

Chapter 7 Results using Maastricht Treaty Criteria

While the preceding chapter delivers the OCA-based findings, the present chapter presents the findings addressing research questions involving the Maastricht Treaty criteria. This chapter is also significant in a way as it also compares the results by the real OCA dimensions of the previous chapter with those by the nominal Maastricht dimensions of this chapter.

The research questions concerned in this chapter are highlighted in Table 7.1. Questions 4, 6, and 7 involve only OCA criteria and hence are not discussed here. Other questions will be answered using Maastricht variables. As with the OCA results, the discussion on how the research questions would have been answered by the Maastricht results will be detailed in Chapter 8.

The structure of the chapter is depicted in Figure 7.1. Firstly, the chapter commences with preliminary analysis in Section 7.1. The chapter then proceeds with the findings by hierarchical cluster analysis (HCM) in Section 7.2, fuzzy cluster analysis (FCM) in Section 7.3, and model-based cluster analysis (MBC) in Section 7.4. Each of these cluster analysis sections contains classifications, assessment of preparedness, and a recapitulation. The results are then compared and contrasted across methods in Section 7.5. Lastly, OCA and Maastricht findings are compared in Section 7.6 in terms of classifications and preparedness assessment. The chapter concludes in Section 7.7.

Table 7.1 Research questions and objectives

Specific Research Question	Specific Research Objective
1 How would the grouping configuration differ under different monetary anchor?	To evaluate and compare the results when different monetary anchors, namely dollar, currency basket, yen, euro, and yuan anchors are alternatively assigned.
2 How different are the partitions when different sets of criteria are used?	To explore and compare the results by OCA with those by Maastricht criteria.
3 How would the results differ across different clustering methods?	To assess and compare the results by hierarchical, fuzzy, and model-based cluster analysis methods. Results are also compared with those of principal component analysis.
4 How would the arrangements vary if benefits and costs of monetary integration are treated equally?	To inspect and compare the solutions when the sum of 'benefit' OCA criteria and the sum of 'cost' OCA criteria are weighted equally.
5 How prepared are generated country clusters for exchange rate fixation and for monetary union?	To infer the degree of readiness for fixed exchange rate and for monetary union by evaluating the groupings of East Asian countries with dollarized and euroized countries respectively.
6 How dominant are some criteria in representing the rest of the criteria?	To detect and examine subsets of OCA criteria which are most representative of the rest in generating the results.
7 How important are certain criteria in producing the best partitions?	To detect and assess subsets of OCA criteria which produce the most data-fitting partitions as indicated by particular statistical measures.
8 How would the results vary over different economic periods?	To compare the results across pre-crisis, crisis, and post-crisis periods.
9 How do the findings compare with the actual HongKong-Macau and Singapore-Brunei fixed exchange rate arrangements?	To evaluate the results against the existing fixed exchange rate arrangements of HongKong-Macau and Singapore-Brunei.

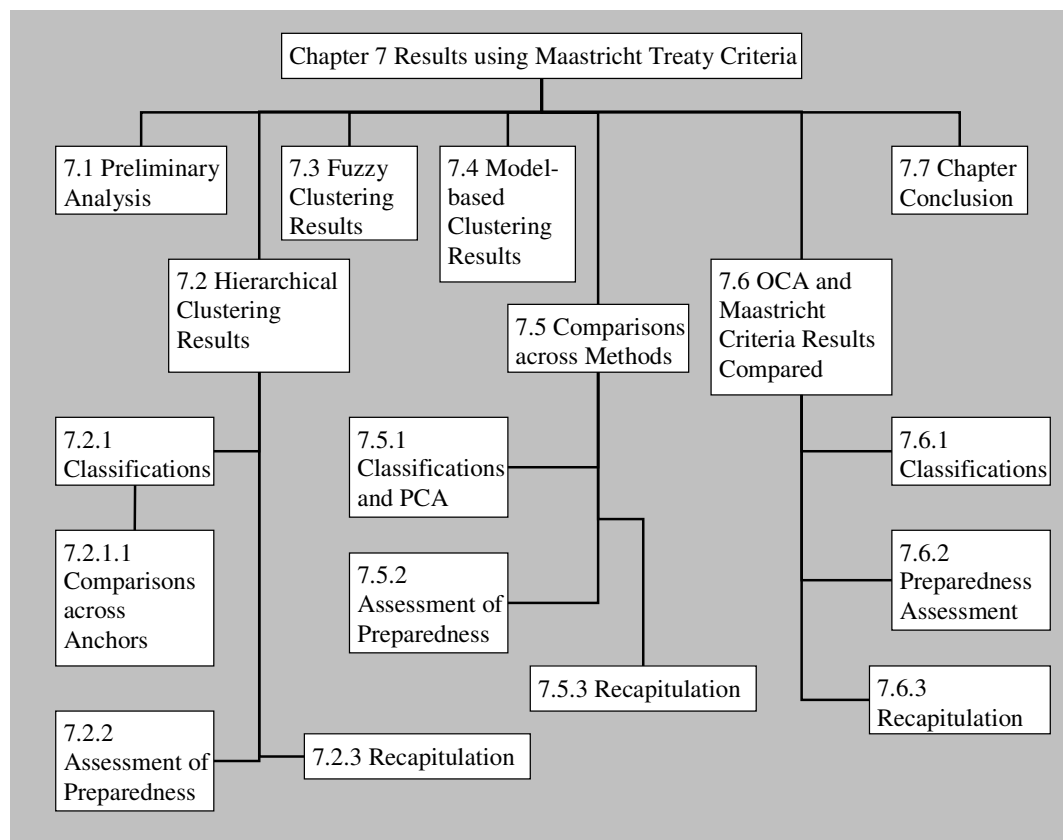


Figure 7.1 Structure of Chapter Seven

7.1 Preliminary Analysis

The analysis begins with a general description of the Maastricht variables. The variables are government budget deficit as percent of GDP (DEF), CPI inflation rate differential (INF), standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate (NER), and interest rate differential (INT). The latter three variables are measured against a reference. Comparisons are made across reference countries and periods.

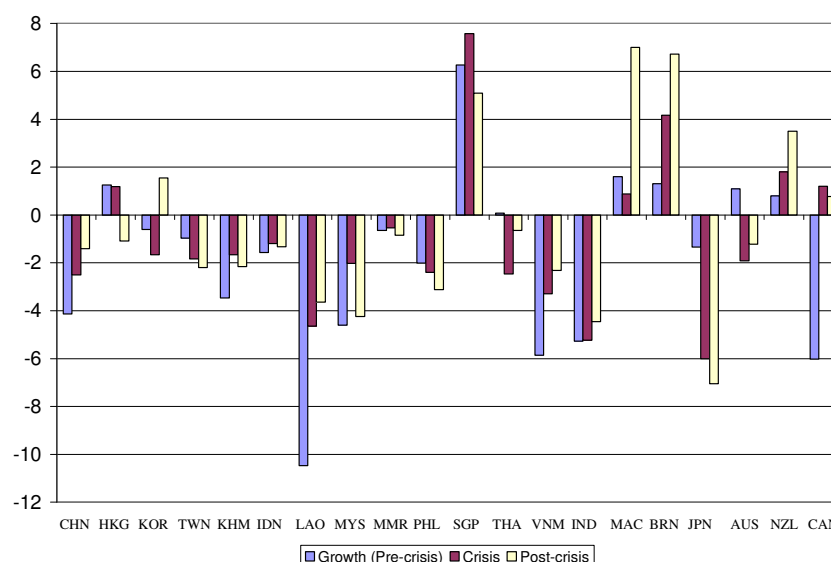


Figure 7.2 Budget deficit as percent of GDP

Figure 7.2 depicts the budget deficit ratios. Positive values represent budget surpluses and negative values signify budget deficits. Only four countries, Singapore, Macau, Brunei, and New Zealand consistently report a surplus across the periods. On the contrary, high public deficits are reported by Laos, Vietnam, India, and Japan.

Consistently improving budget balance can be seen from China, Laos, Vietnam, India, Brunei, and New Zealand whereas constantly deteriorating budget balance is shown by Hong Kong, Taiwan, the Philippines, and Japan.

For the effective dollar areas of Hong Kong and Macau, Hong Kong exhibits a budget deficit only for the post-crisis period which is relatively small whereas Macau displays consistent surplus over the periods and even a remarkable surplus for the post-

crisis period. For the monetary union constituents of Singapore and Brunei, both had been having consistent positive budget balances over the periods and Singapore even reported the largest surplus amongst the countries in almost all periods. These healthy budget balances appear to support the fixed exchange regimes implemented by these economies.

