Chapter 9

The Real/Financial Dimensions to Measuring Regional Economic Integration in ASEAN and East Asia

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CHAPTER 9

The Real/Financial Dimensions to Measuring Regional Economic Integration in ASEAN and East Asia

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No single measure of real or financial integration sufficiently captures all of the salient characteristics of the extent of integration between economies and of economies within particular regional groups. As a way of addressing this issue, this paper employs various measures of bilateral and regional real and financial integration for Association of South-East Asian Nations Plus Three (ASEAN + 3) countries for the period 2000–09. By using many measures, one should be able to, first, capture many of the main attributes of integration and, second, investigate the extent to which individual measures drive the overall level of integration. In addition to gaining insights about the nature of integration in the region, this study develops indexes of integration using principal components methods that show which countries are most closely integrated with which others and in what sphere. This allows us to draw some significant policy implications about how to best target liberalization policies of both trade and financial markets as well as informing the ongoing debate about optimal currency areas (OCAs) and a possible monetary union in Asia.

Key Words: Economic Integration, ASEAN + 3, Regionalism

JEL Classifications: F30 F40 F36

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1. Introduction

A commonly asked question in the area of international trade and finance is what is the extent of economic integration in East and Southeast Asia? The reasons for asking this question are many and various. There is increasing evidence that real and financial integration (as subsets of "economic" integration more generally) are closely connected; it is plausible to consider a situation where trade integration is associated with more synchronous business cycles and together produces spill-overs that facilitate monetary integration (see Frankel and Rose, 1998). Monetary integration itself is rooted in the optimal currency area (OCA) literature. Furthermore, there are political-economy considerations that can lead to or are caused by the extent of real and financial integration.

No single measure of real or financial integration sufficiently captures all of the salient characteristics of the extent of integration between the economies in East and Southeast Asia. Furthermore, no single measure is able to explain what particular or individual aspects of integration drive the overall degree of closeness between economies and of economies within particular regional groups.

This paper seeks to employ many and various measures of bilateral real and financial integration for the Association of South-East Asian Nations Plus Three (ASEAN + 3) countries. Measuring the extent of integration through individual metrics is not new and, as is well known, there are many methods that have been employed to measure the degree of real and financial integration (see Cavoli and Rajan, 2009; and for a recent treatment, Kim and Lee, 2010). Real integration measures include, among others, business-cycle synchronization (see Imbs, 2006), trade openness, and relative purchasing power parity (PPP) (see Alba and Papell, 2007; Barumshah et al., 2007; Kim et al., 2009; and Liew et al., 2009 for recent contributions to measuring PPP).

Financial integration measures are many and can be divided into arbitrage conditions such as uncovered interest parity (UIP) (see, for instance, Alper et al., 2009; Chinn, 2006; Goh et al., 2006), asset market correlations (see, for example, Chi et al., 2006), quantity measures using flow data (Lane and Milesi-Ferretti, 2001), macroeconomic measures such as savings/investment correlations and consumption

correlations (Kim and Lee, 2008), and many more. Attempts have been made to find a multivariate measure of integration. Takagi and Hirose (2001) and de Brouwer (1999) have employed techniques to combine various measures of financial integration and reduce them to one measure. Chinn and Ito (2008) have also created what is now a very well-known index of capital mobility/financial openness. The advantage of these techniques is that, first, they capture the breadth of available measures of integration—information is not simply lost by virtue of the non-employment of a measure. Second, the index and all the information contained within can be assessed over time.

Moreover, this paper seeks to calculate the extent of "overall" integration in the region. The objective here is to employ data that are readily available and to construct several measures of integration taking in the real and financial dimensions. By using many measures, one should be able to investigate which individual measure drives the overall level of integration. While each measure might not be perfect (after all, this is why there is such a large literature on each individual measure of real or financial integration), and while the list of measures adopted here might not be exhaustive, there is much value to gaining information about the stylized facts of integration in Asia and to provide insights into the nature of integration in the region. This has significant policy implications about how to best target policies of liberalization of both trade and finance. The paper also intends to measure the extent of integration between a country and a set of other countries (cluster or region). The questions that we can seek to answer here are: which countries are 'closest' to each other in terms of economic integration? Do different measures of integration produce different results in relation to these clusters or groups?

The measures presented in this paper are, in essence, summaries relating to a particular characteristic of economic integration. By and large, the measures fall into two categories: real integration and financial integration. Perhaps surprisingly, there appears to be very little work of this type in this area[2]—researchers seemingly selecting to pursue the option of refining individual measures rather than examining the interaction of individual measures in an attempt to ascertain a broader perspective of integration in the Asian region.

[2] With the exception of the work mentioned above in this section.

The policy implications of this work include, but are not limited to, the following: information about which individual measures might drive overall integration possibly has some useful policy implications. It might provide insights into the suitability of a number of political instruments of integration (trade agreements versus investment accords; removal of controls over foreign direct investment flows versus portfolio versus bank flows, and so on). Information about the different dimensions of integration will inform the ongoing debate about OCAs and a possible monetary union in Asia. As is very well known, OCAs are heavily reliant on integration. Is the region sufficiently close to justify a currency union? What would be the optimum in terms of the countries in a possible union? Where would the central bank be?

This paper is structured as follows: the following section outlines the data sources, defines each of the measures of integration employed in this study and sets out the methodology under which integration is calculated. Section 3 presents the results for bilateral levels of integration as well as each country's level of integration against regional groups. Two methods deriving an overall integration metric are also presented. Section 4 offers some concluding remarks.

2. Data and Methodology

The measures proposed are as follows.

