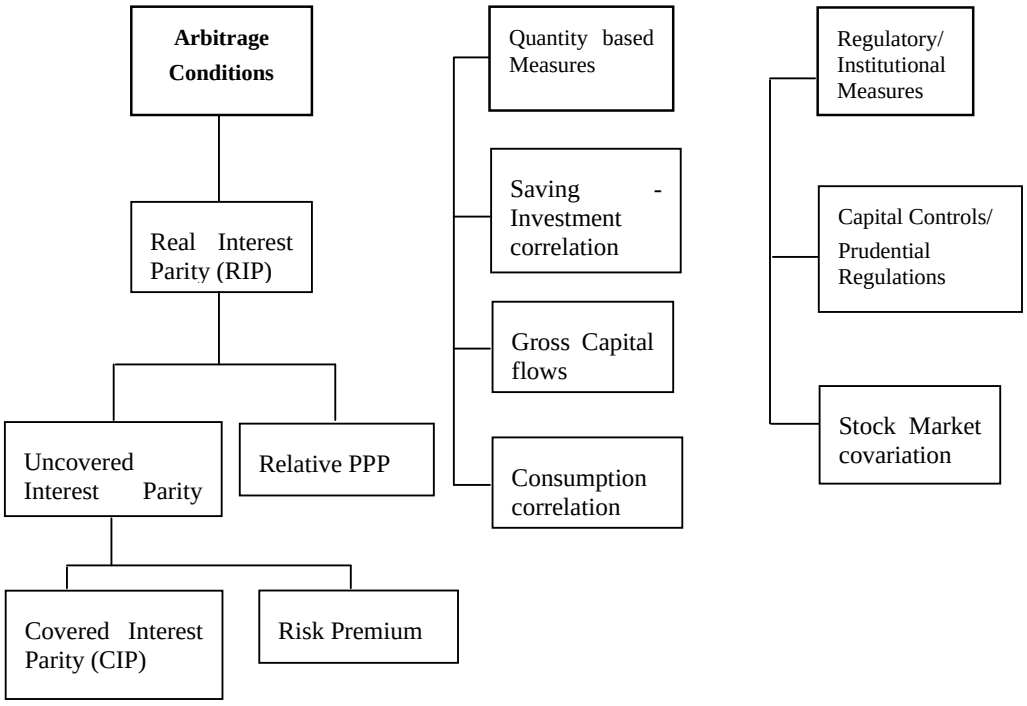
4. Price-based Measures of Financial and Real Integration

While monetary integration may be the final step in regionalism, it is important to explore the nexus between financial and real sector integration. There is an enormous literature on the measurement of financial and real integration and there exist a number of measures of integration (see Figure 1; also see Corbett, 2010). The first category refers to the price-based conditions involving mainly debt flows. These are largely embodied in the interest parity conditions, viz. the covered interest parity (CIP), the uncovered interest parity (UIP), and the real interest parity (RIP). As will be discussed, the CIP is the narrowest of measures (of capital mobility per se), the UIP being a somewhat broader measure (of financial integration), while the RIP is the broadest arbitrage measure (incorporating both financial and real integration). The second category involves quantity-based measures such as savings–investment correlations, consumption correlations, current account dynamics and gross capital flows.[10] The third category can be broadly classified as regulatory or institutional factors (such as capital controls and prudential regulations) as well as non-debt flows such as the co-movement of stock market returns. We limit our focus here to the common price-based measures (see Cavoli and Rajan, 2009, chapter 9 for a discussion of quantity measures). The aim is to formulate some stylized facts about the extent of financial integration amongst East Asian economies.

Price-based measures of financial integration or arbitrage conditions seek to equate rates of returns of comparable assets across different markets/economies. In this section we examine three common interest parity conditions, viz. CIP, UIP and RIP.[11]

[10] Gross capital flows and current account dynamics will not be covered here. See Montiel (1994) and Rajan and Siregar (2002) for the former and Obstfeld (1998) and Taylor (2002) for the latter; also see Lane and Milesi-Feretti (2001). While examination of cross-border capital flows is useful, it is probably of limited use as a measure of financial integration. For instance, a country that is highly integrated with international capital markets – in the sense of there being no significant difference in domestic and international rates of return – will experience little if any international portfolio capital flows (at least debt related flows). An interesting extension to this issue is provided in McCauley et al. (2002) and McCauley (2007), who examine the extent to which Asian bonds issued are bought by Asian counterparties. Morevoer, there is an interesting literature emerging where gravity-type models are being employed for financial flows as a way of measuring the likely direction of capital between countries (see Kim et al., 2006 and Poonpatipul et al., 2006).

Figure 1. Categorizing Measures of Financial Integration: A Simple Framework



Source: Cavoli and Rajan (2009)

[11] Another arbitrage condition is the closed interest parity condition that essentially states that the returns on identical instruments of the same currency but traded in different markets (such as onshore and offshore markets) should be equalized. Any deviation arising from this condition can be interpreted as possible evidence of the existence of capital controls in one of the two countries or the existence of other political or country risks that may prevent interest rate equalization. The measurement of the closed interest differential is difficult for developing economies as it requires that a particular asset is traded sufficiently for there to be a liquid offshore market for it (see Obstfeld, 1998 and Frankel and Okwongu, 1996).

4.1. The Covered Interest Parity (CIP) Condition

The CIP may be formally stated as follows:

$$i_t = i^*_t + f^d_{t,t+n} \quad (1)$$

where: i_t is the domestic interest rate, i^*_t is the foreign or benchmark interest rate (US rate unless otherwise stated) and $f^d_{t,t+n}$ is the forward margin (discount on the domestic currency) for n periods into the future (in logs).[12]

The CIP indicates that the difference between the current spot rate and the forward rate will equal the interest differential between similar assets measured in local currencies. Therefore, in the absence of capital account restrictions and/or transactions costs, the covered interest differential (CID) ought not to differ significantly from 0. A negative differential suggests the existence of capital controls or transactions costs that restrict capital *outflows*. Investors would certainly not tolerate a lower domestic return in the absence of capital controls (Frankel, 1991).

4.2. The Uncovered Interest Parity (UIP) Condition

The UIP may be represented as follows:

$$i_t = i^*_t + \Delta e^e_{t,t+n} \quad (2)$$

where: $\Delta e^e_{t,t+n}$ is the expected change in the log of exchange rate at time $t+n$.

The nexus between the UIP and the CIP is apparent by decomposing eq. (2) as follows:

$$i_t - i^*_t - \Delta e^e_{t,t+n} = [i_t - i^*_t - (f_{t,t+n} - e_t)] + (f_{t,t+n} - e^e t,_{t+n}) \quad (3)$$

where the first bracketed term on the right-hand side is the CIP (sometimes referred to as country or political risk premium), and the second term is the currency risk premium. If the CIP holds but the UIP is rejected, this would imply that forward rates are biased predictors of future exchange rate.

[12] Throughout this paper, the exchange rate is quoted as the domestic price of foreign currency. The forward margin can also be expressed as $(f_{t,t+n}–e_t)$ where $f_{t,t+n}$ is a forward rate and e_t is the spot rate (both in logs).

Before formally testing Equation (2), the researcher needs to find a way of measuring the expectation of the future exchange rate. One way to make the leap from theory to empirical operationalization is by using *ex-post* differentials. This may be justified by assuming that Rational Expectations (RE) holds. This assumption – that the actual or ex-post spot exchange rate equals the expected spot exchange plus an uncorrelated error term – is a practical way of overcoming the problem of non-observable expected exchange rate changes. Another approach is to use surveys of exchange rate expectations of market agents.

4.3. The Real Interest Parity (RIP) Condition

The third arbitrage condition is the RIP. This condition may be derived by first taking the following UIP equation:

$$\Delta e^{e}_{t,t+n} = i_t - i^{*}_{t} \tag{4}$$

and substituting it into an expression for relative purchasing power parity (PPP):

$$e_t = p_t - p^{*}_{t} \text{ or } \Delta e^{e}_{t,t+n} = \pi^{e}_{t,t+n} - \pi^{e*}_{t,t+n} \tag{5}$$

Combining the two with the Fisher equation, $r_t = i_t - \pi^{e}_{t,t+n}$ yields the expression for the RIP:

$$r_t = r^{*}_{t} \tag{6}$$

Clearly, for the RIP to hold the UIP, PPP and the Fisher hypothesis also need to simultaneously hold. This is no easy task given the lack of empirical success of both the UIP and PPP over the short to medium terms. Thus, the RIP is generally considered a very long run interest parity condition encompassing both real and financial linkages.

4.4. Summary of Price-Based Measures

The most popular methodology for determining the extent of financial integration is the uncovered interest parity (UIP), which was emphasized above. Indeed, as Flood and Rose (2002) have noted, “the UIP is a classic topic of international finance, a critical building block of most theoretical models” (p.252). However, it is important to keep a number of caveats in mind when interpreting the findings. First, the test for the UIP is in

fact a joint test for the CIP and the currency risk premium. We are unable to test separately for the CIP given lack of data on forward foreign exchange markets in developing East Asia. Second, the tests for the UIP generally assume that all agents form expectations rationally. Thus, the failure of the UIP to hold (in the sense that there exists large and persistent UIDs), could be because (a) the Covered Interest Parity (CIP) does not hold (imperfect capital mobility); (b) there may be large and time-varying currency risk premiums (imperfect asset substitutability (see Bhatt and Virmani, 2005); or (c) rational expectations (RE) is an inappropriate assumption for the foreign exchange markets (or that the market consists of heterogeneous agents).[13]

While the CIP is a generally preferred measure of financial integration in view of the preceding limitations of operationalizing the UIP (Frankel, 1991), as noted, there needs to be a liquid forward foreign exchange market in the currency pair under investigation. While this is not problematic for industrialized economies, it is definitely a niggling problem for developing economies. In any case, Willett et al. (2002) observe:

> [S]ubstantial deviations from covered interest parity are a good indication that capital mobility is less than perfect. [However] [f]inding that covered interest parity holds is consistent with either high or low capital mobility, and there is no good reason to presume that the magnitudes of deviations from interest parity will provide a reasonable proxy for the degree of international capital mobility. In terms of modern theory, the appropriate measure of capital mobility is the extent to which uncovered rather than covered interest parity holds (pp. 424–5).