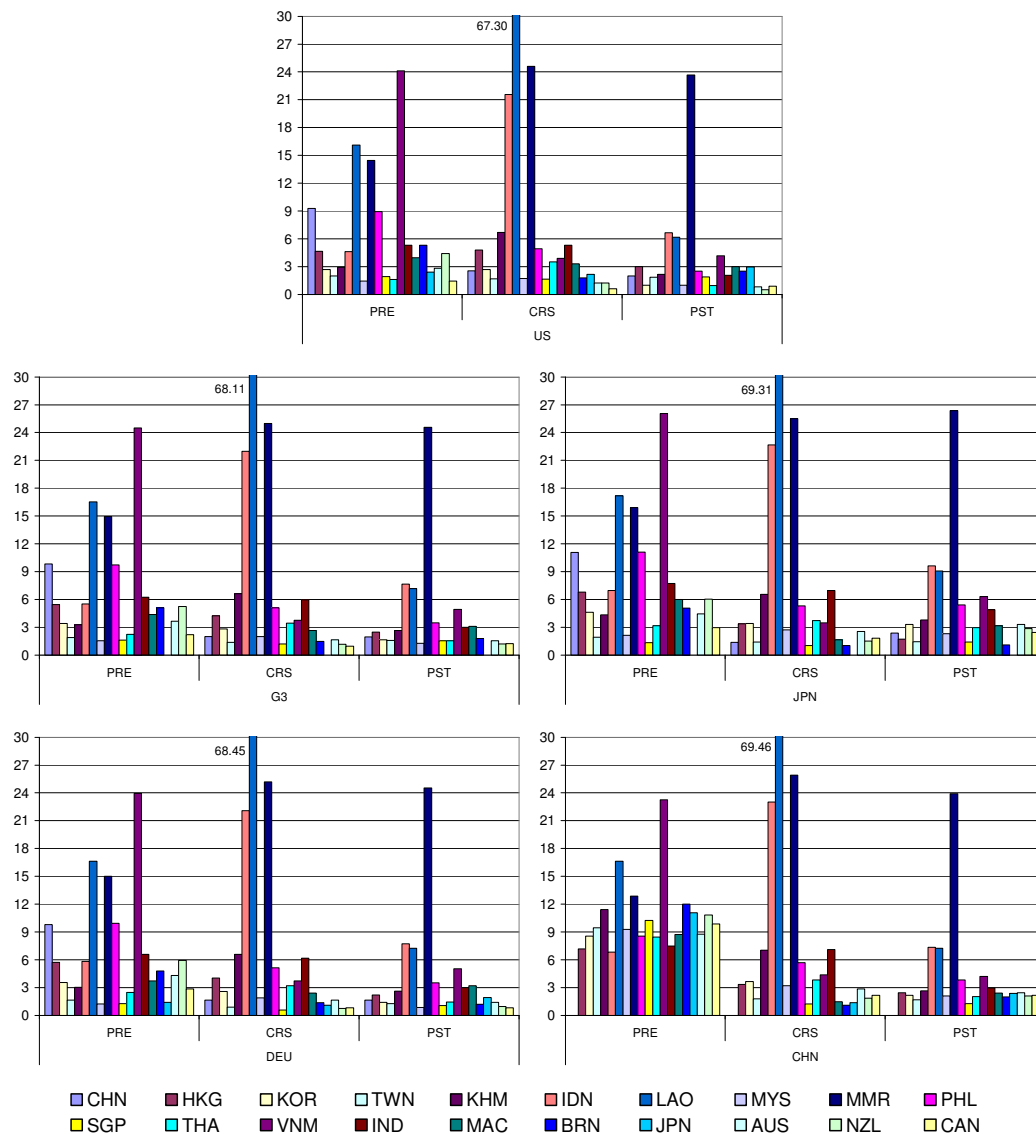


Figure 7.3 Inflation rate differential (%)

Inflation rate differentials measuring convergence in inflation with each of the reference countries are portrayed in Figure 7.3. Immediately, one can see a general rise in inflation convergence depicted by lower differentials toward each of the reference

levels since the Asian crisis. Nevertheless, dispersion in the rate of inflation in the less developed Indonesia and the two least liberalized economies of Laos and Myanmar had remained high.

For Hong Kong and Macau, their degrees of inflation convergence with US and with China had been increasing and even converged in the post-crisis period, in line with the hard dollar pegs in Hong Kong and Macau. This is straightforward because the inflation in China had also been converging toward that in US, coherent with the yuan-dollar rate fixation during that time. For Singapore and Brunei, their levels of inflation convergence with the G3 reference had been rising before converging in the post-crisis period, consistent with their prevailing common currency basket peg led by Singapore.

Figure 7.4 puts together the standard deviations measuring nominal exchange rate volatility with each of the reference countries. It is apparent that variability was precipitously high in the crisis period particularly against the German mark/euro. After the crisis period, the region's exchange rates had been ever stabler against every reference currency especially against the dollar and the yuan.

Notice that the distributions over countries for US and China references are virtually the same for the crisis and the post-crisis period because the nominal rate of the Chinese renminbi had been pegged to the US dollar in those periods.

For Hong Kong and Macau, their nominal dollar rates had been equally highly stable throughout, exemplifying their hard dollar pegs and Macanese currency board on the HK dollar. For Singapore and Brunei, their exchange rate variations are constantly symmetrical, reflecting their monetary union arrangement.

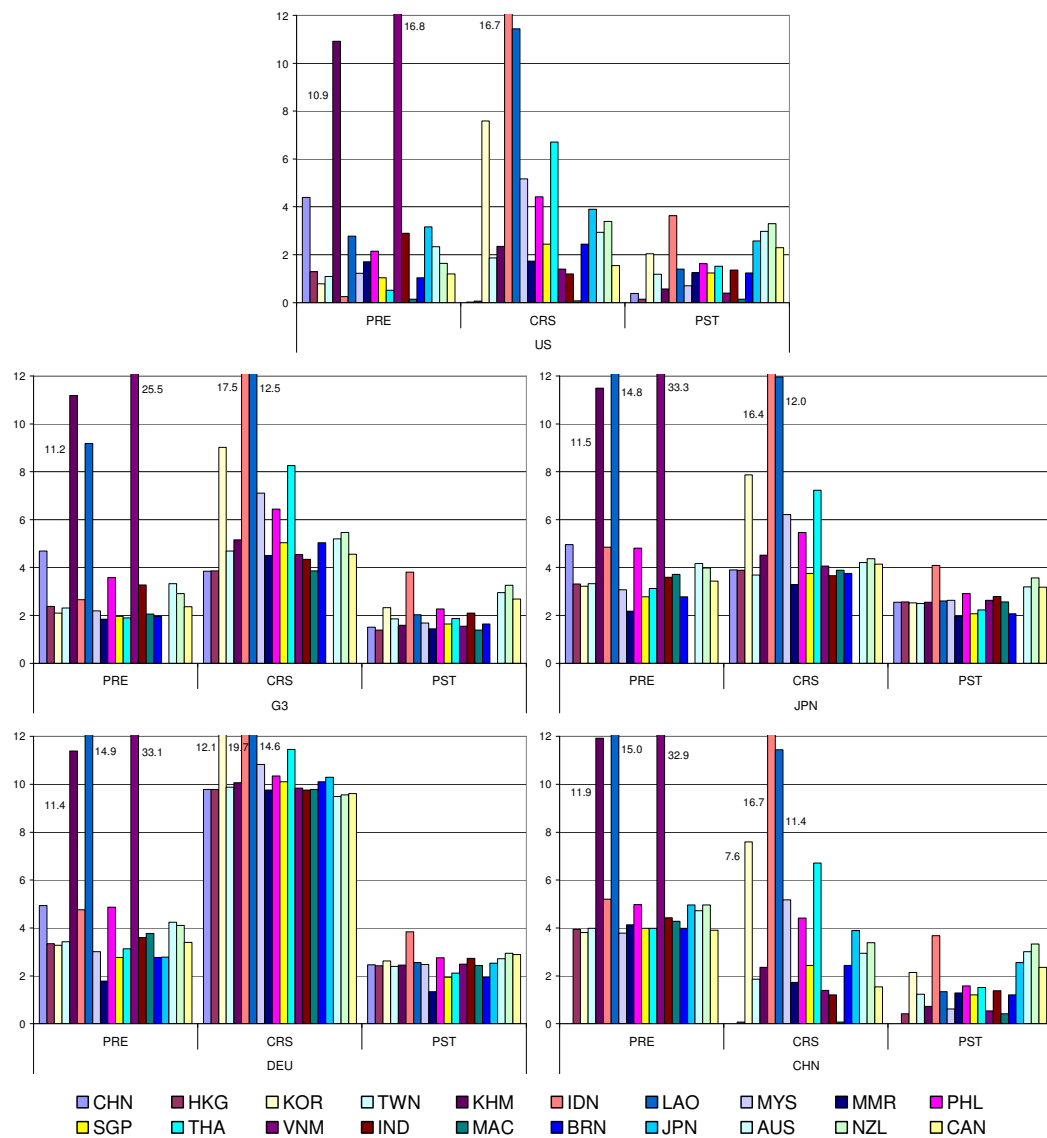


Figure 7.4 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate

Figure 7.5 depicts the interest (lending) rate differentials with the reference rates. By and large, the patterns over the countries are similar over the periods. Noticeably, the rates are comparatively divergent from the Japanese rate. This is not unexpected given the lost decade and the near-zero nominal interest rates in Japan since around 1990. Amongst the countries, consistently higher spreads are shown by Indonesia, Laos, Cambodia, and Myanmar.