The first is a measure of business-cycle correlations (BCS).[3] These are given by $\rho_{GDPi,GDPj}$, where *GDPi* is the annual growth rate of GDP for country *i*. The correlation coefficient is calculated from 12 monthly observations. A higher value implies greater integration, as it would suggest that the pair of countries for which the correlation is taken can be subject to, and react in the same way to, common shocks.

Deviations from relative PPP (RPPD): this is given by $ABS(\Delta e_t^{d/f} + \pi_t^f - \pi_t^d)$, where e_t is the nominal exchange rate at time t and π_t^f(π_t^d) refers to the foreign (domestic) inflation rate at time t. A smaller value implies greater integration as the law of one price with respect to goods prices is more likely to hold.

[3] "S" for synchronicity.

Trade openness or intensity (TI): this is given by T_{ij}/T_{ALL}, where T_{ij} is the trade (exports plus imports) between countries *i* and *j*, and T_{ALL} is all trade recorded for each country pair within the sample examined (not double counted). A higher value means greater integration as it implies that the country pair examined occupies a greater share of total trade in the region.

Deviations from uncovered (money-market rates) interest parity (UID): this is measured by $ABS(i_t^d - i_t^f - \Delta e_{t+1}^{d/f})$, where i_t^d and i_t^f refer to domestic and foreign interest rates respectively. A lower value implies greater integration between two countries, as the law of one price with respect to financial assets is more likely to apply.

Equity market correlations (EQ): these are given by $\rho_{Ri,Rj}$, where *Ri* is the annual return for the main stock-market index for country *i*. The correlation coefficient is calculated from 12 monthly observations. A higher value implies two countries' stock-markets are more closely aligned, hence indicating a higher level of integration.

Foreign direct investment (FDI) openness or intensity (FI): this is given by $(FD_{ij}+FD_{ji})/FD_{ALL}$. The definitions for the bilateral FDI flows and for FD_{ALL} are as per the trade-intensity measure. Portfolio investment intensity (PI) is given by $(PF_{ij}+PF_{ji})/PF_{ALL}$. The definitions for the bilateral portfolio (PF) flows and for PF_{ALL} are as per the trade-intensity measure. For both FI and PI, a higher value is taken to imply higher integration, as a higher value suggests that the country pair examined occupies a greater share of total financial flows in the region.

These measures lend themselves appropriately as ways to ascertain the degree of integration between countries for the following reasons:

a) they are simple and easy to comprehend;

b) data are readily available for all countries sampled;

c) they are underpinned by economic intuition about agent behavior.[4]

The objective is to use data that are readily and publicly available so as to show the ease with which the overall measures can be calculated. The main data source is the international integration statistics database of the Asia Recovery Integration Center of the Asian Development Bank (ADB) (http://aric.adb.org/), except the data used to calculate the UID and RPPP measures, which were from the International Monetary

[4] This is especially the case for RPPD and UID.

Fund's *International Financial Statistics.* The sample selected for this features data from 2000–09. It is crucial that the measures are bilateral. This way, integration can be assessed between country pairs as well as between countries and predetermined groups. The groups that one might initially consider would be ASEAN5 (Indonesia, Malaysia, the Philippines, Singapore, Thailand), the more recent members, New ASEAN (Brunei, Cambodia, Lao PDR, Myanmar, Vietnam), and the larger regional economies, Plus3 (China, Japan, Korea). The availability of data is such that all countries in the sample are represented in four of the seven measures—namely, BCS, RPPD, UID and TI. All seven measures are presented for the ASEAN5 and the Plus3 nations. This, in itself, is quite instructive in revealing something about the possible extent of integration: the more established nations in terms of development are able to report more comprehensively on integration.

We use the measures as follows—for example, we can measure the extent of Indonesia's integration with, say, Malaysia by observing each measure *individually* between the two countries. We can also measure Indonesia's integration with the Plus3 countries by calculating each measure with China, with Japan and with Korea. For these calculations, we take the average of each bilateral measure, so Indonesia's level of integration, say UID, with the Plus3 equals the average of the UIDs between Indonesia and China plus the UID between Indonesia and Japan plus the UID 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.

Once we have analyzed the individual measures of integration, we can create a measure of "overall" integration. We do this in two ways: the first is to impose cumulative normal distributions to all of the measures such that they all map on to the same distribution. The normalized individual measures are then summed to create an overall measure.[5] The second is to take the raw individual measures of integration and employ principal components analysis to reduce them to a single measure. Given the data considerations outlined above, two composite measures of integration are presented for the normalized metric and the principle components score—one using the four

[5] One can take averages rather than sums, but the effect is much the same.

individual measures for the whole sample, and the other using all seven measures for the ASEAN5 and Plus3 sample. The next section presents the results.

3. Results

3.1. Bilateral Integration and Regional Groupings

This section is divided broadly into two parts. The first examines the extent of (or level of) bilateral integration by calculating the level of integration under each individual measure. The second part examines how each country is integrated to a number of regional groupings.

Table 1 presents the extent of bilateral integration for each measure; the highlighted numbers show some potentially interesting results. From Table 1a, we can see that the level of business-cycle synchronization is high for Malaysia and the Philippines, Singapore and Thailand. The BCS for Japan/Philippines and Japan/Thailand are also high. The RPPDs in Table 1b also reveal a high level of integration (low RPPD) for pairings involving Malaysia and the Philippines. The same is found for the UIDs in Table 1e and, albeit to a lesser extent, the equity correlations in Table 1d.