With regard to the third price measure of financial integration, the RIP, the conditions for it to hold are quite prohibitive as both the PPP and the UIP need to simultaneously hold. However, the RIP provides a useful general condition encapsulating both trade and financial linkages, and thus should not be dismissed as being altogether irrelevant.

[13] McCallum (1994) also believes that deviations from the UIP may be due to monetary policy decisions of central banks and proposes that a monetary policy reaction function be included in an expression for the UID. Bird and Rajan (2001) offer bank-based explanations for persistent interest rate differentials in East Asia; also see Edwards and Khan (1985) and Willett et al. (2002).

The RIP is more likely to hold over longer time horizons and acts as a useful proxy for the marginal cost of capital.[14]

Whichever price measure of financial integration is used, there are two important considerations with their use. First, arbitrage conditions are probably a more appropriate way of measuring integration for certain sectors (e.g. the banking sector) rather than the whole economy (Chinn and Dooley, 1995). Second, a perennial problem with using such price measures, especially in developing economies, is what interest rate should be used, and to what extent are the available interest rates comparable across countries.

5. Empirical Estimation of Integration in East Asia

5.1. Empirical Strategy

This section will present an investigation of the relationship between real and financial market integration by examining the extent of real versus financial integration and also the dynamics of this nexus. The objective of the exercise is to ascertain whether one might possibly be a precondition to the other. The level of integration will be examined in two dimensions. The first is bilateral integration – how closely integrated each country might be with each other. The second looks at regional integration – that is, how integrated each individual country is to a grouping of other countries. These groupings are discussed further below.

In keeping with the theme developed above, integration will be measured by utilizing the parity conditions – UIP and Relative PPP (RPPP). Both measures lend themselves appropriately as ways to ascertain the degree of integration between countries and they do so in a way that is underpinned by agent behavior in both the real and asset markets. However, since we are measuring integration and not the degree to which UIP and RPPP hold, the absolute value of the uncovered interest differential (UID) and RPPP (or, by construction, the real exchange rate) differential is taken. The UID is our proxy

[14] In fact, the UIP may also be more valid over longer time horizons, i.e. over one year (see Chinn and Meredith, 2004 and Madarassy and Chinn, 2002).

measure for financial market integration and the RPPP deviation represents our measure of real integration. These are given as follows:

$$\textit{Real Integration (RI)} = ABS(\Delta e^{e}_{t,t+n} + \pi^{e*}_{t,t+n} - \pi^{e}_{t,t+n}) \quad (7)$$

$$\textit{Financial market integration (FI)} = ABS(i_t - i^{*}_{t} - \Delta e^{e}_{t,t+n}) \quad (8)$$

where the variables and notation are as described above. The *smaller the value of RI or FI, the greater the possible integration* as a smaller number implies that the asset markets and/or goods markets exhibit greater convergence. Two important caveats should be noted before proceedings.

First, there are, in this literature, many competing methods of calculating financial and real integration (Corbett, 2010). The rationale for selecting the ones described above are manifold:

a) They are simple and easy to comprehend.

b) Data are available for all countries sampled (although the sample sizes do vary).

c) They are underpinned by economic intuition about agent behavior.

The two measures can be summed and, thus are able to be compared directly. This is crucial as we are examining the relationship and the interaction between the two measures.

Second, UIP is regarded in the literature as a flawed measure but its inclusion here as an integration measure is justified on the basis of the arguments presented above, and on the following:

a) The literature rarely uses UIP as an integration measure, instead focusing on whether or not UIP holds. One of the bigger issues with whether UIP holds is usually over the sign of the UID. By taking the absolute value, this issue is mitigated to some extent.

b) Furthermore, excessive exchange rate movements are often the cause of suspicious UIDs. In this sample, the exchange rate movements are relatively small as most countries employ some degree of exchange rate fixity for local currencies.

c) In any event, some basic robustness testing was conducted comparing the absolute values of UID used in this study against some common price-based measures as calculated by the Asian Development Bank (ADB). It is found that other measures are not on the same scale as our FIs – making direct comparison with RI impossible. It is also found that, while there is some variation (this is expected as each measure will pick up on slightly different integration characteristics), there is some consistency between measures. In other words, those countries highly integrated tend in one measure tend also to be highly integrated in others (see Annex for more details).

5.2. Data and Sources

Monthly observations for the period 1990m1–2009m7 are used. All data are taken from the International Financial Statistics (IFS) CD database (August 2009) of the International Monetary Fund (IMF). Exchange rate data are taken from line RF and the cross-rates were calculated from each local currency per US dollar. The exchange rates are reported in natural logs and, as such, $\Delta e^{e}_{t,t+n}$ is calculated as (100*), the log monthly difference of the exchange rate. The interest rate data used are taken from line 60B, money market rates. These are based on interbank rates and contain sufficient volatility to form the basis of the empirical testing undertaken below. Interest rates are all divided by 12 to reflect a monthly return. Inflation data are taken from CPI series, line 64, and are calculated as the monthly change in CPI, [log CPI(t) – logCPI(t–1)]*100. Each measure, therefore, is a percentage absolute deviation from either relative PPP or UIP.

Each measure of financial and real integration is calculated for each country pair. Furthermore, each measure is calculated for each country against a regional grouping. The groupings (along with associated country acronyms) are as follows: ASEAN 1 = [Indonesia (ID), Malaysia (MA), Philippines (PH), Singapore (SG), Thailand (TH)]'. ASEAN2 = [Brunei (BR), Cambodia (CA), Laos (LA), Myanmar (MY), Vietnam (VT)]. ASEAN = ASEAN1 + ASEAN2. BIG3 = [China (CH), Japan (JP), Korea (KR)]. For example, we can measure Indonesia's integration (real and financial) with, say, Malaysia by observing the FI and RI between the two countries. We can also measure Indonesia's integration with the BIG3 by calculating her UID and RPPP Deviations

with China, with Japan and with Korea. For these calculations, we simply added each bilateral measure, so Indonesia's level of financial integration with the BIG equals the FI between Indonesia and China + FI between Indonesia and Japan + FI between Indonesia and Korea. To derive the level of integration between a particular country and the region of which it is a member, the country is left out of the member's group.

5.3. Results and Discussion

This section is divided broadly into two parts. The first examines the extent of (or level of) integration by calculating the mean RI and FI for the full sample, a pre-Asia crisis sample, and post-crisis sample. The second part utilizes the time series variation in the sample by examining the interaction between RI and FI. In this part, we investigate whether integration follows a sequence; is there sufficient evidence to suggest that real integration leads or lags financial market integration?

Table 1A presents bilateral RI for the full sample. Table 1B presents that same measure for a pre-Asia-crisis sample (1990m1–1997m5) while Table 1C presents bilateral RI for a post-crisis sample (2000m1–2009m7). Table 2A presents bilateral FI for the full sample. Table 2B(2C) present the corresponding results for the pre-(post)-crisis sample. The most obvious observation when one eyeballs all three figures is that there is not much difference between the pre and post values of integration. Furthermore, there do not seem to be overwhelming differences between RI and FI over each sample period. Some patterns do emerge: Singapore and Malaysia appear to be the countries most

Table 1A. Bilateral Real Integration, Full Sample

	BR	CA	CH	ID	IN	JP	KR	LA	MA	MY	PH	SG	TH	VT
BR	-													
CA	0.003	-												
CH	0.268	0.667	-											
ID	0.431	0.176	1.072	-										
IN	0.052	0.039	0.718	0.021	-									
JP	0.246	0.201	0.062	0.095	0.073	-								
KR	0.112	0.195	0.581	0.037	0.059	0.132	-							
LA	0.105	0.015	1.455	0.246	0.158	0.283	0.213	-						
MA	0.174	0.176	0.385	0.008	0.013	0.086	0.031	0.269	-					
MY	1.760	1.572	0.195	1.819	1.761	1.647	1.846	1.550	1.760	-				
PH	0.119	0.087	0.581	0.118	0.096	0.022	0.155	0.143	0.109	1.669	-			
SG	0.007	0.109	0.162	0.119	0.098	0.024	0.157	0.114	0.111	1.644	0.001	-		
TH	0.189	0.126	0.393	0.056	0.035	0.038	0.177	0.186	0.046	1.737	0.061	0.063	-	
VT	0.158	0.076	0.627	0.295	0.017	0.217	0.324	0.012	0.251	1.502	0.178	0.180	0.193	-

Table 1B. Bilateral Real Integration, Pre-crisis Sample

	BR	CA	CH	ID	IN	JP	KR	LA	MA	MY	PH	SG	TH	VT
BR	0													
CA	0.037	0												
CH	0.279	0.117	0											
ID	0.184	0.071	0.558	0										
IN	0.384	0.106	1.09	0.382	0									
JP	0.338	0.874	0.026	0.015	0.398	0								
KR	0.317	0.287	0.551	0.138	0.244	0.153	0							
LA	0.035	0.086	0.713	0.449	0.678	0.568	0.553	0						
MA	0.168	0.019	0.163	0.053	0.436	0.038	0.192	0.459	0					
MY	1.323	1.08	0.178	1.569	1.951	1.554	1.707	1.092	1.515	0				
PH	0.018	0.185	0.427	0.224	0.606	0.208	0.362	0.181	0.17	1.345	0			
SG	0.082	0.106	0.061	0.168	0.551	0.153	0.306	0.207	0.114	1.4	0.055	0		
TH	0.111	0.021	0.255	0.067	0.451	0.052	0.206	0.343	0.014	1.501	0.156	0.1	0	
VT	0.031	0.046	1.151	0.073	0.668	0.849	0.347	0.267	0.025	0.98	0.057	0.136	0.042	0