For Hong Kong and Macau, their interest rates had been most parallel to the US rates throughout, in line with their effective hard dollar pegs. As for Singapore and

Brunei, their interest rate differentials against each reference country had been highly parallel over the periods specifically that against the US, compatible with their monetary union system.

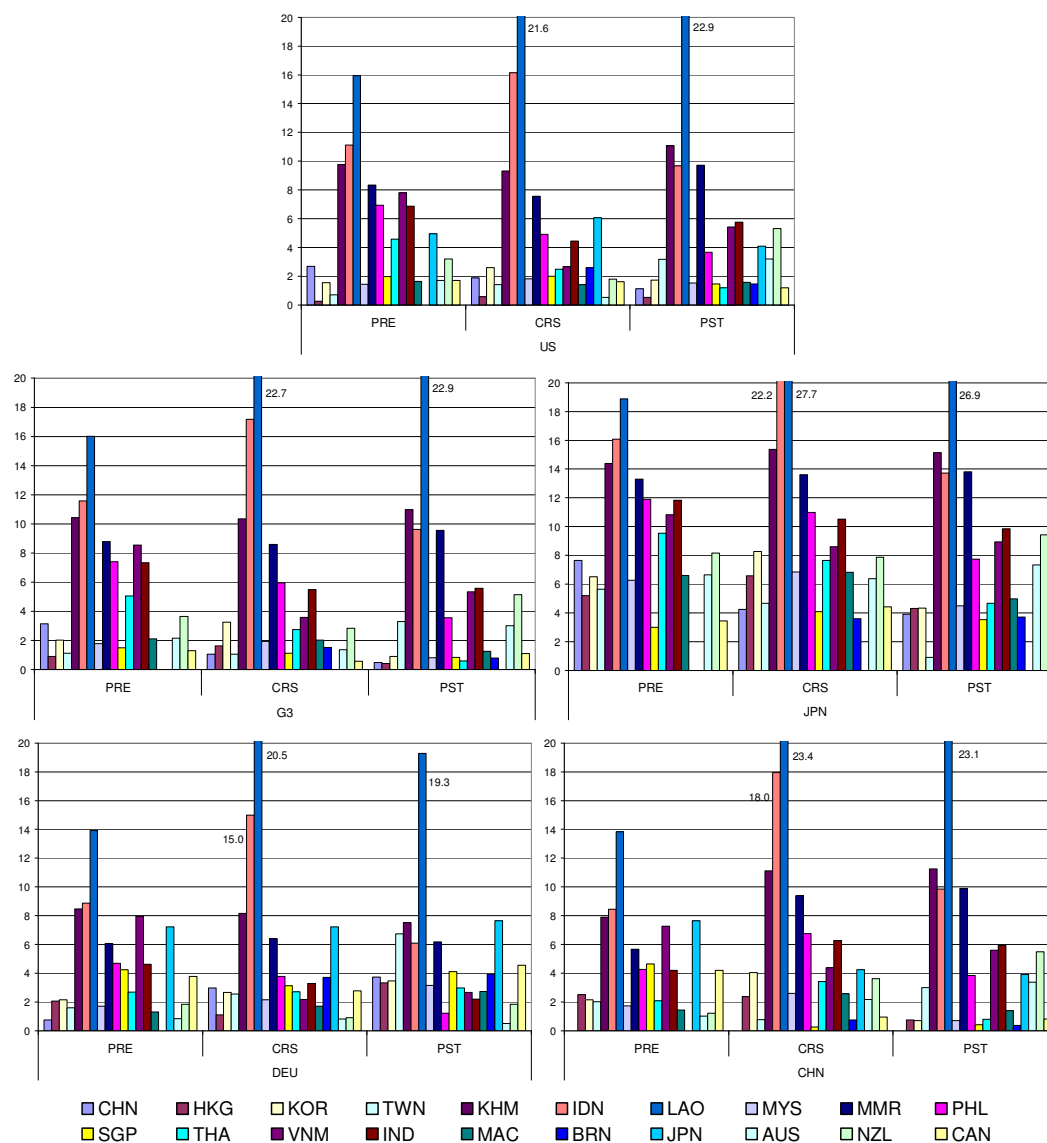


Figure 7.5 Interest rate differential (%)

Table 7.2 exhibits the averages over countries of the reference-dependent variables, that is, averages for each criterion except the budget deficit criterion. Based on the charts and the averages, it can be seen that the region's inflation has converged more closely toward the US and the German level; nominal exchange rates have been much more stable against the US and the Chinese currency; and interest rates have diverged

considerably from the Japanese rate. With respect to public budget balance, only four countries have consistently reported a surplus.

In another respect, pairs of economies associated with fixed exchange rates, Hong Kong and Macau, and Singapore and Brunei are somewhat parallel across all the nominal Maastricht dimensions.

Table 7.2 Maastricht criteria averages

	US			G3			Japan			Germany/EMU			China		
	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST
INF	6.017	8.154	3.485	6.694	8.494	3.906	7.619	8.700	4.931	6.671	8.011	3.645	10.600	8.971	4.061
NER	2.867	3.866	1.498	4.595	6.365	2.048	6.150	5.592	2.694	6.103	10.845	2.504	6.784	4.070	1.609
INT	4.901	4.671	4.788	5.271	5.002	4.544	9.212	9.492	7.939	4.499	4.682	4.692	4.565	5.635	4.800

The scatter matrices depicting the Maastricht features against the US for the periods are collected in Figure 7.6. The scatterplot matrices by other reference countries are placed in Appendix D. Similar to the OCA variables, the grouping of the Maastricht data varies for each variable so there is no simple way to classify the data. Hence, multivariate clustering analysis used here is one appropriate method to classify the objects into symmetrical groups with respect to the Maastricht criteria.

The ensuing section presents the Maastricht criteria findings by hierarchical cluster analysis.

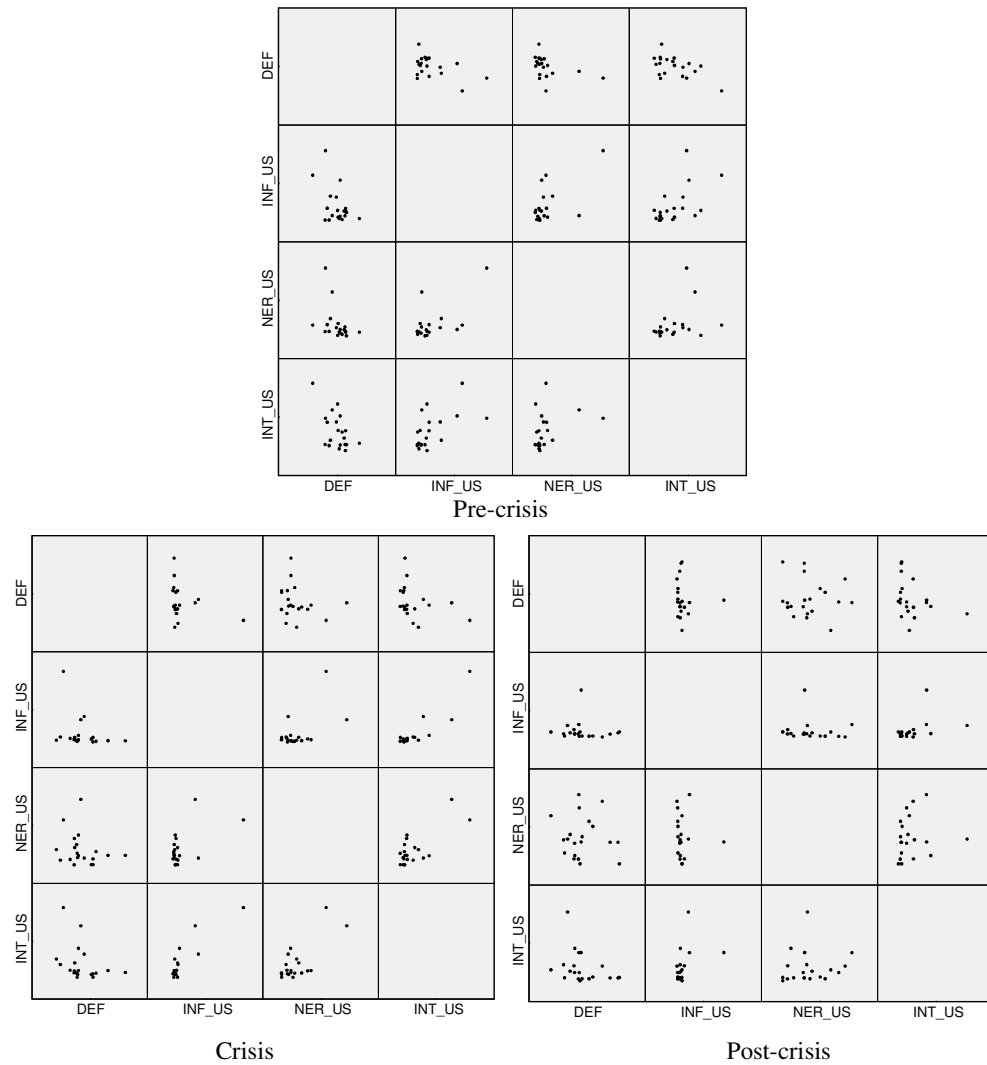


Figure 7.6 Maastricht-dollar scatter matrices

7.2 Hierarchical Clustering Results

The results by hierarchical cluster analysis are categorized into three main sections: classifications, assessment of preparedness, and a recapitulation.