Table 1. Bilateral Integration Measures by Type

Table 1a. Business-Cycle Synchronization

	BR	CA	PRC	ID	JP	KR	LAO	MA	MY	PH	SG	TH	VT
BR	1.00												
CA	- 0.08	1.00											
PRC	- 0.16	0.62	1.00										
ID	- 0.60	0.41	0.78	1.00									
JP	0.23	0.66	0.38	0.33	1.00								
KR	0.51	- 0.06	0.01	0.07	0.71	1.00							
LAO	- 0.11	0.38	0.79	0.77	0.21	- 0.04	1.00						
MA	- 0.14	0.40	0.57	0.60	0.85	0.64	0.78	1.00					
MY	- 0.11	0.42	- 0.03	0.33	0.66	- 0.01	0.17	0.63	1.00				
PH	- 0.10	0.48	0.59	0.65	0.86	0.61	0.60	0.94	0.49	1.00			
SG	0.06	0.64	0.55	0.61	0.84	0.63	0.58	0.88	0.63	0.95	1.00		
TH	0.33	0.33	0.32	0.25	0.89	0.58	0.32	0.91	0.68	0.82	0.75	1.00	
VT	0.05	0.89	0.74	0.47	0.83	0.40	0.56	0.78	0.13	0.76	0.76	0.74	1.00

Table 1b. RPPP Deviations

	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 1c. Trade Intensity

	BR	CA	PRC	ID	JP	KR	LAO	MA	MY	PH	SG	TH	VT
BR													
CA	0.016%												
PRC	0.035%	0.041%											
ID	0.119%	0.012%	1.880%										
JP	0.320%	0.015%	23.079%	3.738%									
KR	0.113%	0.014%	12.762%	1.425%	9.073%								
LAO	0.000%	0.017%	0.023%	0.000%	0.005%	0.005%							
MA	0.054%	0.010%	3.343%	0.962%	4.116%	1.434%	0.002%						
MY	0.000%	-0.002%	0.188%	0.020%	0.047%	0.037%	0.000%	0.046%					
PH	0.002%	0.002%	1.447%	0.201%	2.155%	0.697%	0.000%	0.584%	0.001%				
SG	0.077%	0.069%	3.258%	1.513%	4.300%	1.312%	0.076%	3.161%	0.216%	0.707%			
TH	0.049%	0.070%	2.650%	0.747%	4.911%	0.832%	0.151%	1.623%	0.314%	0.457%	0.832%		
VT	0.000%	0.050%	1.181%	0.185%	1.090%	0.614%	0.029%	0.306%	0.007%	0.128%	0.640%	0.403%	

Table 1d. Equity Market Correlation

	PRC	ID	JP	KR	MA	PH	SG	TH
PRC								
ID	0.19							
JP	0.25	0.28						
KR	0.21	0.56	0.67					
MA	0.29	0.78	0.37	0.56				
PH	0.37	0.6	0.41	0.26	0.5			
SG	0.41	0.62	0.55	0.59	0.67	0.65		
TH	0.27	0.69	0.54	0.77	0.62	0.44	0.61	

Table 1e. UID Deviations

	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

Table 1f. FDI Intensity

	PRC	ID	JP	KR	MA	PH	SG
PRC							
ID	0.611%						
JP	22.619%	-0.006%					
KR	18.523%	0.001%	4.543%				
MA	1.491%	0.089%	4.690%	1.071%			
PH	0.911%	0.003%	0.903%	0.009%	0.116%		
SG	10.304%	0.022%	11.253%	0.805%	5.415%	0.499%	
TH	0.867%	0.022%	9.744%	0.230%	0.258%	0.152%	4.702%

Table 1g. Portfolio Intensity

	PRC	ID	JP	KR	MA	PH	SG
PRC							
ID	0.041%						
JP	15.805%	1.628%					
KR	8.881%	0.453%	29.307%				
MA	0.098%	0.313%	5.868%	1.904%			
PH	0.054%	0.044%	4.323%	0.299%	0.482%		
SG	0.043%	0.521%	14.074%	3.961%	2.970%	0.722%	
TH	0.043%	0.134%	3.054%	2.829%	0.339%	0.046%	0.697%

When one observes the quantity-based measures, such as trade, FDI and portfolio investment intensity, the higher levels of integration occur in the larger economies of Japan, China and Korea. This possibly emphasizes the importance of size for trade and finance flows. We can see this effect most emphatically in the case of TI in Table 1c for the Japan–China, Japan–Korea and China–Korea pairings. The results for FI and PI

also show that these pairs are significant but, additionally, they reveal Singapore as an important source of openness when paired with the larger economies—notably Japan.

Figure 1 presents the extent of integration (by each measure) of each country with a predetermined grouping of countries. For BCS, RPPD, UID and TI, these groupings are ASEAN5, the New ASEAN, Plus3 and the entire sample as specified above. For the others—equity, FD and PF—the groupings are ASEAN5, Plus3 and ASEAN5+3. The results here confirm the patterns mentioned above—that Malaysia, Singapore and Thailand are among the most integrated when one observes the price-based measures (RPPD, UID and EQ as given in Figures 1b, 1d and 1e), but the larger regional economies exhibit higher integration when one observes the quantity measures (TI, FI and PI given in Figures 1c, 1f and 1g respectively). Furthermore, Figure 1 shows that, across all measures, the New ASEAN nations are among the least integrated generally, in terms of both the extent of integration with each other and with the other groupings in the sample.