Table 1C. Bilateral Real Integration, Post-crisis Sample

	BR	CA	CH	ID	IN	JP	KR	LA	MA	MY	PH	SG	TH	VT
BR	0													
CA	0.092	0												
CH	0.132	0.417	0											
ID	0.332	0.007	0.798	0										
IN	0.246	0.041	0.455	0.034	0									
JP	0.236	0.321	0.251	0.313	0.279	0								
KR	0.366	0.0215	0.558	0.207	0.174	0.105	0							
LA	0.285	0.179	0.462	0.139	0.221	0.675	0.263	0						
MA	0.124	0.11	0.304	0.107	0.074	0.205	0.069	0.271	0					
MY	1.685	1.382	0.275	1.504	1.464	1.677	1.699	1.278	1.512	0				
PH	0.014	0.091	0.485	0.084	0.05	0.229	0.123	0.287	0.023	1.515	0			
SG	0.035	0.131	0.255	0.123	0.089	0.189	0.084	0.305	0.015	1.524	0.039	0		
TH	0.029	0.062	0.272	0.054	0.02	0.258	0.118	0.223	0.049	1.512	0.029	0.069	0	
VT	0.131	0.074	0.513	0.126	0.088	0.317	0.345	0.198	0.171	1.345	0.135	0.177	0.122	0

Table 2A. Bilateral Financial Integration, Full Sample

	BR	CA	CH	ID	IN	JP	KR	LA	MA	MY	PH	SG	TH	VT
BR	-													
CA	0.149	-												
CH	0.299	0.415	-											
ID	0.108	0.258	0.142	-										
IN	0.524	0.493	0.054	0.691	-									
JP	0.072	0.079	0.008	0.165	0.054	-								
KR	0.111	0.176	0.151	0.020	0.088	0.158	-							
LA	1.326	0.675	0.730	0.483	0.474	0.832	0.507	-						
MA	0.084	0.039	0.035	0.166	0.066	0.055	0.154	0.660	-					
MY	0.699	0.779	0.592	0.472	0.609	0.598	0.494	0.075	0.630	-				
PH	0.599	0.345	0.271	0.125	0.392	0.291	0.146	0.307	0.314	0.314	-			
SG	0.086	0.084	0.027	0.120	0.138	0.044	0.113	0.675	0.065	0.565	0.246	-		
TH	0.196	0.319	0.068	0.081	0.150	0.083	0.075	0.568	0.106	0.522	0.206	0.038	-	
VT	0.131	0.079	0.091	0.082	0.066	0.302	0.267	0.398	0.271	0.503	-	0.244	0.231	-

Table 2B. Bilateral Financial Integration, Pre-crisis Sample

	BR	CA	CH	ID	IN	JP	KR	LA	MA	MY	PH	SG	TH	VT
BR	0													
CA	0	0												
CH	0	0.42	0											
ID	0	0.217	0.609	0										
IN	0	0.039	0.124	0.473	0									
JP	0	0.687	0.541	0.124	0.349	0								
KR	0	0.267	0.758	0.134	0.608	0.258	0							
LA	0	1.262	1.808	1.229	1.402	1.43	1.018	0						
MA	0	0.093	0.54	0.073	0.399	0.051	0.208	1.187	0					
MY	0	0.339	0.77	0.145	0.618	0.269	0.011	0.977	0.218	0				
PH	0	0.57	0.919	0.298	0.771	0.422	0.163	0.639	0.372	0.153	0			
SG	0	0.045	0.525	0.072	0.4	0.051	0.207	1.307	0.001	0.217	0.71	0		
TH	0	0.503	0.691	0.085	0.558	0.209	0.049	1.205	0.016	0.059	0.213	0.157	0	
VT	0	0.335	0.244	0.256	0.294	1.449	0.727	1.031	0.318	0.318	0.048	0.81	0.341	0

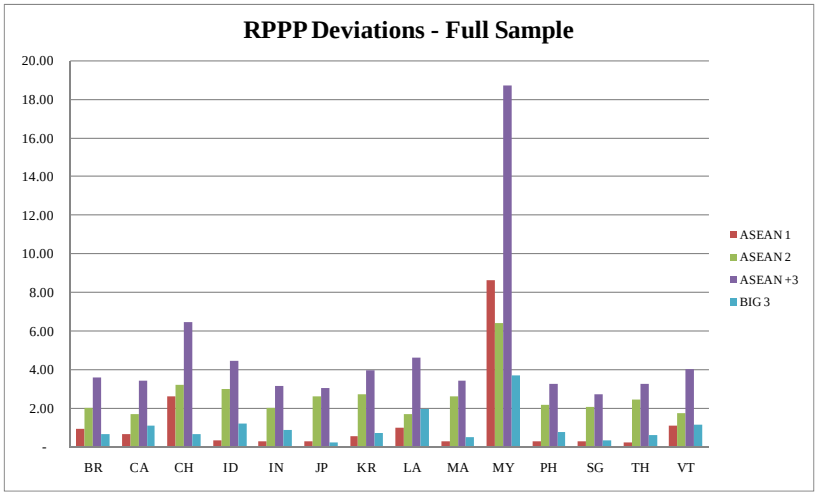
Table 2C. Bilateral Financial Integration, Post-crisis Sample

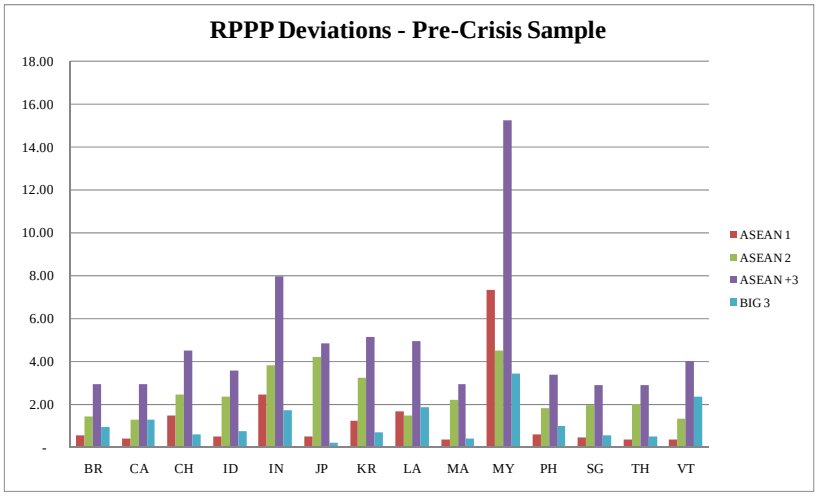
	BR	CA	CH	ID	IN	JP	KR	LA	MA	MY	PH	SG	TH	VT
BR	0													
CA	0.149	0												
CH	0.299	0.279	0											
ID	0.108	0.233	0.046	0										
IN	0.524	0.535	0.152	0.603	0									
JP	0.073	0.092	0.347	0.326	0.321	0								
KR	0.111	0.044	0.181	0.188	1.325	0.166	0							
LA	1.326	1.545	1.247	1.159	0.555	1.703	1.238	0						
MA	0.084	0.147	0.136	0.06	0.458	0.155	0.114	1.3	0					
MY	0.699	0.766	0.484	0.603	0.326	0.848	0.795	0.678	0.647	0				
PH	0.599	0.319	0.04	0.086	0.071	0.412	0.275	1.149	0.193	0.448	0			
SG	0.086	0.092	0.162	0.14	0.373	0.185	0.018	1.333	0.039	0.685	0.227	0		
TH	0.196	0.144	0.163	0.138	0.189	0.184	0.018	1.387	0.035	0.676	0.224	0.001	0	
VT	0.131	0.007	0.117	0.011	0.283	0.204	0.222	1.401	0.015	0.593	0.163	0.082	0.091	0

integrated with the others. In fact, the ASEAN 1 countries seem to return some very low numbers. The ASEAN2 countries appear to be least integrated with other countries.

Figure 2A to 2C presents the extent of bilateral RI for each country to the groupings defined above for the full sample, pre- and post-crisis samples respectively. The level of integration in the post crisis sample appears to be marginally less (larger RI and FI) than the pre crisis sample. The level of integration of Myanmar is lower than the others – as seen in Table 1. The RI to the ASEAN2 nations is lower (higher RI) than for other groupings.