7.2.1 Classifications

The section is divided into three parts: cluster validation; findings by each monetary anchor; and comparisons of findings across the anchors.

Cluster Validation

The cophenetic correlation coefficients from hierarchical cluster analysis using

Maastricht criteria are displayed in Table 7.3. Akin to the OCA solutions, the average linkage method yields the highest coefficients almost all the time.

Table 7.3 Cophenetic correlation coefficients using Maastricht criteria

Method	Dollar			Currency Basket			Yen			Euro			Yuan		
	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST
Average	.928	.934	.887	.922	.943	.916	.920	.938	.909	.949	.957	.946	.949	.912	.878
Centroid	.937	.932	.886	.921*	.942	.915	.915*	.939	.906	.947	.956*	.945*	.949*	.927	.887*
Ward	.854	.868	.766	.876	.873	.795	.864	.864	.803	.908	.891	.869	.911	.858	.765

Note: *Distances between clusters are not monotonically increasing; the centroid method may not be appropriate.

Source: Hierarchical cluster analysis. See Appendix A for data description.

The values of the stopping indexes, the Calinski-Harabasz Index (CHI) and the C-index (C) are listed in Table 7.4. The selected numbers of clusters are highlighted. The basis for selection is similar to that in OCA analysis, that is, solutions which yield significantly high CHIs and at the same time significantly low C-indexes are chosen. Of course the selected number of clusters should be neither too few nor too many.

For pre-crisis period, the CHI selected for the China-based solution is the highest whereas for crisis and post-crisis periods, the CHIs selected for the US-based solutions are the greatest.

Table 7.4 CHI and C-index using Maastricht criteria

k	Dollar						Currency Basket					
	Pre-crisis		Crisis		Post-crisis		Pre-crisis		Crisis		Post-crisis	
	CHI	C	CHI	C	CHI	C	CHI	C	CHI	C	CHI	C
2	2.40	.51	11.78	.51	3.79	.49	-5.35	.51	6.46	.51	-2.27	.50
3	4.98	.50	6.98	.51	2.07	.49	-1.95	.49	4.92	.49	.74	.49
4	1.90	.50	3.93	.52	1.35	.51	5.27	.42	1.56	.51	.52	.50
5	2.05	.50	1.94	.54	1.90	.52	4.22	.41	2.71	.49	2.06	.49
6	6.83	.44	2.37	.53	1.49	.53	3.16	.42	2.47	.50	2.31	.44
7	5.33	.43	3.41	.49	7.88	.35	2.36	.44	3.23	.47	2.28	.43
8	4.26	.45	2.72	.47	4.89	.34	3.17	.42	2.56	.45	1.79	.45
9	3.03	.44	5.72	.36	3.92	.36	2.56	.41	5.61	.37	4.22	.36
10	4.11	.43	10.55	.31	35.01	.15	2.52	.39	4.29	.38	3.93	.33
11	3.33	.42	8.95	.28	28.37	.17	2.01	.38	3.93	.36	3.15	.33

k	Yen						Euro						Yuan					
	Pre-crisis		Crisis		Post-crisis		Pre-crisis		Crisis		Post-crisis		Pre-crisis		Crisis		Post-crisis	
	CHI	C	CHI	C	CHI	C	CHI	C	CHI	C	CHI	C	CHI	C	CHI	C	CHI	C
2	.16	.52	7.37	.51	3.99	.49	-1.44	.51	3.60	.50	28.99	.48	-1.89	.54	-.45	.52	3.46	.50
3	1.19	.51	5.78	.49	2.57	.47	.36	.51	2.95	.50	12.12	.47	.06	.52	.82	.50	1.76	.49
4	1.54	.51	2.03	.50	1.67	.49	.64	.51	3.30	.49	8.17	.48	.15	.53	-1.33	.52	2.49	.50
5	6.39	.45	2.25	.51	3.18	.45	4.89	.46	1.33	.49	10.03	.41	7.08	.42	1.09	.52	3.78	.43
6	5.02	.47	2.46	.54	2.36	.45	4.98	.43	1.16	.54	8.15	.39	5.45	.43	1.63	.48	2.81	.45
7	4.93	.47	2.29	.52	2.94	.40	3.82	.39	1.39	.54	5.93	.44	4.75	.42	1.26	.48	3.98	.42
8	3.89	.50	2.79	.47	2.72	.44	6.37	.36	1.75	.50	10.27	.32	7.36	.26	2.89	.38	3.59	.41
9	3.10	.48	2.48	.47	2.52	.41	5.12	.36	2.35	.47	13.75	.28	5.85	.24	2.64	.39	2.86	.44
10	2.61	.47	3.04	.37	3.02	.35	4.14	.37	2.11	.44	13.25	.23	4.76	.23	2.22	.35	7.18	.32
11	2.09	.45	4.46	.26	2.97	.33	4.56	.34	2.75	.38	10.74	.26	4.37	.24	2.90	.31	5.75	.33
12	1.85	.43	3.56	.27	2.30	.36	3.69	.35	2.42	.34	8.68	.29	5.40	.25	2.60	.29	4.58	.37

Note: In general, an effective representation of data requires that the number of clusters be neither too small nor too large. The number of clusters considered here should suffice for meaningful interpretations.

Source: Hierarchical cluster analysis. See Appendix A for data description.

Dollar Anchor Results

The dendrograms illustrating the US-reference agglomeration are presented in Figure 7.7 and the cluster features are reported in Table 7.5. A total of 6, 10, and 10 clusters are indicated for the pre-crisis, the crisis, and the post-crisis period respectively. Suggested by the all-case average silhouette at 0.45, the crisis period clusters are the best classified.

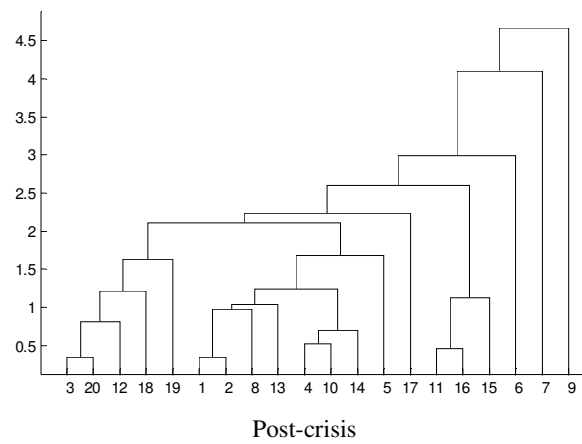
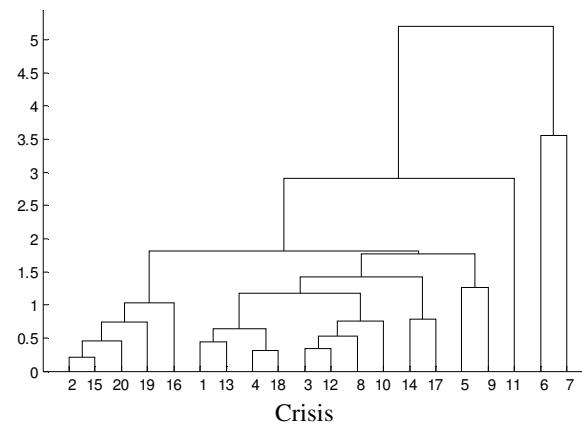
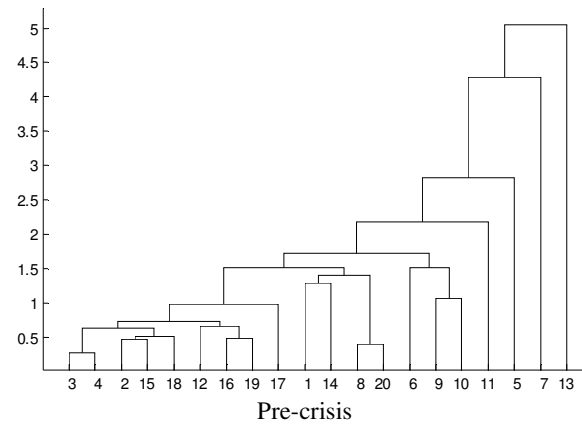
The pre-crisis dendrogram shows that the Korea-Taiwan and Malaysia-Canada pairs are the most closely connected mergers. Together with a bunch of other economies, they constitute the first cluster, as shown in the Table 7.5. However, the most properly classified group is the second group with silhouette 0.53 and the most potential cluster for dollar peg is the singleton Singapore which boasts all four most Maastricht-conforming attributes.

The configuration is significantly more fragmented in the crisis period solution with the presence of 10 clusters. Even so, Hong Kong, Macau, Canada, and New Zealand maintain in the same grouping and share two best features.

Only Korea and Thailand retain their linkage since the pre-crisis period in the post-crisis configuration. Nonetheless, the best classified cluster for this period is Singapore-Brunei-Macau at silhouette 0.80 which enjoys the highest budget surplus and the most convergent interest rate. This cluster could be relatively feasible for dollar peg for this period.