Figure 1. Regional Integration by Type

Figure 1a. Business-Cycle Correlation

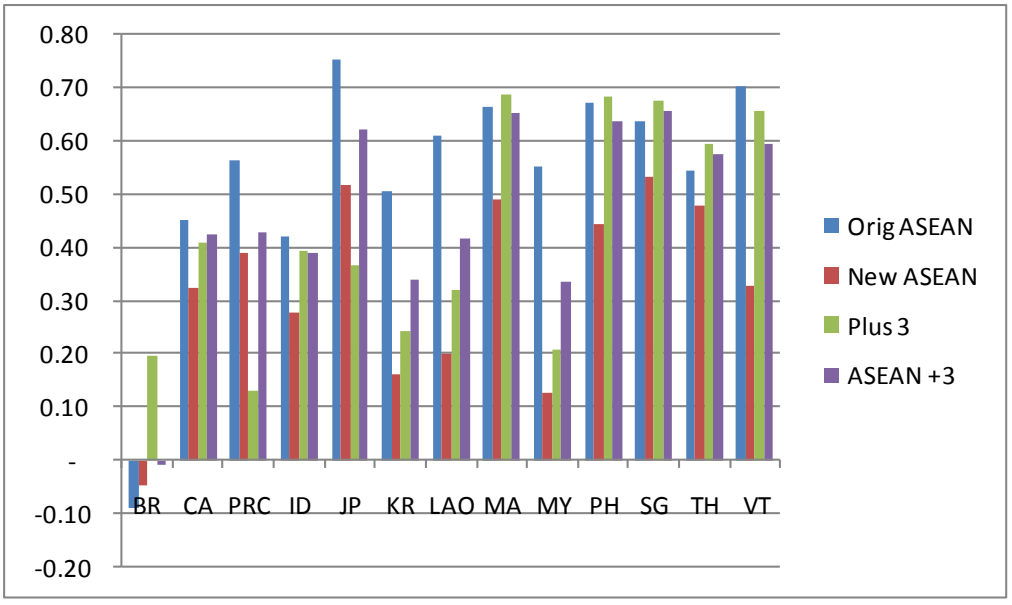


Figure 1b. RPPD Deviations

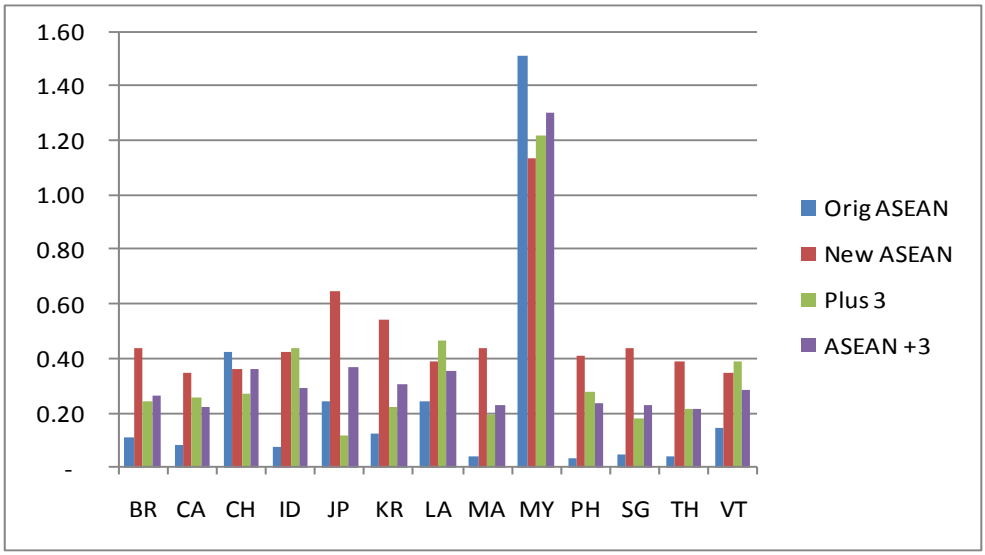


Figure 1c. Trade Intensity

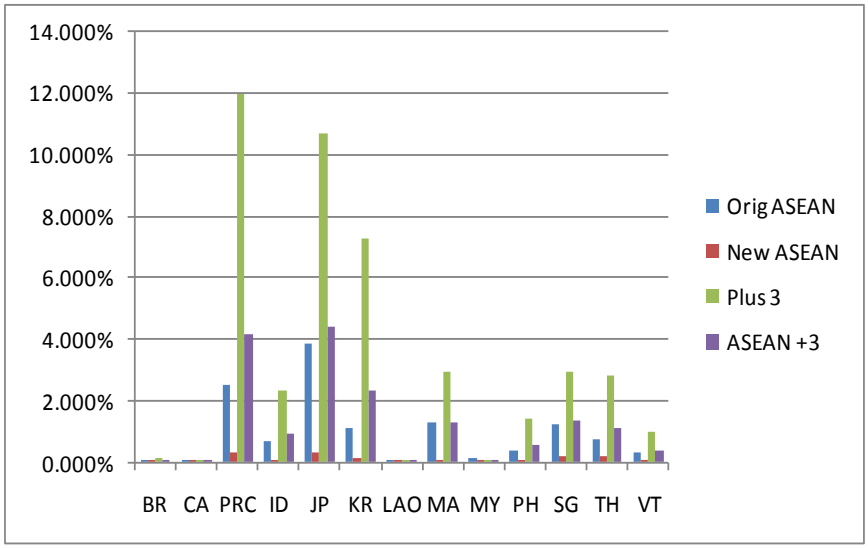


Figure 1d. Equity Market Correlation

Figure 1e. UID Deviations

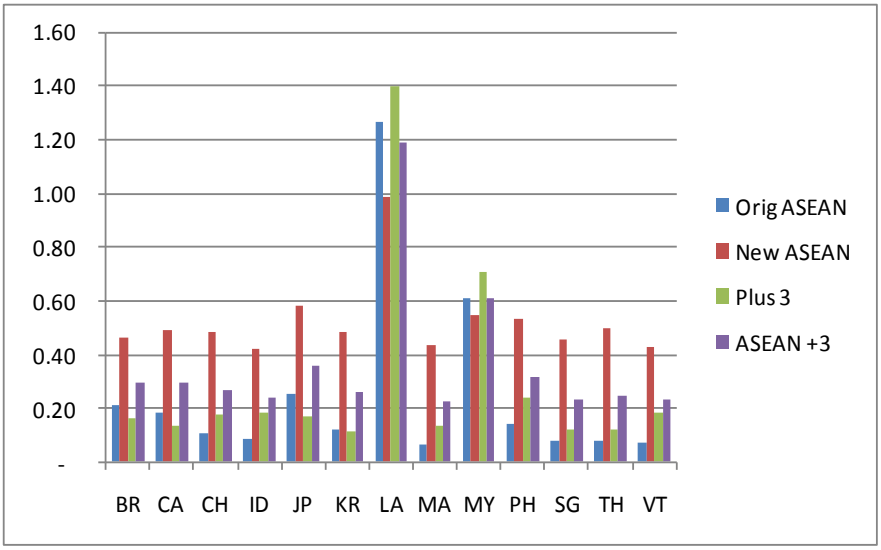


Figure 1f. FDI Intensity

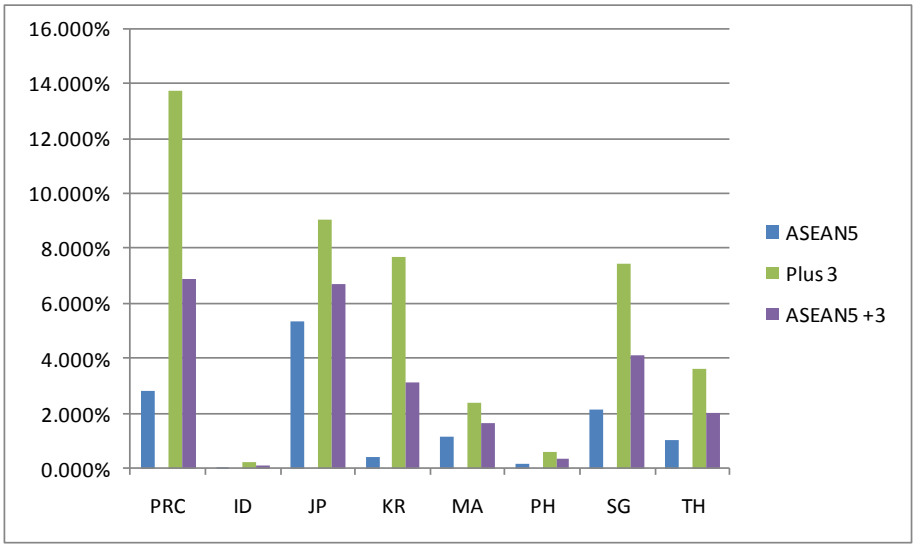
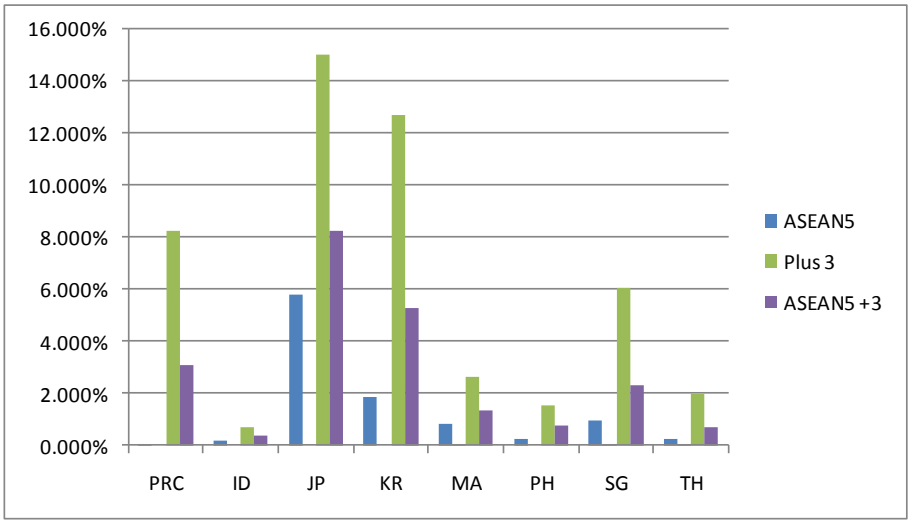


Figure 1g. Portfolio Intensity



3.2. Normalised Overall Measure of Integration

The next set of results attempts to use all of the available measures to return an overall measure of integration that captures both real and financial dimensions. This facilitates the investigation of which individual measure might possibly drive the overall level of integration and, in doing so, addresses the question of what might be the possible sources of integration between countries in the region. Each measure of integration against the defined regional groupings as defined above has been normalized to return a value between 0 and 1 where 0 = least integrated and 1 = most integrated.

Prior to making these transformations, the UID and RPPD are inverted such that a larger value now implies more integration. Each value is then simply summed to present an overall measure of integration for each country against the regional groupings. The benefit of this exercise is that it removes any issue of the scaling of individual measures as each metric is scaled from 0 to 1. As such, we can examine where each individual measure is in a cumulative normal distribution—thus facilitating comparisons.

Figures 2 and 3 present the results. Figure 2 presents the overall integration where all seven measures are used, and therefore omits the New ASEAN sample of countries. Figure 3 presents the overall integration where four measures (BCS, RPPD, UID and TI) are employed, thus utilizing all 13 countries in our sample. By construction, each normalized individual measure of integration shows what position it assumes in the distribution. As such, the larger the segment in each column graph relating to a particular measure, the more that measure contributes to the total.