Figure 2A to 2C RPPP Deviations





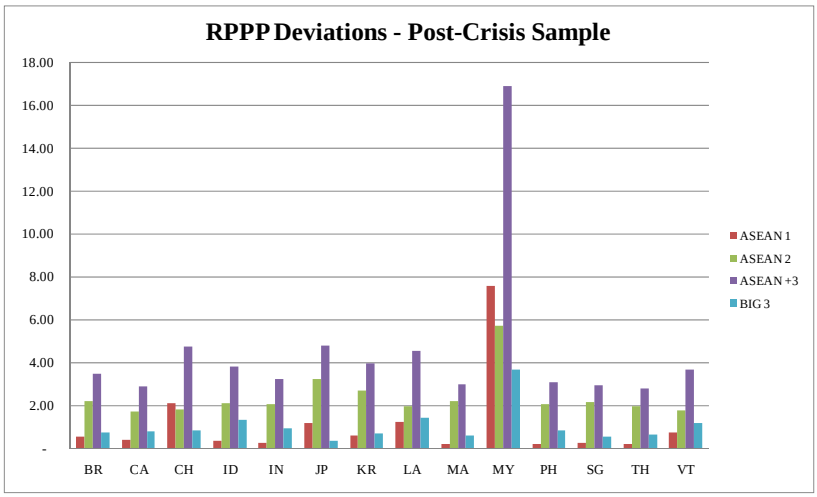
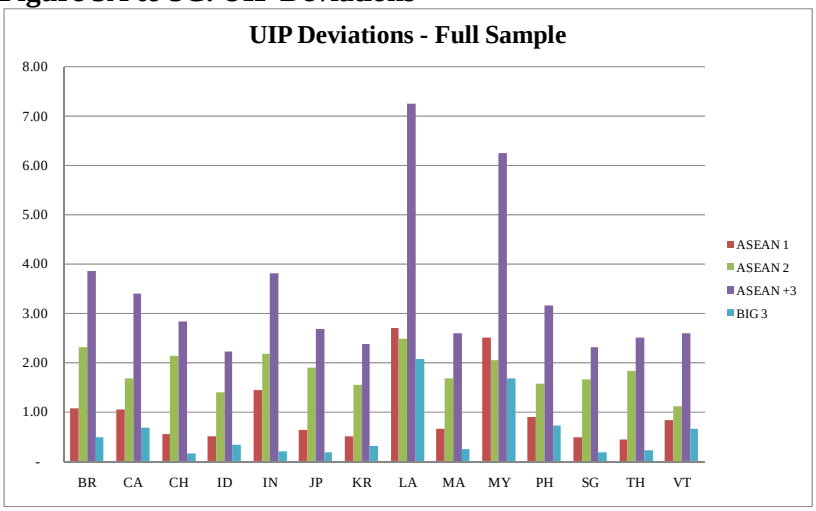
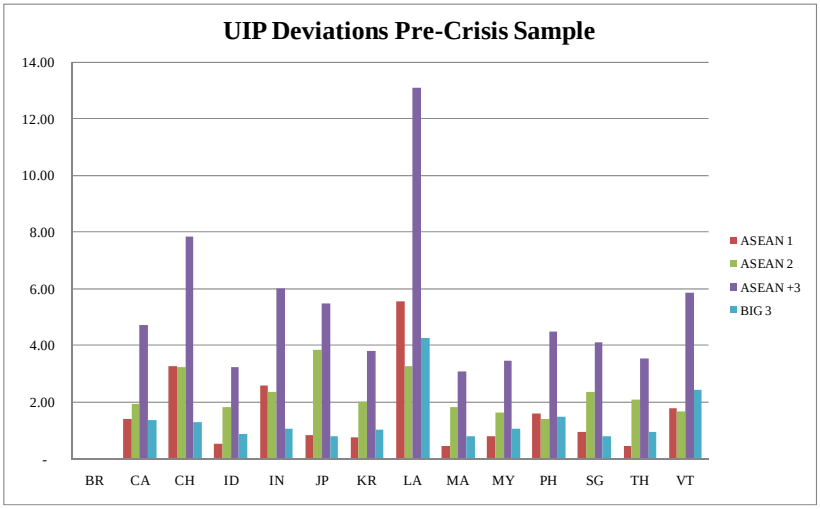


Figure 3A to 3C presents the extent of bilateral FI for each country to the groupings defined above for the full sample, pre- and post-crisis samples respectively. As with the results for RI, the differences appear minimal and the level of integration to ASEAN2 is lower than for the others.

Figure 3A to 3C. UIP Deviations





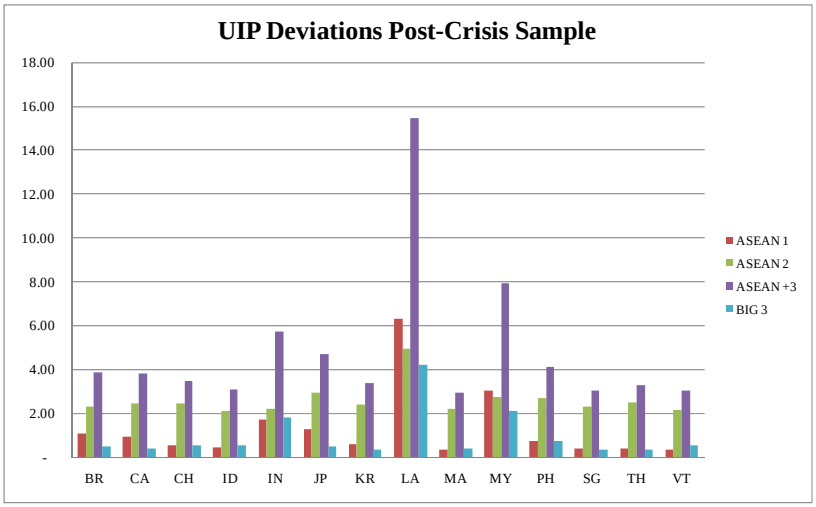
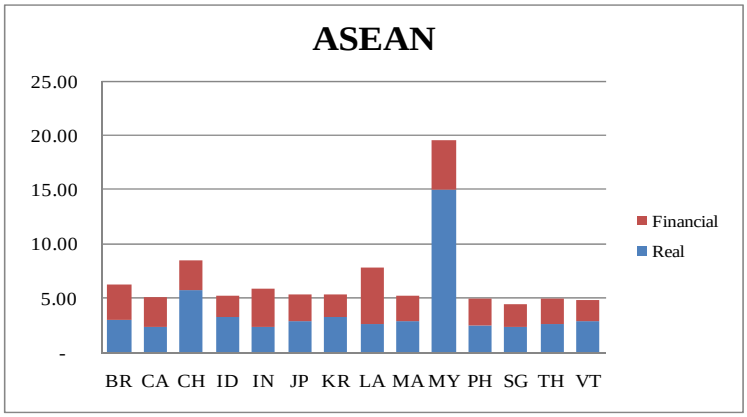
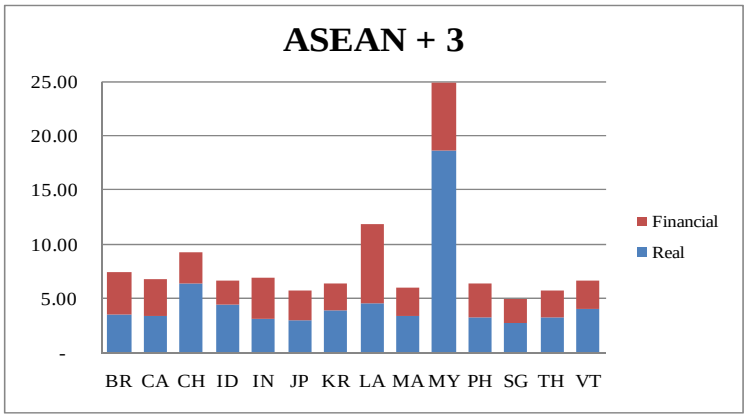


Figure 4A to 4C shows the relationship between RI and FI by presenting both together (summed) as a measure of "economic" integration. This is done for each country as measured against ASEAN, ASEAN+3 and BIG3 for the full, pre- and post-crisis sample respectively. It appears there is a lower degree of financial integration (larger FI value) post-crisis against ASEAN+3 than when compared to the pre-crisis – but the effect is quite marginal. The opposite appears to occur when the level of integration against ASEAN is observed, but it is again worth noting that the effect is slight. The extent of integration to the Big 3 countries is identifiably high.