Since Korea and Thailand consistently share the same grouping over the results, they might have been stably parallel in the dimensions with reference to US throughout the periods. The findings also imply that the region has become significantly fragmented against the US.

In other respect, the less liberalized/developed nations such as Laos, Cambodia, Myanmar, and Indonesia are almost always distanced from the pack. They are singled out either by dispersion in inflation and/or interest rate from the US rate.



CHN	HKG	KOR	TWN	KHM	IDN	LAO	MYS	MMR	PHL	SGP	THA	VNM	IND	MAC	BRN	JPN	AUS	NZL	CAN
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Source: Hierarchical cluster analysis. See Appendix A for data description.

Figure 7.7 Maastricht-dollar dendrograms

Table 7.5 Maastricht-HCM-dollar clusters

			Averages			
Cluster	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis						
All Cases	.29	-1.726	6.017	2.867	4.901	
1 CHN, HKG, KOR, TWN, MYS, THA, IND, MAC, BRN, JPN, AUS, NZL, CAN	.33	-1.292	3.636	1.669	2.606	0
2 IDN, MMR, PHL	.53	-1.402	9.326	1.367	8.799	0
3 SGP	.00	6.269	1.941	1.032	1.971	4
4 KHM	.00	-3.467	2.928	10.921	9.748	0
5 LAO	.00	-10.466	16.120	2.778	15.935	0
6 VNM	.00	-5.860	24.109	16.810	7.797	0
Crisis						
All Cases	.45	-1.027	8.154	3.866	4.671	
1 HKG, MAC, CAN, NZL	.58	1.268	2.479	1.266	1.357	2
2 BRN	.00	4.162	1.771	2.439	2.583	0
3 CHN, VNM, TWN, AUS	.70	-2.384	2.331	1.553	1.622	0
4 KOR, THA, MAC, MYS, PHL	.67	-1.976	2.748	4.758	2.683	0
5 IND, JPN	.61	-5.615	3.726	2.547	5.253	0
6 KHM	.00	-1.658	6.694	2.349	9.303	0
7 MMR	.00	-5.535	24.586	1.730	7.548	0
8 SGP	.00	7.572	1.652	2.439	1.995	2
9 IDN	.00	-1.199	21.576	16.679	16.132	0
10 LAO	.00	-4.645	67.298	11.438	21.618	0
Post-crisis						
All Cases	.36	-.553	3.485	1.498	4.788	
1 KOR, CAN, THA, AUS	.37	.114	.909	2.205	1.832	0
2 NZL	.00	3.501	.492	3.298	5.315	1
3 CHN, HKG, MYS, VNM	.33	-2.265	2.536	.408	2.145	1
4 TWN, PHL, IND	.70	-3.255	2.143	1.390	4.196	0
5 KHM	.00	-2.149	2.149	.563	11.075	0
6 JPN	.00	-7.050	2.968	2.573	4.091	0
7 SGP, BRN, MAC	.80	6.272	2.462	.871	1.499	2
8 IDN	.00	-1.330	6.663	3.639	9.675	0
9 LAO	.00	-3.641	6.162	1.398	22.913	0
10 MMR	.00	-.846	23.681	1.254	9.705	0

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Hierarchical cluster analysis. See Appendix A for data description.

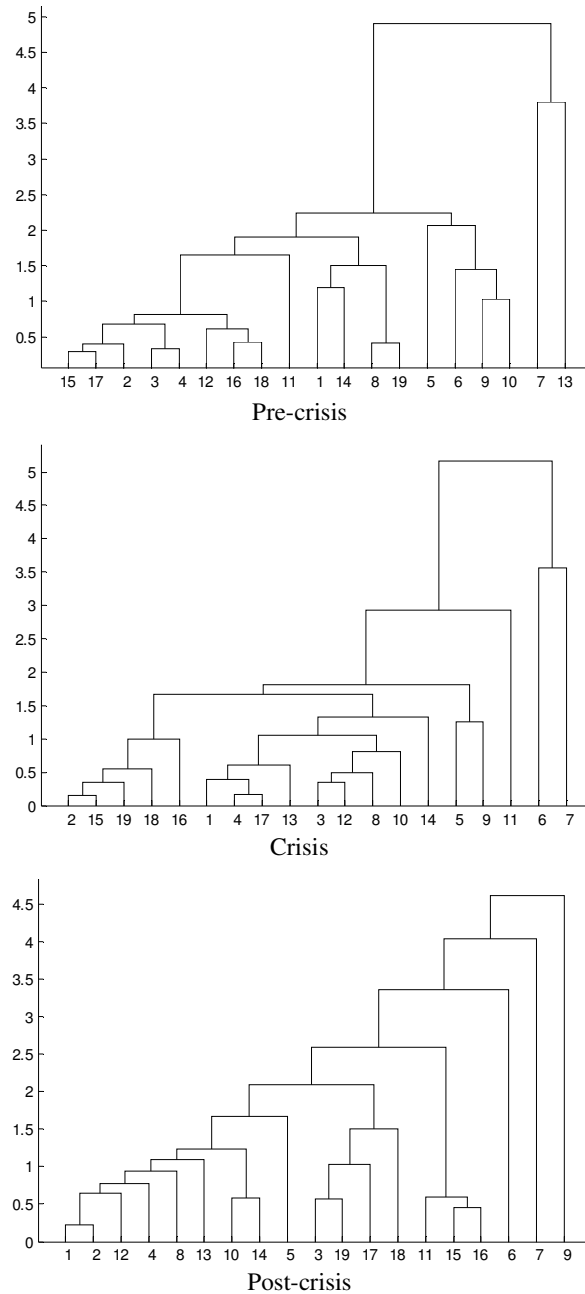
Currency Basket Anchor Results

The G3-based merging progressions are illustrated in Figure 7.8. Table 7.6 exhibits the groupings and descriptions. 4, 9, and 9 clusters are present for the three periods respectively, signifying increased degree of fragmentation since the crisis period against the weighted G3 countries, the US, Japan, and Germany/EMU with respective weights of 0.47, 0.23, and 0.30.

The pre-crisis dendrogram reveals that the most closely connected mergers are Macau-Australia, Korea-Taiwan, Brunei-New Zealand, and Malaysia-Canada which constitute part of the first group. Not only the largest, the first group of 13 countries also enjoys the highest silhouette at 0.50 and all 4 attributes most compatible for fixed basket peg.

A couple of nations retain their pre-crisis links in the crisis period setting.

Nonetheless, it is Singapore, possessing 3 most conforming features which might be most prospective for fixed peg in the crisis period.



CHN	HKG	KOR	TWN	KHM	IDN	LAO	MYS	MMR	PHL	SGP	THA	VNM	IND	MAC	BRN	AUS	NZL	CAN
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Source: Hierarchical cluster analysis. See Appendix A for data description.

Figure 7.8 Maastricht-basket dendrograms

In the post-crisis finding, Singapore, Macau, and Brunei restore their pre-crisis linkage and make up the most tightly classified cluster with remarkable silhouette 0.94

exhibiting 2 best attributes, the highest surplus and most parallel interest rate.

Throughout the solutions, China-Taiwan, Malaysia-Thailand and Macau-Brunei consistently share the same groupings. Akin to the US-based results, the findings here also suggest that the region has become significantly divergent since the crisis period. This is not surprising since US has the greatest weight in the currency basket.

Table 7.6 Maastricht-HCM-basket clusters

			Averages			
Cluster	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis						
All Cases	.43	-1.747	6.694	4.595	5.271	
1 MAC, AUS, HKG, KOR, TWN, THA, BRN, NZL, SGP, CHN, IND, MYS, CAN	.50	-.707	4.052	2.568	2.676	4
2 KHM, IDN, MMR, PHL	.42	-1.918	8.368	4.816	9.554	0
3 LAO	.00	-10.466	16.519	9.182	16.008	0
4 VNM	.00	-5.860	24.510	25.481	8.544	0
Crisis						
All Cases	.41	-.765	8.494	6.365	5.002	
1 HKG, MAC, CAN, NZL, BRN	.50	2.078	2.790	4.254	1.727	1
2 CHN, TWN, AUS, VNM	.68	-2.384	2.189	4.566	1.770	0
3 KOR, THA, MYS, PHL	.50	-2.135	3.335	7.704	3.480	0
4 IND	.00	-5.231	5.950	4.335	5.493	0
5 KHM	.00	-1.658	6.631	5.161	10.351	0
6 MMR	.00	-.535	24.978	4.496	8.597	0
7 SGP	.00	7.572	1.186	5.041	1.137	3
8 IDN	.00	-1.199	21.985	17.533	17.181	0
9 LAO	.00	-4.645	68.106	12.501	22.666	0
Post-crisis						
All Cases	.44	-0.211	3.906	2.048	4.544	0
1 CHN, HKG, THA, TWN, MYS, VNM	.35	-1.984	2.289	1.638	1.830	0
2 PHL, IND	.78	-3.782	3.226	2.181	4.586	0
3 KHM	.00	-2.149	2.658	1.588	10.987	0
4 KOR, AUS, CAN	.60	.366	1.474	2.648	1.681	0
5 NZL	.00	3.501	1.174	3.253	5.139	1
6 SGP, MAC, BRN	.94	6.272	2.134	1.555	.970	2
7 IDN	.00	-1.330	7.663	3.803	9.628	0
8 LAO	.00	-3.641	7.151	2.026	22.923	0
9 MMR	.00	-0.846	24.559	1.441	9.550	1