Figure 2. Overall Integration: Seven measures

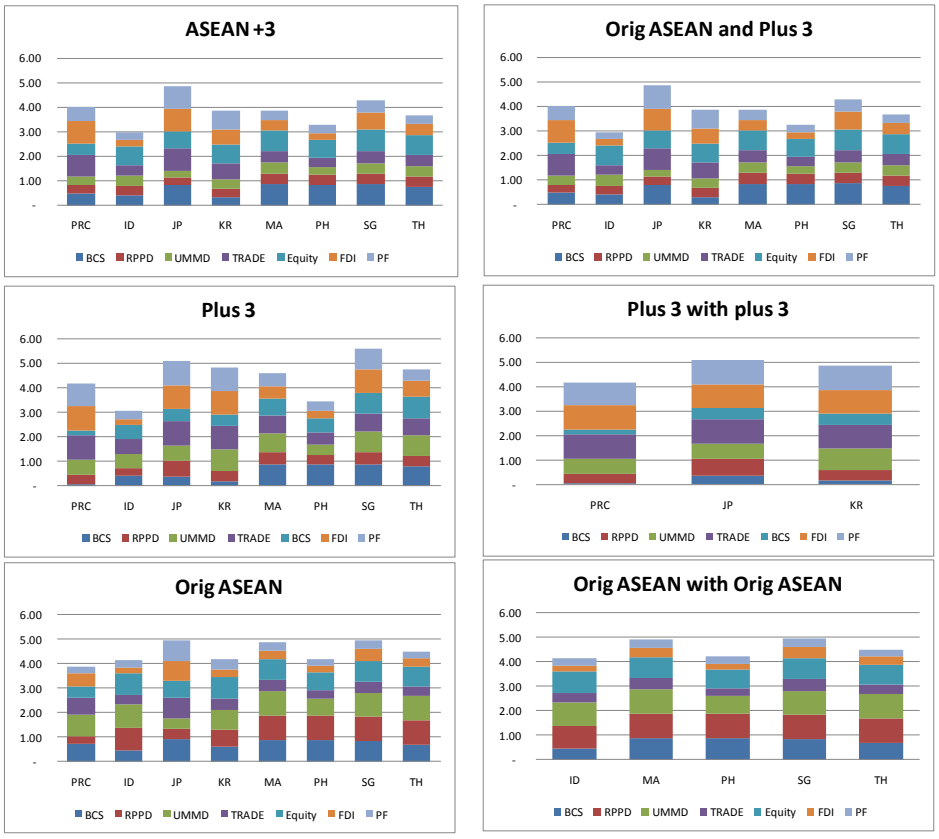
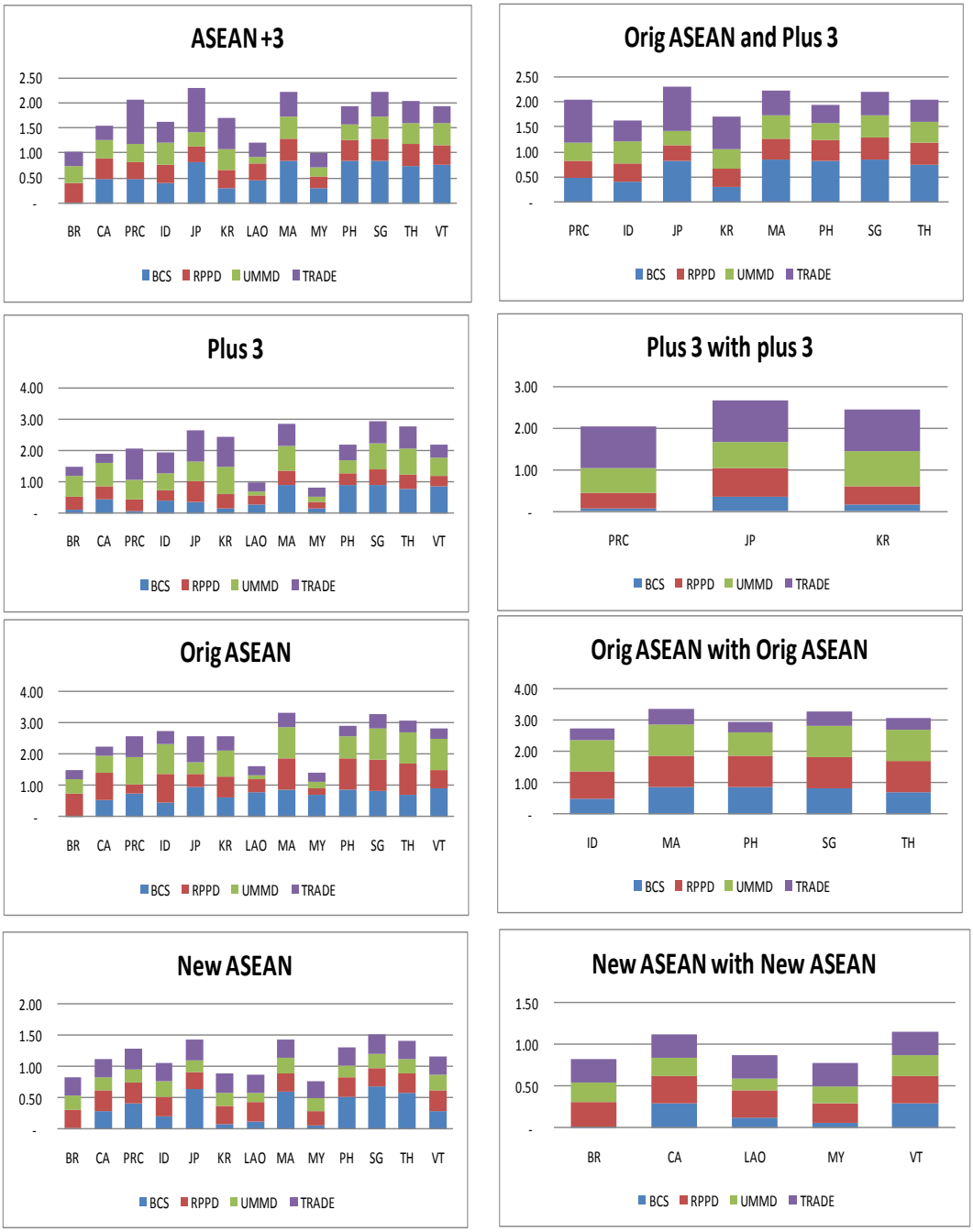