Figure 4A. Real + Financial Integration, Full Sample





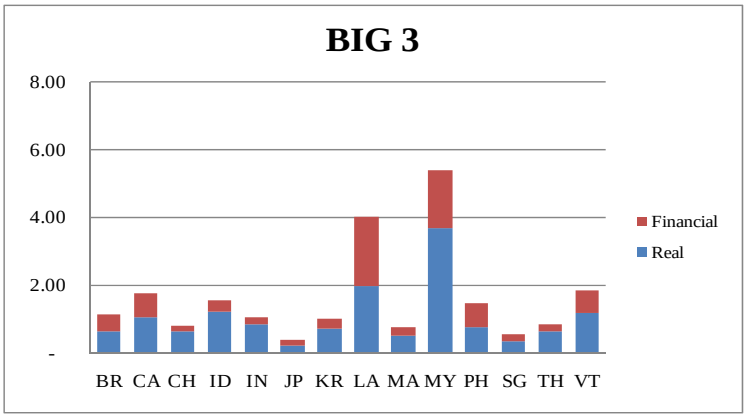


Figure 4B. Real + Financial Integration, Pre-Crisis

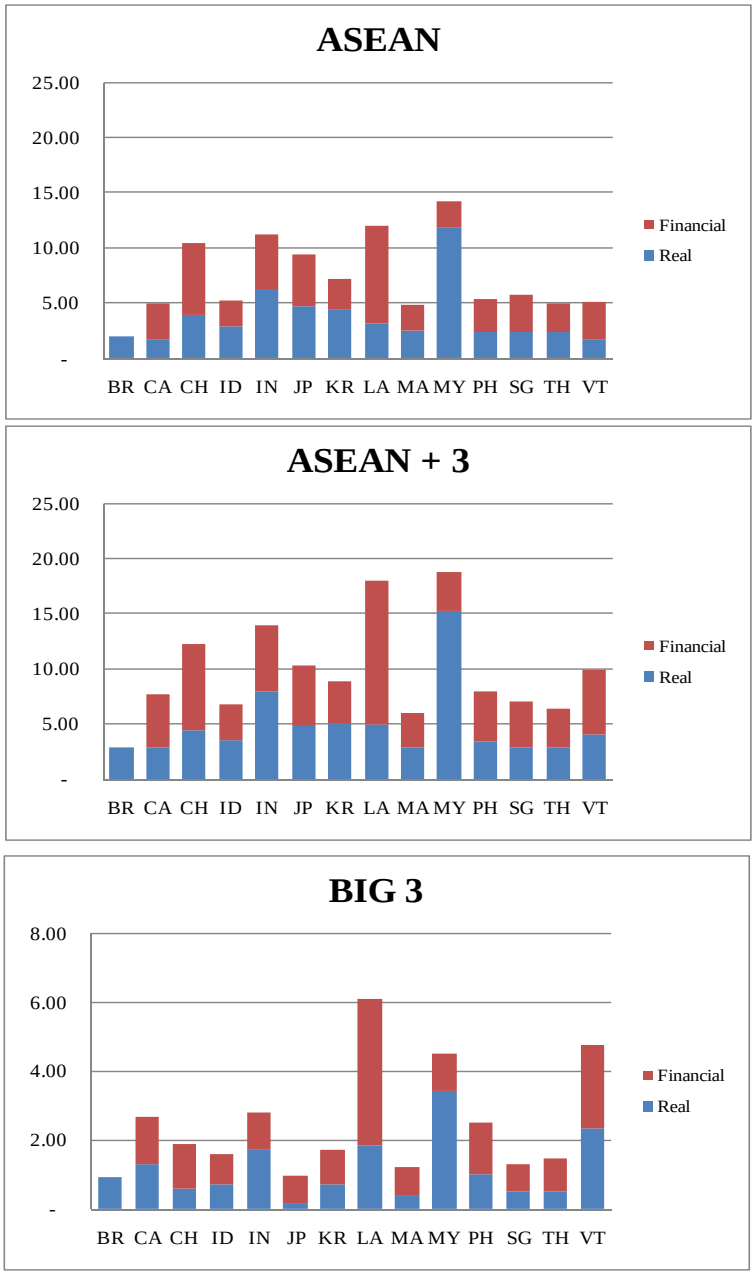


Figure 4C. Real + Financial Integration, Post-Crisis

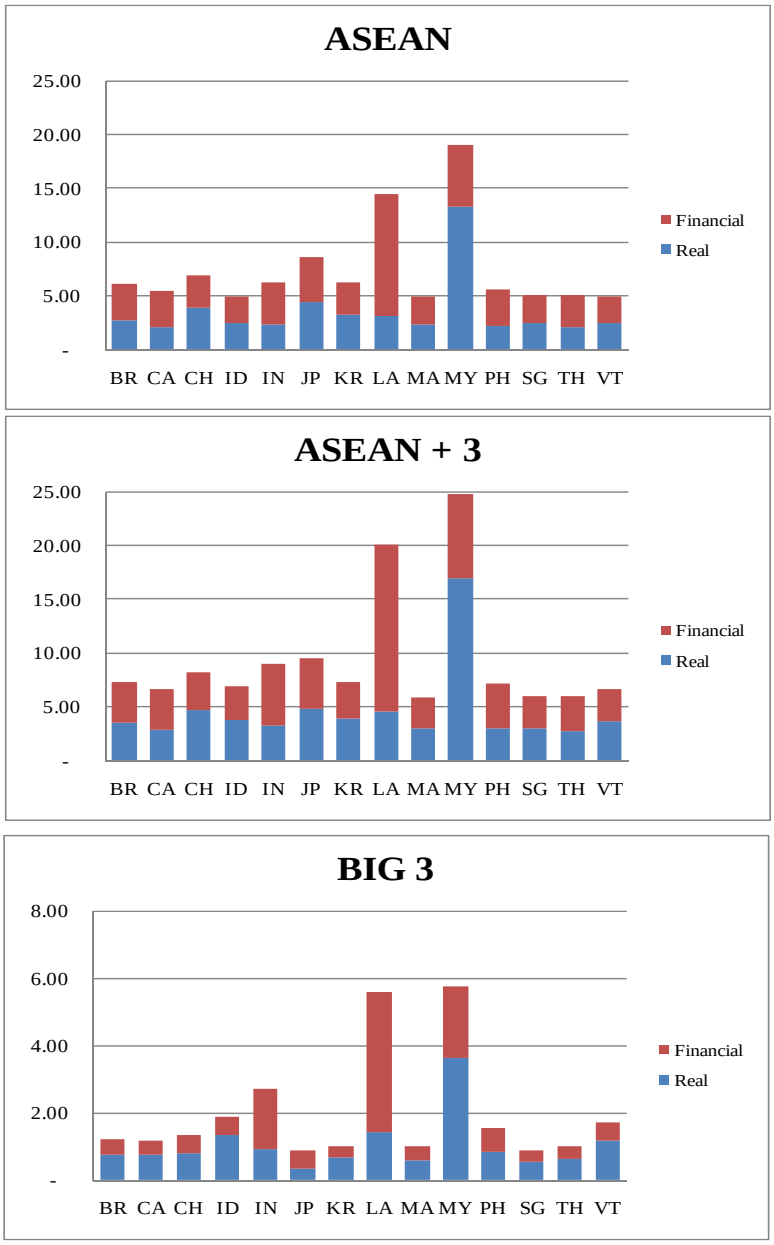
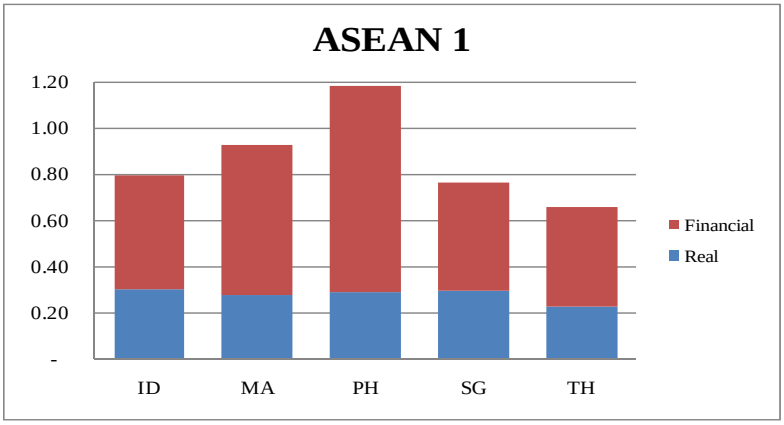
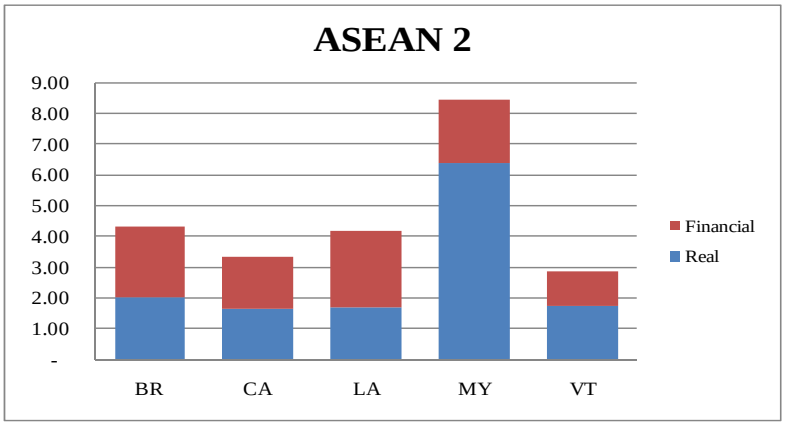


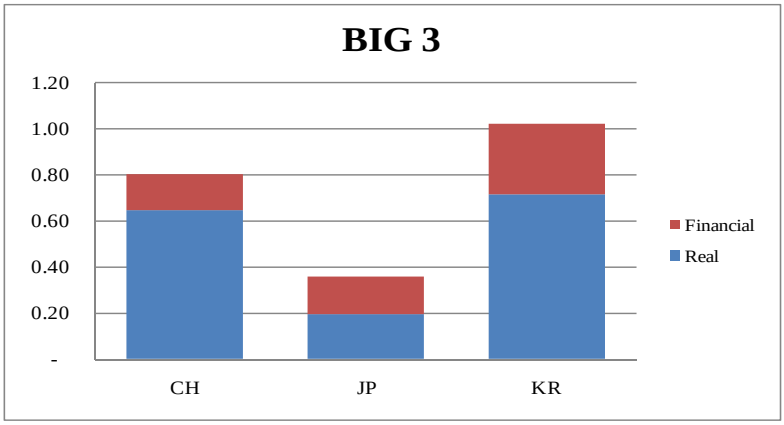
Figure 5 shows the extent of economic (RI+FI) for each member of ASEAN1, ASEAN2 and BIG3 with its own group. It is quite clear here that real integration is greater than financial integration for the post-crisis period when one examines the results for

ASEAN1 and BIG3. The results are less clear-cut for ASEAN2, although the overall level of integration appears lower.[15]

Figure 5A. Real + Financial Integration within Group, Full Sample

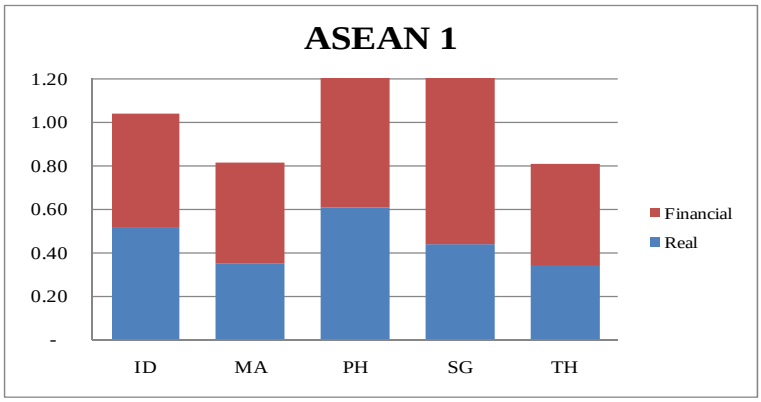


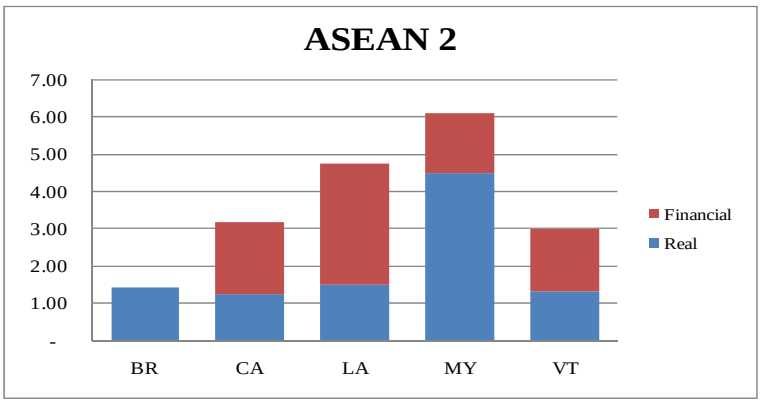




[15] We cannot compare the results for Brunei as data is unavailable for this sample period.