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

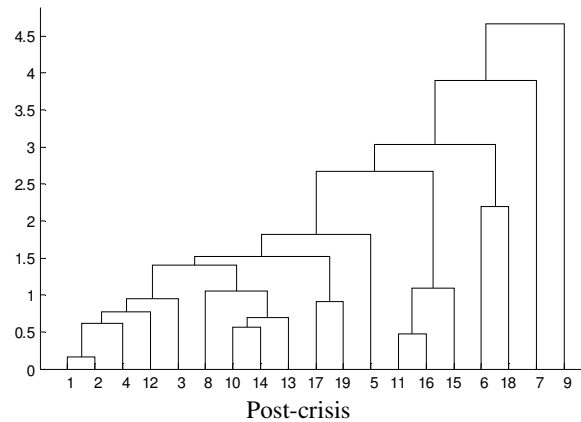
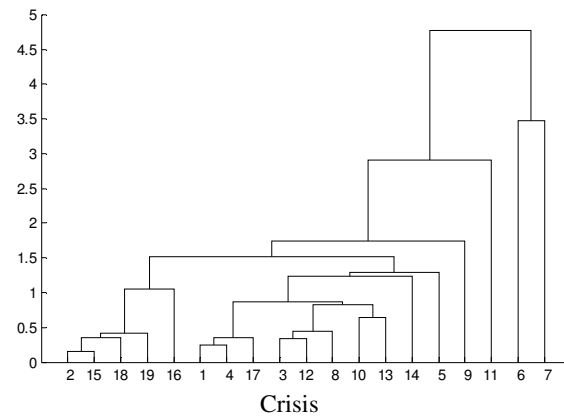
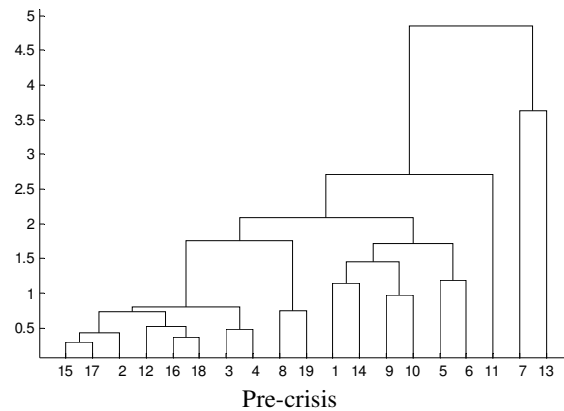
Source: Hierarchical cluster analysis. See Appendix A for data description.

Yen Anchor Results

The agglomerations using Japan as the anchor are illustrated in Figure 7.9 and the characteristics of the groupings are found in Table 7.7. The stopping rules suggest 5, 11, and 5 clusters respectively for pre-crisis, crisis, and post-crisis periods. The significantly more clusters for the crisis period could indicate increased divergence vis-à-vis Japan in the crisis period. The silhouette over all objects of the post-crisis solution at 0.55 is the largest.

The pre-crisis dendrogram reveals that the Macau-Australia and Brunei-

NewZealand pairs are the most closely linked subclusters. In combination with 6 other countries, they constitute the first group which is not only the dominant group but is also the most tightly classified cluster at silhouette 0.62. Nevertheless, displaying the most favorable conditions, the one most appropriate for yen adoption is the singleton Singapore.



CHN	HKG	KOR	TWN	KHM	IDN	LAO	MYS	MMR	PHL	SGP	THA	VNM	IND	MAC	BRN	AUS	NZL	CAN
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19

Source: Hierarchical cluster analysis. See Appendix A for data description.

Figure 7.9 Maastricht-yen dendrograms

A few countries retain their pre-crisis groupings in the crisis period arrangement. Amongst them, HongKong-Macau-NewZealand-Canada is best classified.

The subclusters of Korea-Malaysia-Thailand, Taiwan-Australia, and HongKong-Canada are robust from the pre-crisis till the post-crisis solution. For post-crisis period, it is the group of Singapore-Brunei-Macau which is the best classified at silhouette 0.88 and the most prospective cluster with 3 most favorable conditions.

Table 7.7 Maastricht-HCM-yen clusters

Cluster	Averages					N ³
	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	
Pre-crisis						
All Cases	.46	-1.747	7.619	6.150	9.212	
1 MAC, AUS, HKG, THA, BRN, NZL, KOR, TWN, MYS, CAN	.62	-.606	4.312	3.410	6.445	0
2 CHN, IND, MMR, PHL, KHM, IDN	.42	-2.845	9.509	5.312	12.521	0
3 SGP	.00	6.269	1.340	2.776	2.988	4
4 LAO	.00	-10.466	17.197	14.842	18.874	0
5 VNM	.00	-5.860	26.045	33.265	10.821	0
Crisis						
All Cases	.45	-.765	8.700	5.592	9.492	
1 HKG, MAC, NZL, CAN	.86	1.268	2.082	4.072	6.423	0
2 CHN, TWN, AUS	.85	-2.083	1.767	3.930	5.096	0
3 KOR, THA, MYS	.75	-2.049	3.277	7.104	7.585	0
4 PHL, VNM	.20	-2.841	4.381	4.761	9.791	0
5 IND	.00	-5.231	6.971	3.655	10.506	0
6 BRN	.00	4.162	1.032	3.757	3.594	2
7 MMR	.00	-.535	25.494	3.278	13.610	1
8 SGP	.00	7.572	1.038	3.757	4.078	1
9 KHM	.00	-1.658	6.546	4.506	15.365	0
10 IDN	.00	-1.199	22.682	16.431	22.194	0
11 LAO	.00	-4.645	69.312	11.962	27.680	0
Post-crisis						
All Cases	.55	-.211	4.931	2.694	7.939	
1 CHN, HKG, KOR, THA, TWN, MYS, PHL, IND, VNM, AUS, CAN, KHM	.58	-1.710	3.346	2.687	6.226	0
2 SGP, BRN, MAC	.88	6.272	1.882	2.236	4.073	3
3 IDN, NZL	.39	1.086	6.238	3.830	11.582	0
4 LAO	.00	-3.641	9.059	2.607	26.941	0
5 MMR	.00	-.846	26.361	1.955	13.812	0

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^3$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

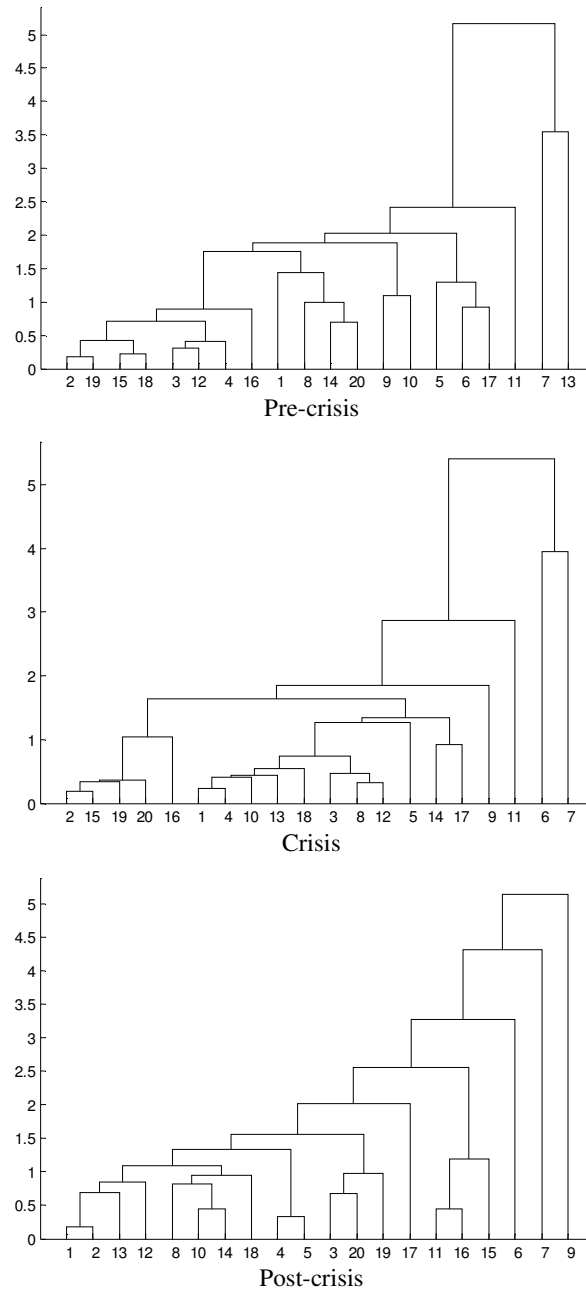
Source: Hierarchical cluster analysis. See Appendix A for data description.