Figure 3. Overall Integration: Four measures



Generally speaking, if one observes the components of each measure, one sees that no one individual measure dominates the total measure. We see that equity market correlation and business-cycle synchronization are quite influential for the original ASEAN nations. We also see that the effect of UID seems generally greater than RPPD. From Figure 2, it can be seen that Singapore and Japan remain the most

integrated economies in the sample—and that this result occurs irrespective of which groupings these countries are measured against. Figure 3 presents a couple of interesting results. The first is that Malaysia's level of overall integration is higher under this measure—highlighting possibly the importance of BCS, RPPD, UID and TI for that country. The second interesting result is from the newer ASEAN nations. It can be seen that Vietnam and Cambodia are the most integrated from this group of countries but these levels are significantly lower than the ASEAN5 and Plus3 countries.

3.3. Principle Components Analysis

We also present some results of the application of principal components analysis to our measures of integration. The reasons for this are twofold. First, we can use the method to act as a robustness test for the above measures of (normalized) integration. The second is to augment the above measures, as they are not subject to any formal statistical testing. Principal components analysis is a method that is often used to reduce the number of variables into a single one for the purposes of estimation. It models the variance structure of a set of observed variables using linear combinations of the variables. These linear combinations, or components, might be used in subsequent analysis, and the combination coefficients, or loadings, might be used in interpreting the components. It is essentially an optimization algorithm that selects the optimal weights in a linear combination such that the variance of the linear combination is maximized. See Johnson and Wichern (1992) for more information.

We compute the principal components of the estimated (Spearman rank-order) correlation matrix of our series of measures, and display our results in Tables 2 and 3 and in Figures 4 and 5.

Table 2 presents the output for the seven-variable case for the ASEAN5 and the Plus3 countries. We can see from the first panel that the first principal component explains 39 percent of the variation in the measures of integration. The second panel shows the weights of each measure in constructing the components. We see that there is a difference in the price versus the quantity-based measures in that the price measures return a positive coefficient. The data are able to clearly differentiate between these broad types of measures—suggesting that each type can explain different aspects of the data.

Table 2. Principal Components Analysis (using BCS, UID, RPPP, Trade, Equity, FD, PF)

Eigen values: (sum = 7, average = 1)					
Number	**Value**	**Diff.**	**Prop.**	**Cum. value**	**Cum. prop.**
1.00	2.74	0.94	0.39	2.74	0.39
2.00	1.80	0.71	0.26	4.53	0.65
3.00	1.09	0.35	0.16	5.63	0.80
4.00	0.74	0.43	0.11	6.37	0.91
5.00	0.31	0.09	0.04	6.68	0.95
6.00	0.22	0.11	0.03	6.89	0.98
7.00	0.11	---	0.02	7.00	1.00

Eigen vectors (loadings):							
Variable	**PC 1**	**PC 2**	**PC 3**	**PC 4**	**PC 5**	**PC 6**	**PC 7**
BCS	0.21	0.46	–0.31	0.66	0.45	0.04	–0.07
EQ	0.44	0.31	0.23	–0.44	0.16	0.54	–0.38
FD	–0.37	0.43	0.28	0.31	–0.61	0.14	–0.34
PF	–0.22	0.58	–0.15	–0.47	0.14	–0.59	–0.08
RPP	0.49	0.33	–0.16	–0.05	–0.51	0.01	0.60
TR	–0.52	0.24	0.16	–0.10	0.30	0.46	0.58
UID	0.24	0.07	0.84	0.19	0.20	–0.36	0.18

The first panel of Table 3 shows that the first principal component explains 48 percent of the total variation in the data. The second panel shows that each variable is (reasonably) similarly weighted in the first component but the component shows some differences between the price measures, UID and RPPD and the others in explaining the variation in the second component.

Table 3. Principal Components Analysis (using BCS, UID, RPPP, Trade)

Eigen values: (sum = 4, average = 1)					
Number	**Value**	**Difference**	**Proportion**	**Cum. value**	**Cum. prop.**
1.00	1.95	0.95	0.49	1.95	0.49
2.00	1.00	0.33	0.25	2.95	0.74
3.00	0.67	0.28	0.17	3.61	0.90
4.00	0.39	---	0.10	4.00	1.00

Eigen vectors (loadings):				
Variable	**PC 1**	**PC 2**	**PC 3**	**PC 4**
BCS	0.43	0.58	0.65	–0.25
RPP	0.44	–0.65	0.45	0.43
TR	0.54	0.39	–0.49	0.56
UID	0.58	–0.30	–0.37	–0.66

Figure 4 presents the output of the principal components analysis for the seven-variable case for the ASEAN5 and the Plus3 countries. As with the normalized results, a larger number implies higher integration. This is configured in the same way as Figure 1 in that it shows the level of integration (but this time the level of overall

integration) of each nation against country groupings. What is quite obvious from these results is that the Plus3 nations are much less integrated than the ASEAN5 countries and much less integrated than what was being suggested in the earlier tests.