Figure 5B. Real + Financial Integration within Group, Pre-crisis Sample





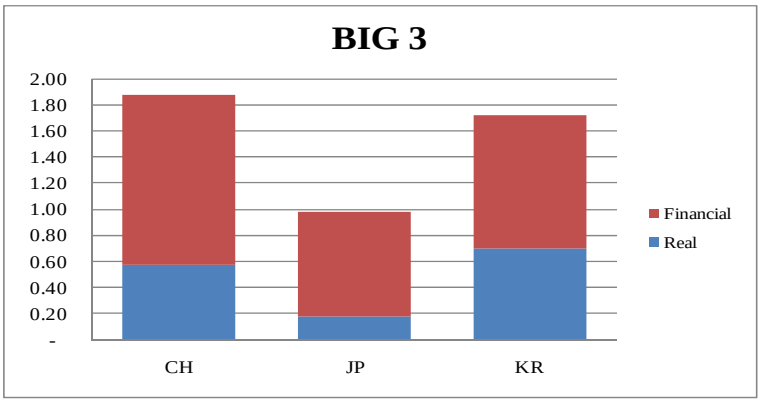


Figure 5C. Real + Financial Integration within Group, Post-crisis Sample

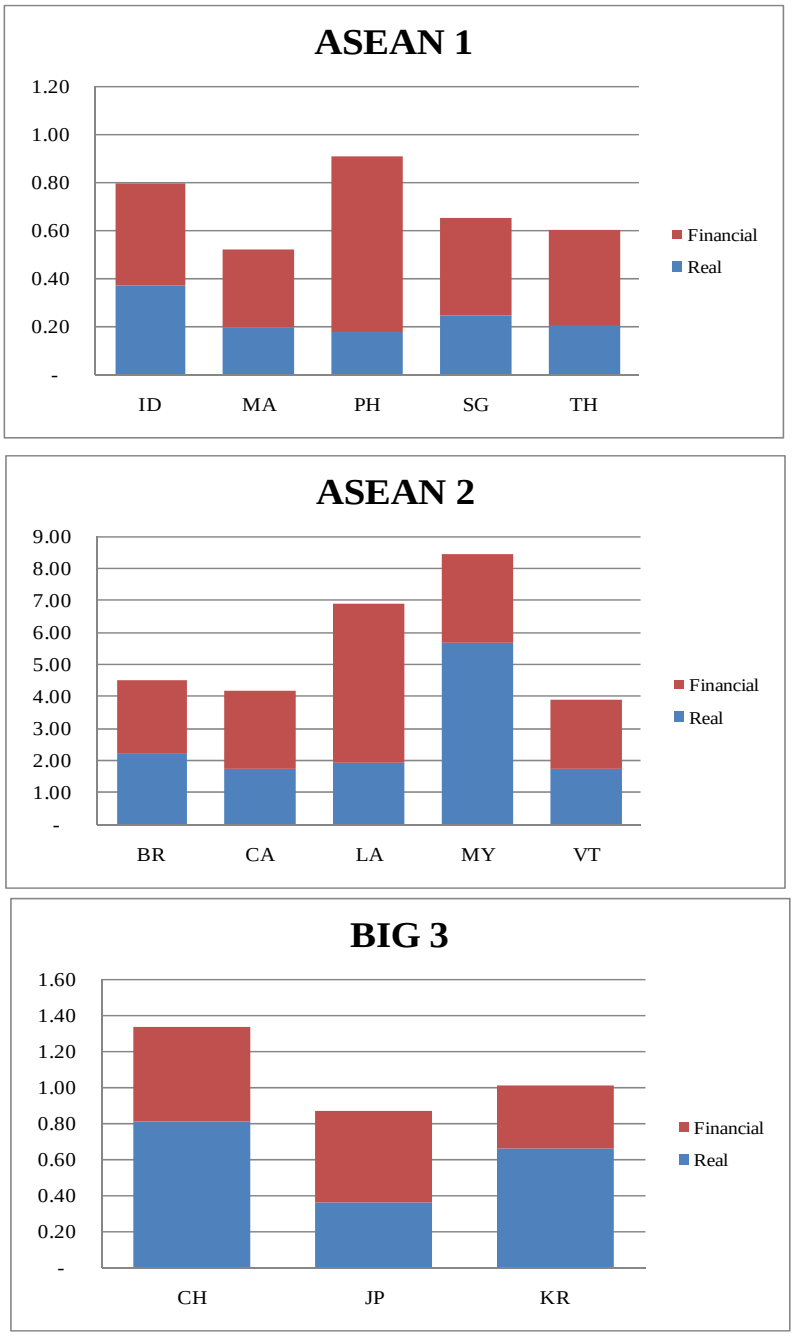


Table 3 introduces some results of the time-series properties of RI and FI by presenting some Granger Causality (GC) results. The results are presented for each country and assess the extent to which the variables interact when compared to their own group, to ASEAN and to the BIG3. A third variable, the absolute value of the (log) difference of

each exchange rate (calculated bilaterally and then added to other bilateral pairs to form the value for each grouping) is included. The intuition for this is to assess whether the possibility of sustained integration may lead to systematically lower exchange rate volatility – thus opening up the possibility of fixed exchange rate zones under OCA criteria. In other words, what can the data tell us about the possibility of an OCA and does it comply with the regional groupings?

Table 3 presents the GC results for a reduced form VAR specification for the full sample with three monthly lags. The choice of three lags is mainly because this specification returned more favorable Shwartz Bayesian Criteria (SBC) results than for other lag lengths and that a parsimonious model specification is preferred given the different sample sizes of the various groupings. It is for data considerations also that the sample is not split between pre- and post-crisis periods as some countries (mainly the ASEAN2 countries) did not present sufficient data for statistical inference.

Table 3. Granger Causality Results, 3-Lag Model

Country	Integration	Causalities. X -> Y = Ho: X Granger Causes Y. (In Probabilities)					
		Real -> ER	Fin -> ER	ER -> Real	Fin -> Real	ER -> Fin	Real -> Fin
BR	ASEAN 2	0.00	0.01	0.68	0.15	0.08	0.62
	ASEAN	0.01	0.04	0.83	0.24	0.26	0.52
	BIG 3	0.42	0.00	0.04	0.00	0.24	0.85
CA	ASEAN 2	0.96	0.57	0.44	0.52	0.36	0.41
	ASEAN	0.83	0.39	0.47	0.33	0.40	0.05
	BIG 3	0.09	0.00	0.05	0.00	0.32	0.60
LA	ASEAN 2	0.94	0.67	0.69	0.11	0.95	0.94
	ASEAN	0.09	0.77	0.98	0.10	0.41	0.79
	BIG 3	0.83	0.00	0.01	0.00	0.84	0.20
MY	ASEAN 2	0.60	0.00	0.53	0.12	0.76	0.73
	ASEAN	0.17	0.00	0.25	0.02	0.77	0.83
	BIG 3	0.20	0.00	0.39	0.00	0.02	0.01
VT	ASEAN 2	0.99	0.08	0.60	0.35	0.17	0.19
	ASEAN	0.94	0.00	0.80	0.01	0.24	0.60
	BIG 3	0.55	0.00	0.60	0.00	0.39	0.35

Country	Integration	Causalities. X -> Y = Ho: X Granger Causes Y. (In Probabilities)					
		Real -> ER	Fin -> ER	ER -> Real	Fin -> Real	ER -> Fin	Real -> Fin
ID	ASEAN 1	0.24	0.00	0.00	0.00	0.00	0.93
	ASEAN	0.20	0.00	0.05	0.02	0.31	0.56
	BIG 3	0.39	0.00	0.09	0.00	0.00	0.02
MA	ASEAN 1	0.00	0.00	0.00	0.00	0.00	0.40
	ASEAN	0.50	0.00	0.02	0.00	0.77	0.89
	BIG 3	0.17	0.00	0.75	0.00	0.27	0.50
PH	ASEAN 1	0.22	0.00	0.11	0.00	0.01	0.68
	ASEAN	0.06	0.00	0.33	0.00	0.86	0.97
	BIG 3	0.40	0.00	0.02	0.00	0.01	0.46
SG	ASEAN 1	0.32	0.00	0.00	0.00	0.00	0.40
	ASEAN	0.07	0.15	0.35	0.02	0.18	0.03
	BIG 3	0.01	0.00	0.84	0.00	0.15	0.27
TH	ASEAN 1	0.38	0.00	0.05	0.00	0.61	0.86
	ASEAN	0.44	0.00	0.17	0.00	0.97	0.99
	BIG 3	0.44	0.00	0.20	0.00	0.02	0.41

Country	Integration	Causalities. X -> Y = Ho: X Granger Causes Y. (In Probabilities)					
		Real -> ER	Fin -> ER	ER -> Real	Fin -> Real	ER -> Fin	Real -> Fin
CH	BIG 3	0.00	0.00	0.06	0.00	0.06	0.14
	ASEAN	0.64	0.01	0.14	0.00	0.53	0.82
JP	BIG 3	0.14	0.00	0.34	0.00	0.06	0.72
	ASEAN	0.00	0.00	0.33	0.00	0.39	0.26
KR	BIG 3	0.44	0.00	0.38	0.00	0.64	0.93
	ASEAN	0.28	0.00	0.85	0.01	0.07	0.18

As with the results above pertaining to the extent of financial integration, the ASEAN1 and BIG3 countries exhibit a greater propensity for integration than ASEAN2. Examining the issue of sequence, we see that, for the most part, FI Granger Causes RI much more than RI Granger Causes FI. Can we conclude categorically that FI leads RI? A nuanced response is necessary. While not in complete accordance with the recent literature on this issue (much of which is dedicated to the sequencing of real versus *monetary* integration – which is a slightly different question, and one we address with the inclusion of the exchange rate series), it is not an entirely unreasonable conclusion – it may be due to trade links being made closer due to trade financing arrangements (see Amity and Weinstein, 2009), or to the political effect of further trade facilitation. A further conclusion that may cast some doubt over the results might be that the story being told may not be one of *sequencing* but one of *timing*. Asset markets tend to adjust

more quickly than goods markets. As such, the GC results may simply be a reflection of the difference in the timing of the adjustment.[16]

Does integration have some effect on exchange rates? The answer suggests that this is possible. It is known that exchange rates in the region are subject to some management and that most appear to be exhibiting greater fixity after the crisis than during (Cavoli and Rajan, 2009). It would appear as if FI is doing much of the driving here but since these results do not hint at direction, and due to the issue of timing versus sequence, these conclusions are conjecture at best.