Euro Anchor Results

The Germany/EMU-based dendrograms are exhibited in Figure 7.10 and the characteristics of the clusters are listed in Table 7.8. The number of groups for the pre-crisis, crisis, and post-crisis periods are 8, 4, and 10 clusters respectively, suggesting a substantially convergent region in the crisis period. Indicated by the all-case average silhouette at 0.56, the crisis period configuration is also the best partitioned.

For the pre-crisis period, HongKong-NewZealand and Macau-Australia are the

early mergers which are joined by Korea, Thailand, Taiwan, and Brunei. They form the largest group which is also most tightly classified at silhouette 0.80. In respect of conformity to Maastricht conditions, Singapore is most favorable in the budget, inflation, and exchange rate dimensions.



CHN	HKG	KOR	TWN	KHM	IDN	LAO	MYS	MMR	PHL	SGP	THA	VNM	IND	MAC	BRN	JPN	AUS	NZL	CAN
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Source: Hierarchical cluster analysis. See Appendix A for data description.

Figure 7.10 Maastricht-euro dendrograms

The arrangement is highly convergent in the crisis period solution, containing only 4 clusters in which 3 are singletons. Singapore is unique in the sense that it is most Maastricht-conforming in all the dimensions.

HongKong-Thailand, Malaysia-India, and Korea-NewZealand retain their pre-crisis ties until the post-crisis setting. The groups containing Malaysia-India and Korea-NewZealand each exhibit one best attribute. The independent Macau and Myanmar also maintain one best feature each. Unlike previous findings, no cluster shows more than one best feature. For this post-crisis era, Taiwan and Cambodia make up the most tightly clustered group with remarkable silhouette at 0.91.

Based on the size of the dominant cluster and the number of groups, on the whole the region might have been more divergent vis-à-vis Germany/EMU over the periods.

Table 7.8 Maastricht-HCM-euro clusters

			Averages				
Cluster	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³	
Pre-crisis							
All Cases	.52	-1.500	6.671	6.103	4.499		
1 HKG, NZL, MAC, AUS, KOR, THA, TWN, BRN	.80	.570	4.012	3.511	1.783	0	
2 CHN	.00	-4.130	9.797	4.933	.759	1	
3 MYS, IND, CAN	.56	-5.296	3.543	3.334	3.362	0	
4 MMR, PHL	.47	-1.322	12.480	3.324	5.381	0	
5 KHM, IDN, JPN	.54	-2.123	3.417	6.312	8.182	0	
6 SGP	.00	6.269	1.264	2.772	4.229	3	
7 LAO	.00	-10.466	16.624	14.877	13.926	0	
8 VNM	.00	-5.860	23.962	33.098	7.968	0	
Crisis							
All Cases	.56	-1.027	8.011	10.845	4.682		
1 HKG, MAC, NZL, CAN, BRN, CHN, TWN, PHL, VNM, AUS, KOR, MYS, THA, KHM, IND, JPN, MMR	.66	-1.310	4.065	10.147	3.239	0	
2 SGP	.00	7.572	.570	10.102	3.136	4	
3 IDN	.00	-1.199	22.092	19.715	14.981	0	
4 LAO	.00	-4.645	68.446	14.578	20.466	0	
Post-crisis							
All Cases	.42	-.553	3.645	2.504	4.692		
1 CHN, HKG, VNM, THA	.44	-1.363	2.569	2.376	3.173	0	
2 MYS, PHL, IND, AUS	.36	-3.259	2.181	2.670	1.769	1	
3 TWN, KHM	.91	-2.176	1.931	2.429	7.122	0	
4 KOR, CAN, NZL	.52	1.941	1.059	2.816	3.288	1	
5 JPN	.00	-7.050	1.912	2.527	7.646	0	
6 SGP, BRN	.86	5.908	1.126	1.942	4.024	0	
7 MAC	.00	7.001	3.184	2.433	2.719	1	
8 IDN	.00	-1.330	7.720	3.840	6.085	0	
9 LAO	.00	-3.641	7.239	2.563	19.295	0	
10 MMR	.00	-.846	24.554	1.340	6.166	1	

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Hierarchical cluster analysis. See Appendix A for data description.

Yuan Anchor Results

The China-centered solutions are shown in Figure 7.11 and Table 7.9. The numbers of clusters indicated for pre-crisis, crisis, and post-crisis periods are 8, 11, and 10. The pre-crisis silhouette for all objects is the largest at 0.49.

The pre-crisis dendrogram reveals that the most closely linked countries in that period are Korea and Thailand, and Macau and Australia. It might be interesting to find the tight linkage between Macau and Australia vis-à-vis China before the crisis. Anyway, these countries make up part of the best classified cluster with silhouette 0.83 and also the largest group which displays the most convergent interest rate toward the Chinese rate. Meantime, Singapore has the most favorable budget balance and stable yuan rate while the Indonesian inflation is the closest to the Chinese one.

Taiwan and Australia maintain their pre-crisis link and form the best classified cluster for the crisis period. Singapore, having the highest surplus in budget balance and the most parallel interest rate to the Chinese rate, might still the most conforming country in this period of distress.

Singapore, in combination with Brunei and Macau, is still the most prospective nation for a fixed yuan peg in the post-crisis arrangement. The three economies share the highest silhouette 0.88, the best budget position, and the highest degree of symmetry in inflation and interest rate with China.

No counties are constantly put together in the same grouping over the results. By looking at the size of the dominant group and the number of clusters, the region could have been more divergent in relation to China since the crisis period.