Figure 4. Overall Integration Using Principal Components (seven measures: BCS, UID, RPPP, Trade, Equity, FD, PF)

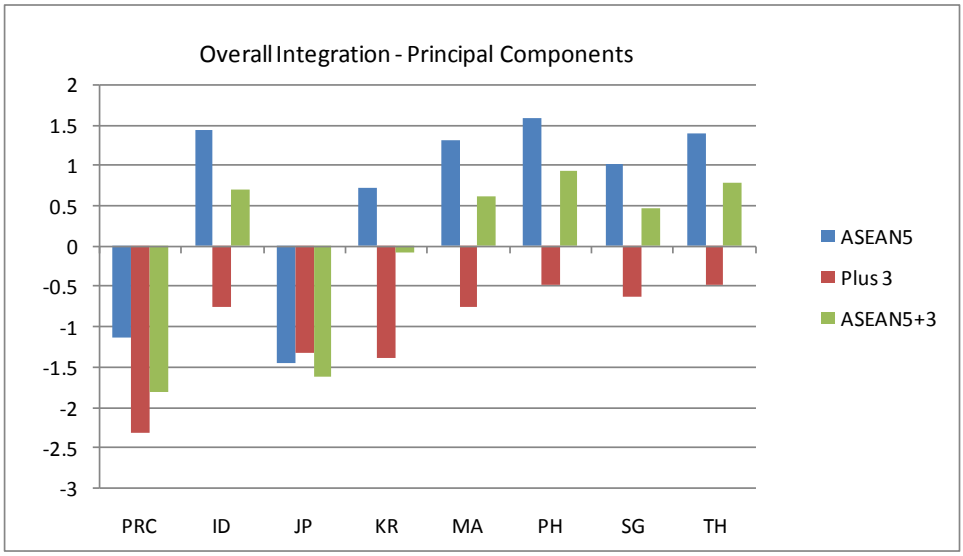
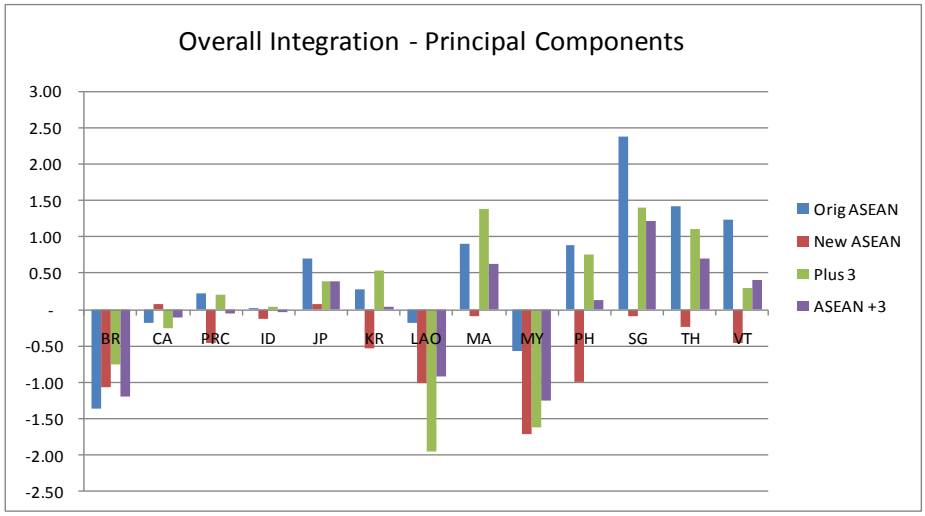


Figure 5 shows the principal components score for the four-variables case. It can easily be seen from Figure 5 that the newer ASEAN countries are much less integrated overall. This is the case in terms of their integration with others and with others' integration with these countries. The original ASEAN countries exhibit higher integration than all the others. Perhaps surprisingly (but consistent with Figure 4), the Plus3 nations are not as strongly integrated as the previous measures suggest.

Figure 5. Overall Integration Using Principal Components (four measures: BCS, UID, RPPP, Trade)



4. Some Conclusions

The three East Asian financial centers and high-income economies of Hong Kong,[6] 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 as well as the Philippines, are relatively less financially integrated, but still more integrated, in general, when one compares them with the less-developed ASEAN countries of Brunei, Cambodia, Laos, Myanmar and Vietnam.

Our analysis of the extent of real versus financial market integration finds that, overall, the original ASEAN nations—Indonesia, Malaysia, the Philippines, Singapore and Thailand—seem to be more integrated with the rest of Asia than other groups. This is the case for broad measures of both real and financial integration. They tend also to be especially well integrated with each other. Of these, Singapore and Malaysia appear to be the most connected generally. The newer ASEAN members are the least

[6] Not examined in the empirical section in this work.

integrated across all measures by a considerable margin—although the exception here is a possible exception itself.

The original ASEAN countries also seem to be more integrated when measured by the price-based measures—namely, UID, RPPD, equity-market correlations and business-cycle measures. The quantity measures show that Japan, Korea and China are highly integrated when measuring both the real (trade intensity) and the financial (FDI and portfolio intensity).

The principal components scores and the normalized scores for overall integration are reasonably consistent in that Singapore and Malaysia emerge as those countries with the highest levels. The scores do differ for China, Japan and Korea, with the principal component scores seemingly picking up more of a large-country effect.

There are several interesting policy implications arising from this work. First, it would appear that the financial aspects of integration are more persuasive in the smaller economies of ASEAN and that real integration is more prominently defined in the larger Plus3 countries. Thus, in terms of those aspects of integration that might more easily be reached by liberalization, it would appear that finance-based liberalization is more accessible. Second, there are still quite well-defined clusters, or regions, in the sample. This has implications for the design of trade or investment accords, and most certainly has implications for the outlook for monetary regionalism. While the larger economies are quite well integrated with the smaller ones, they are not as well integrated with each other. For this reason, the data suggest there is a considerable distance to travel before any regional bloc or monetary union involving the three major countries could be achieved.

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