To augment the results from the GC tests in Table 3, we estimated a number of fixed effects autoregressive distributed lag specifications. The rationale behind this specification is that we can extend the GC analysis by incorporating the effect of contemporaneous variables by examining the direction (and not just statistical significance) of the relationships and also by controlling for fixed effects. Depending upon the fixed effects that are being controlled for, there is a possibility of being able to pick up such factors as trade agreements, investment agreements, any regional political instruments, any possible implicit exchange rate phenomena such as a basket, and possibly differences in institutions between country pairs and groups. We estimate four fixed effects models. The first controls for bilateral fixed effects; that is, the RI, FI and exchange rate measures used are bilateral. The second examines each country's integration with ASEAN and therefore controls for fixed effects specific to ASEAN. The third examines ASEAN1 and the fourth, BIG3.[17] The results are presented in Table 4. The results at first appear to confirm the GC tests above in that the model for FI is not as good in terms of its R-sqd than those for RI. But there does seem to be more support in these models for the level of FI being caused by RI. This seems to be more prominent when observing the bilateral model and the model for ASEAN1. The effect of one-

[16] To assess whether this result is due to a causality brought about by sequence, or one induced by the possibility that asset markets adjust more quickly than real ones, the test is repeated with a longer lag length to allow for the opportunity for RI to influence FI over an increased time horizon. These tests do not show materially different results than those shown in Table 3. A caveat to this analysis is that not all countries were tested at 12 lags owing to the data availability issues presented in the text.

[17] Fixed effects themselves are not reported but are available on request.

lagged FI on RI in the bilateral model looks strange and is anomalous when compared to the same coefficient in the other models.[18]

If we turn our attention once again to the effect that integration might have on exchange rates, we see that the effect is similar to that seen in the GC tests. However, the effects are not as pronounced. In the bilateral case, it is RI that appears to effect exchange changes but the magnitude of the effect is small and the signs are mixed. As such, it is very difficult to draw solid conclusions in this instance.

Table 4A. Fixed Effects Estimation

	Bilateral			**ASEAN**		
Dep Var:	**RI**	**FI**	**ER**	**RI**	**FI**	**ER**
Const	–0.02 (0.12)	–0.02 (0.57)	2.17 (0.00)	3.40 (0.05)	12.88 (0.00)	0.29 (0.61)
RI	–	0.05 (0.04)	0.21 (0.36)	–	–0.01 (0.88)	0.01 (0.81)
FI	0.01 (0.04)	–	–0.15 (0.07)	–0.01 (0.88)	–	–0.01 (0.59)
ABS(d(er))	0.00 (0.35)	–0.001 (0.07)	–	0.05 (0.81)	–0.11 (0.59)	–
RI(-1)	0.35 (0.00)	0.20 (0.00)	0.58 (0.02)	–0.00 (0.99)	–0.03 (0.68)	–0.04 (0.09)
FI(-1)	–0.95 (0.00)	0.29 (0.00)	–1.35 (0.00)	0.93 (0.00)	0.37 (0.07)	0.86 (0.00)
ABS(d(er))(-1)	–0.001 (0.001)	–0.00 (0.79)	0.26 (0.00)	–0.07 (0.75)	0.37 (0.09)	0.26 (0.00)
RI(-2)	0.14 (0.00)	0.05 (0.03)	–1.11 (0.00)	–0.11 (0.10)	0.19 (0.003)	0.01 (0.56)
FI(-2)	0.38 (0.00)	0.16 (0.00)	0.39 (0.12)	0.02 (0.92)	–0.53 (0.01)	–0.11 (0.09)
ABS(d(er))(-2)	0.001 (0.001)	0.003 (0.001)	0.25 (0.00)	0.28 (0.19)	–0.03 (0.89)	–0.04 (0.55)
RI(-3)	0.01 (0.01)	0.02 (0.01)	0.63 (0.00)	–0.20 (0.05)	0.09 (0.36)	–0.001 (0.97)
FI(-3)	0.17 (0.00)	–0.04 (0.14)	–0.27 (0.25)	0.03 (0.87)	–0.28 (0.18)	–0.06 (0.36)
ABS(d(er))(-3)	–0.00 (0.16)	0.004 (0.00)	0.18 (0.00)	–0.03 (0.80)	–0.30 (0.01)	0.01 (0.72)
Adj R-sq	0.88	0.09	0.44	0.48	0.25	0.89
DW	2.00	2.01	2.08	2.06	1.84	1.98
x-sec/Obs	78/13157	78/13157	78/13157	13/234	13/234	13/234

[18] These models use an unbalanced panel. By balancing the panel in this case, the coefficient becomes more negative. This suggests that the effect is probably driven by one (or more) of the ASEAN2 countries where there is less data.

Table 4B. Fixed Effects Estimation

	ASEAN1			BIG3		
Dep Var:	**RI**	**FI**	**ER**	**RI**	**FI**	**ER**
Const	0.85 (0.00)	2.07 (0.00)	0.45 (0.04)	0.67 (0.00)	1.72 (0.00)	–0.27 (0.00)
RI	–	0.26 (0.00)	0.04 ().26)	–	0.15 (0.04)	0.49 (0.00)
FI	0.04 (0.00)	–	–0.01 (0.39)	0.01 (0.04)	–	–0.01 (0.22)
ABS(d(er))	0.01 (0.26)	–0.02 (0.39)	–	0.58 (0.00)	–0.10 (0.22)	–
RI(-1)	0.24 (0.00)	–0.13 (0.01)	–0.01 (0.75)	0.14 (0.00)	0.28 (0.00)	–0.04 (0.04)
FI(-1)	0.88 (0.00)	0.19 (0.00)	0.90 (0.00)	0.32 (0.00)	0.28 (0.00)	0.52 (0.00)
ABS(d(er))(-1)	0.01 (0.48)	0.03 (0.30)	0.25 (0.00)	0.01 (0.54)	–0.18 (0.03)	0.12 (0.00)
RI(-2)	–0.02 (0.24)	0.18 (0.00)	–0.04 (0.26)	–0.01 (0.38)	–0.02 (0.79)	–0.04 (0.04)
FI(-2)	–0.20 (0.00)	0.13 (0.02)	–0.25 (0.00)	–0.11 (0.00)	–0.06 (0.39)	–0.09 (0.00)
ABS(d(er))(-2)	–0.004 (0.72)	0.06 (0.02)	0.54 (0.00)	–0.04 (0.08)	0.55 (0.00)	0.17 (0.00)
RI(-3)	0.02 (0.12)	0.17 (0.00)	0.07 (0.00)	0.05 (0.01)	0.23 (0.001)	–0.06 (0.03)
FI(-3)	0.002 (0.91)	–0.09 (0.07)	–0.45 (0.00)	0.05 (0.02)	–0.38 (0.00)	–0.10 (0.00)
ABS(d(er))(-3)	–0.01 (0.29)	–0.02 (0.36)	–0.09 (0.00)	–0.04 (0.01)	–0.10 (0.14)	0.03 (0.03)
Adj R-sq	0.90	0.38	0.78	0.94	0.29	0.95
DW	1.99	2.04	1.93	1.99	2.02	1.98
x-sec/Obs	13/2518	13/2518	13/2518	13/2527	13/2527	13/2527

Note: Figures in parentheses are probabilities.

6. Conclusion

The analysis in this paper suggests that the path toward regional integration and its "trade first" orientation is the outcome of a combination of politics and economics. However, the politics dominate. There is increasing evidence from an economic perspective that trade and monetary integration are closely connected. Indeed, it is plausible that monetary integration encourages trade and that trade integration leads to the closer synchronization of business cycles and produces other economic spillovers

that facilitate monetary integration.[19] This implies a complex set of positive causal interconnections between trade and monetary integration. Overall, while it is unclear why a trade-first strategy should be favored on the basis of economic considerations alone, it becomes much easier to understand the preferred approach when political considerations are added.

The literature review and empirical analysis undertaken in this paper suggest there is no obvious indication of intensified financial market integration in the East Asian region on the whole. Nonetheless, the evidence reveals a close correspondence between measures of financial integration and the extent of the development of financial markets in general in that, at a bilateral and regional level, those countries with greater financial integration (lower FI) tend to have more diversified deeper, larger financial markets.[20] The three East Asian financial centers, and the high-income economies of Hong Kong,[21] Japan and Singapore, are fairly highly integrated with global capital markets. The recent pace of liberalization in Korea post-crisis is also intensifying the country's extent of international financial integration. The lower middle-income Southeast Asian countries – Thailand and Indonesia and the Philippines – are relatively less financially integrated, but still more integrated, in general, when compared to the less-developed ASEAN countries of Brunei, Cambodia, Laos, Myanmar and Vietnam.

Our analysis of the extent and sequence of real versus financial market integration finds that, overall, integration is generally higher after the Asian crisis, but the results are quite close. The original ASEAN nations – Indonesia, Malaysia, the Philippines, Singapore and Thailand – seem to be more integrated with the rest of Asia than are other groups. This is the case for both real and financial integration and they appear to be especially well integrated with each other. The dynamic tests conducted above suggest that there is evidence that financial integration might lead to real integration but not necessarily the opposite. This is true of both the Granger Causality and also of the fixed effects results where country characteristics are to some extent controlled for.

[19] See Eichengreen and Taylor (2003) for a critique of this argument. They find that the political context matters far more in determining if and when closer trade integration leads to enhanced monetary integration.
[20] There is sizable literature on this topic. One of the most recent papers is Chinn and Ito (2005).
[21] This is not examined in the empirical section in this work.

These results ought to be interpreted with some care as the causation might not reflect sequence, but rather the difference in timing of adjustment of the respective markets

While these countries continue with their ongoing liberalization efforts, one would expect their effective degree of financial integration to intensify over time. It has, however, been argued that these liberalization attempts may lead to enhanced *regional* rather than *global* integration (Eichengreen and Park, 2003 and Park and Bae, 2002). While this a real possibility,[22] policy makers in East Asia have taken the view that there are positive externalities from cooperating to strengthen their individual financial sectors, to develop regional financial markets, and, in particular, to diversify their financial structures away from bank-based systems to bond markets. Motivated by this, a number of financial cooperation initiatives are underway in East Asia, including the Asian Bond Fund (ABF) established by the 11 members of the Executives' Meeting of East Asia-Pacific Central Bank (EMEAP) and the Asian Bond Market Initiative (ABMI) by the Asian Plus Three (APT) economies. The more successful are these early initiatives, and the deeper and broader they become over time, the greater the likelihood that the region's financial systems will become more closely intra-regionally integrated.

[22] However, see McCauley et al. (2002) for a counter argument.

References

Amity M., and D.E. Weinstein (2009). “Exports and Financial Shocks.” Mimeo, September.

Bhatt, V., and A. Virmani (2005). “Global Integration of India’s Money Market: Interest Rate Parity in India.” Working Paper No.164, Indian Council for Research on International Economic Relations, New Delhi.

Bird, G., and R.S. Rajan (2001). “Banks, Financial Liberalisation and Financial Crises in Emerging Markets.” *The World Economy* 24: 889–910.

Bird, G., and R.S. Rajan (2006). “The Political Economy of Sequencing: The Trade and Monetary Components of Regional Integration.” *North American Journal of Economic and Finance* 17: 335–41.

Calderón, C.A, A. Chong, and E. Stein (2002). “Trade Intensity and Business Cycle Synchronization: Are Developing Countries Any Different?” Mimeo, Inter-American Development Bank, March.

Cavoli, T., and R.S. Rajan (2009). *Exchange Rate Regimes and Macroeconomic Management in Asia*. Hong Kong: Hong Kong University Press.

Chinn, M., and M. Dooley (1995). “Asia–Pacific Capital Markets: Integration and Implications for Economic Activity.” Working Paper No.5280, NBER.

Chinn, M.D., and G. Meredith (2004). “Monetary Policy and Long-horizon Uncovered Interest Parity.” *IMF Staff Papers* 51: 409–30.

Chinn, M.D., and H. Ito (2005). “What Matters for Financial Development? Capital Controls, Institutions and Interactions.” Working Paper 11370, NBER.

Corbett, J. (2010). “Asian Financial Integration.” In *Globalization and Economic Integration: Winners and Losers in the Asia-Pacific*, eds Noel Gaston and Ahmed Khalid. Cheltenham, UK: Edward Elgar (forthcoming).

Edwards, S., and M. Khan (1985). “Interest Rate Determination in Developing Countries.” *IMF Staff Papers* 32: 377–403.

Eichengreen, B., and Bayoumi, T. (1999a). “Is Asia an Optimum Currency Area?, Can It Become One? Regional, Global and Historical Perspectives on Asian Monetary Relations.” In *Exchange Rate Policies in Asian Emerging Countries*, eds S. Collignon and J. Pisani-Ferri. London: Routledge Press.

Eichengreen, B., and Bayoumi, T. (1999b). On Regional Monetary Arrangements for ASEAN. Paper presented at an international conference on exchange rate regimes in emerging market economies, December 17–18, Tokyo, Japan.

Eichengreen B., and Y.S. Park (2003). “Why Has there Been Less Financial Integration in Asia than in Europe?” Mimeo, January.

Eichengreen, B., and M. Taylor (2003). “The Monetary Consequences of a Free Trade Area of the Americas.” Working Paper No.9666, NBER.

Fernandez-Arias, E., U. Panizza, and E. Stein (2002). “Trade Agreements and Exchange Rate Disagreements.” Mimeo, Inter-American Development Bank, March.

Flood, R., and A. Rose (2002). “Uncovered Interest Parity in Crisis.” *IMF Staff Papers* 49: 252-65.

Frankel, J. (1991). “Quantifying International Capital Mobility in the 1980s.” In *National Saving and Economic Performance*, eds B. Bernheim and J. Shoven. Chicago: University of Chicago Press.

Frankel, J., and C. Okwongu (1996). “Liberalized Portfolio Capital Inflows in Emerging Markets: Sterilization, Expectations and the Incompleteness of Interest Rate Convergence.” *International Journal of Finance and Economics* 1: 1–23.

Frankel, J., and A. Rose (1998). “The Endongeneity of the Optimum Currency Area Criteria.” *Economic Journal* 108: 1009–25.

Fratianni, M. (2004). “The Case for Monetary Union in Mercosur.” In *Money Matters – Essays in Honor of Alan Walters*, ed. P. Minford. Northampton: Edward Elgar.

Goodhart, C. (1995). “The Political Economy of Monetary Union.” In *Understanding Interdependence: The Macroeconomics of the Open Economy*, ed. P. Kenen. Princeton, NJ: Princeton University Press.

Kim, S, J-W. Lee, and K. Shin (2006). “Regional and Global Financial Integration in East Asia.” Mimeo, Korea University, May.

Krueger, A. (1999). “Are Preferential Trading Arrangements Trade Liberalising or Protectionist?” *Journal of Economic Perspectives* 13: 105–24.

Krueger, A. (2000). “NAFTA’s Effects: A Preliminary Assessment.” *The World Economy* 23: 761–75.

Krugman, P. (1993). “Lessons of Massachusetts for EMU.” In *Adjustment and Growth in the European Monetary Union*, eds F. Torres and F. Giavazzi. Cambridge, UK: Cambridge University Press.

Krugman, P. (1996). *The Uncomfortable Truth about NAFTA. Pop Internationalism.* Cambridge, MA: MIT Press.

Lane, P.R, and G.M. Milesi-Feretti (2001). “The External Wealth of Nations: Measures of Foreign Assets and Liabilities for Industrial and Developing Countries.” *Journal of International Economics* 55: 263–94.

Lee, Y.F.L. (2004). “Trade, Business Cycles, and the Optimum Currency Area.” Mimeo, February.

Levy Yeyati, E., and Sturzenegger, F, (2000). “Is EMU a Blueprint for Mercosur?” *Cuadernos de Economia* 110: 63–99.

Madarassy, R., and M. Chinn (2002). “Free to Flow? New Results on Capital Mobility Amongst the Developed Countries.” Mimeo, August.

McCauley, R.N. (2007). “Building an Integrated Capital Market in East Asia.” Discussion Paper No.83, Asia Development Bank Institute, November.

McCauley, R.N., S.S. Fung, and B. Gadanecz (2002). “Integrating the Finances of East Asia.” *BIS Quarterly Review* December: 83–95.

Montiel, P. (1994). “Capital Mobility in Developing Countries: Some Measurement Issues and Empirical Estimates.” *World Bank Economic Review* 8: 311–50.

Obstfeld, M. (1998). “The Global Capital Market: Benefactor or Menace?” *Journal of Economic Perspectives* 12: 9–30.

Park, Y.C., and K.H. Bae (2002). “Financial Liberalization and Economic Integration in East Asia”, paper presented at the PECC Finance Forum Conference on “Issues and Prospects for Regional Cooperation for Financial Stability and Development” (Hawaii, August 11–13).

Poonpatipul, C., S. Tanboon, and P. Leelapornchai (2006). “The Role of Financial Integration in East Asia in Promoting Regional Growth and Stability.” Bank of Thailand Symposium, August 2006.

Rajan, R.S., and R. Sen (2002). “Singapore’s New Commercial Trade Strategy: Examining the Pros and Cons of Bilateralism.” In *Singapore Perspectives 2002*, ed. L.L. Chang. Singapore: Times Academic Press.

Rajan, R.S., and R. Siregar (2002). “Boom, Bust and Beyond.” In *Financial Markets and Policies in East Asia*, ed. G. de Brouwer. London: Routledge.

Sapir, A. (2000). “EC Regionalism at the Turn of the Millennium: Towards a New Paradigm?” *The World Economy* 23: 1135–48.

Taylor, A.M. (2002). “A Century of Current Account Dynamics.” *Journal of International Money and Finance* 21: 725–48.

Willett, T., M. Keil, and Y.S. Ahn (2002). “Capital Mobility for Developing Countries May Not Be so High.” *Journal of Development Economics* 68: 421–34.

Annex

Discussion of Comparison between FI and Some Existing Measures of Financial Market Integration

In an attempt to ascertain whether FI captures sufficient information to adequately measure financial market integration, it was subjected to comparison tests against some commonly used measures. The measures were taken from the ADB website at www.aric.adb.org. We took the available data for money market differentials, money market correlations, and equity returns correlations and mapped these against the comparable data for FI. Thirty-six currency pairs were taken.

We are mindful that, as mentioned in Section 4 above, there are many different ways of measuring financial integration, and that each measure will capture different facets of integration. As such, it is unreasonable to expect that the measures will match exactly. That said, we found that, by ranking the country pairs for each measure from lowest to highest (integration), there were, at a general level, some similarities. We plotted the series and extrapolated a linear trend for each. We found that the slope of the trend is in the same direction as FI for the money market differences and for the equity correlations (the money market correlation line was virtually horizontal).

After ranking the measures, we split the sample into thirds. We found that 75 percent of the sample that appeared in one quartile for the measure of FI also appeared in the same quartile for at least one of the other measures, and 33 percent appeared for at least two of the other measures.

Neither of these tests are scientific, but we can show that, in many cases, those country pairs that returned a high level of integration under FI also showed a high level of integration (as captured by comparatively low money market differentials, and high money market and equity correlations) in the other measures.