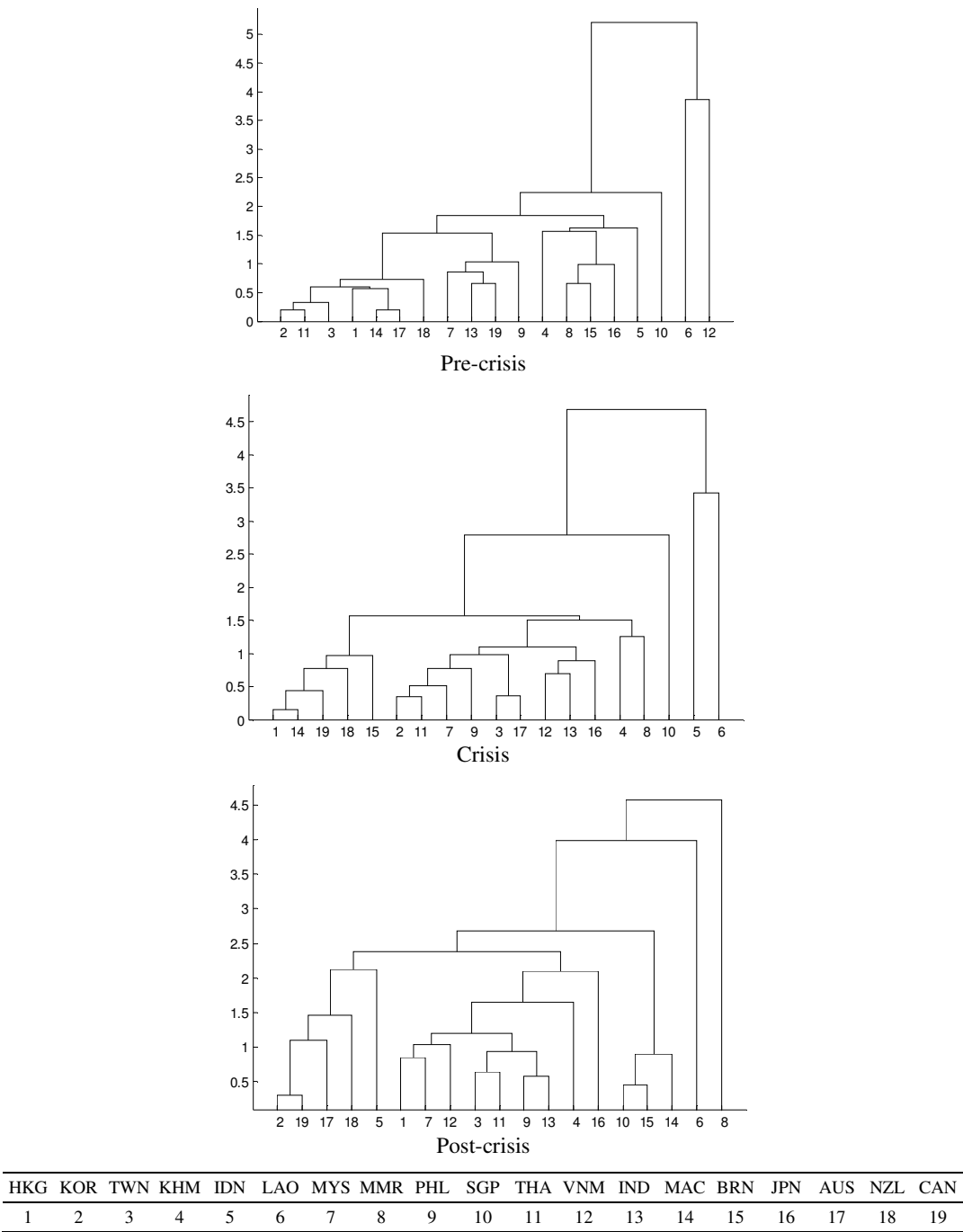


Figure 7.11 Maastricht-yuan dendrograms

Table 7.9 Maastricht-HCM-yuan clusters

			Averages			
Cluster	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis						
All Cases	.49	-1.600	10.600	6.784	4.565	
1 KOR, THA, TWN, HKG, MAC, AUS, NZL	.83	.465	8.850	4.243	1.775	1
2 MYS, IND, CAN, PHL	.53	-4.473	8.796	4.275	3.594	0
3 KHM	.00	-3.467	11.432	11.918	7.895	0
4 MMR, BRN, JPN	.47	-.224	11.974	4.361	6.648	0
5 IDN	.00	-1.563	6.811	5.204	8.442	1
6 SGP	.00	6.269	10.232	3.987	4.651	2
7 LAO	.00	-10.466	16.614	14.963	13.823	0
8 VNM	.00	-5.860	23.264	32.948	7.269	0
Crisis						
All Cases	.33	-.949	8.971	4.070	5.635	
1 HKG, MAC, CAN, NZL	.59	1.268	2.214	1.266	2.385	1
2 BRN	.00	4.162	1.113	2.438	.746	1
3 KOR, THA, MYS, PHL	.47	-2.135	4.081	5.973	4.197	0
4 TWN, AUS	.87	-1.871	2.316	2.405	1.472	0
5 VNM, IND	.20	-4.260	5.739	1.299	5.316	0
6 JPN	.00	-6.000	1.360	3.893	4.237	0
7 KHM	.00	-1.658	7.048	2.351	11.128	0
8 MMR	.00	-.535	25.923	1.732	9.373	0
9 SGP	.00	7.572	1.231	2.438	.272	2
10 IDN	.00	-1.199	23.022	16.679	17.957	0
11 LAO	.00	-4.645	69.459	11.440	23.443	0
Post-crisis						
All Cases	.37	-.508	4.061	1.609	4.800	
1 KOR, CAN, AUS	.58	.366	2.243	2.505	1.638	0
2 NZL	.00	3.501	2.083	3.338	5.494	0
3 IDN	.00	-1.330	7.336	3.680	9.854	0
4 HKG, MYS, VNM	.29	-2.551	2.910	.526	2.353	1
5 TWN, THA, PHL, IND	.46	-2.602	2.621	1.428	3.392	0
6 KHM	.00	-2.149	2.651	.722	11.254	0
7 JPN	.00	-7.050	2.357	2.552	3.912	0
8 SGP, BRN, MAC	.88	6.272	1.889	.946	.725	3
9 LAO	.00	-3.641	7.225	1.345	23.092	0
10 MMR	.00	-.846	23.901	1.285	9.884	0

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Hierarchical cluster analysis. See Appendix A for data description.

7.2.1.1 Comparisons across Anchors

The hierarchical clustering solutions using Maastricht criteria are put together in Table 7.10. The average silhouettes over all cases suggest that euro solutions are most appropriately classified for the former two periods and yen solution is best classified for the latter period. Amongst all clusters, higher silhouettes are obtained by the post-crisis clusters containing Singapore and Brunei.

Overall, there are fewer clusters for the pre-crisis period, indicating higher regional homogeneity in terms of the Maastricht dimensions in that period in which the most convergent configurations are by US, G3, and Japan references. In the crisis period setting, the Germany/EMU-based configuration is highly symmetrical in the sense that one cluster almost encompasses all the cases. Similarly, in the post-crisis configuration

the Japan-based solution is exceptionally homogenous.

To evaluate how the levels of convergence might have changed, it is best to look at the configurations over the periods. On the whole, it appears that only the Japan solution has become slightly more convergent whereas the US and the G3 ones have been more divergent.

Based on the above, in general the Japan reference is associated with more convergent cluster configurations.

Whilst no full groupings are consistently stable over the periods, one can find subgroups which are robust in the rows labeled 'All Periods'. With respect to these cross-period subclusters, none are present by the China reference. A number of cross-period linkages are present by other references.

How parallel are the countries associated with fixed exchange rates? The effective dollar areas of Hong Kong and Macau are put together over all anchors for the pre-crisis and crisis periods but not by any anchor for the post-crisis period. As for Singapore and Brunei, for pre-crisis period they are only placed together by the basket anchor while for post-crisis period they are placed together over all anchors. Hence, despite maintaining similar policies, these pairs of economies are not indicated to be consistently symmetrical over the periods.

Two features of the post-crisis findings are presented in the second part of Table 7.10. The first row shows the groups with the greatest silhouettes and the second row displays the highly closely linked subclusters depicted by the dendrograms. First, for post-crisis period the greatest silhouettes are attained by Singapore-Brunei-Macau for all anchors except for euro anchor. As these economies individually adopt some form of fixed exchange rate in practice, it is not surprising that they are highly parallel in the Maastricht conditions. Second, amongst the closely linked subgroupings, Korea-Canada, China-HongKong, Singapore-Brunei, and Philippines-India are common for all anchors.

Table 7.10 Maastricht-HCM summary

	Dollar	SW	Currency Basket	SW	Yen	SW	Euro	SW	Yuan	SW
Pre-crisis	1 CHN, HKG, KOR, TWN, MYS, THA, IND, MAC, BRN, JPN, AUS, NZL, CAN	.33	MAC, AUS, HKG, KOR, TWN, THA, BRN, NZL, SGP, CHN, IND, MYS, CAN	.51	MAC, AUS, HKG, THA, BRN, NZL, KOR, TWN, MYS, CAN	.62	HKG, NZL, MAC, AUS, KOR, THA, TWN, BRN	.80	KOR, THA, TWN, HKG, MAC, AUS, NZL	.83
	2 IDN, MMR, PHL	.53	KHM, IDN, MMR, PHL	.42	CHN, IND, MMR, PHL, KHM, IDN	.42	CHN	.00	MYS, IND, CAN, PHL	.53
	3 SGP	.00	LAO	.00	SGP	.00	MYS, IND, CAN	.56	KHM	.00
	4 KHM	.00	VNM	.00	LAO	.00	MMR, PHL	.47	MMR, BRN, JPN	.47
	5 LAO	.00			VNM	.00	KHM, IDN, JPN	.54	IDN	.00
	6 VNM	.00					SGP	.00	SGP	.00
	7						LAO	.00	LAO	.00
	8						VNM	.00	VNM	.00
Average		.29		.43		.46		.52		.49
Crisis	1 HKG, MAC, CAN, NZL	.58	HKG, MAC, CAN, NZL, BRN	.50	HKG, MAC, NZL, CAN	.86	HKG, MAC, NZL, CAN, BRN, CHN, TWN, PHL, VNM, AUS, KOR, MYS, THA, KHM, IND, JPN, MMR	.66	HKG, MAC, CAN, NZL	.59
	2 BRN	.00	CHN, TWN, AUS, VNM	.68	CHN, TWN, AUS	.85	SGP	.00	BRN	.00
	3 CHN, VNM, TWN, AUS	.70	KOR, THA, MYS, PHL	.50	KOR, THA, MYS	.75	IDN	.00	KOR, THA, MYS, PHL	.47
	4 KOR, THA, MYS, PHL	.67	IND	.00	PHL, VNM	.20	LAO	.00	TWN, AUS	.87
	5 IND, JPN	.61	KHM	.00	IND	.00		VNM, IND		.20
	6 KHM	.00	MMR	.00	BRN	.00		JPN		.00
	7 MMR	.00	SGP	.00	MMR	.00		KHM		.00
	8 SGP	.00	IDN	.00	SGP	.00		MMR		.00
	9 IDN	.00	LAO	.00	KHM	.00		SGP		.00
	10 LAO	.00			IDN	.00		IDN		.00
	11				LAO	.00		LAO		.00
Average		.45		.41		.45		.56		.33
Post-crisis	1 KOR, CAN, THA, AUS	.37	CHN, HKG, THA, TWN, MYS, VNM	.35	CHN, HKG, KOR, THA, TWN, MYS, PHL, IND, VNM, AUS, CAN, KHM	.58	CHN, HKG, VNM, THA	.44	KOR, CAN, AUS	.58
	2 NZL	.00	PHL, IND	.78	SGP, BRN, MAC	.88	MYS, PHL, IND, AUS	.36	NZL	.00
	3 CHN, HKG, MYS, VNM	.33	KHM	.00	IDN, NZL	.39	TWN, KHM	.91	IDN	.00
	4 TWN, PHL, IND	.70	KOR, AUS, CAN	.60	LAO	.00	KOR, CAN, NZL	.52	HKG, MYS, VNM	.29
	5 KHM	.00	NZL	.00	MMR	.00	JPN	.00	TWN, THA, PHL, IND	.46
	6 JPN	.00	SGP, MAC, BRN	.94			SGP, BRN	.86	KHM	.00
	7 SGP, BRN, MAC	.80	IDN	.00			MAC	.00	JPN	.00
	8 IDN	.00	LAO	.00			IDN	.00	SGP, BRN, MAC	.88
	9 LAO	.00	MMR	.00			LAO	.00	LAO	.00
	10 MMR	.00					MMR	.00	MMR	.00
Average		.36		.44		.55		.42		.37
All Periods	1 KOR, THA		CHN, TWN		KOR, MYS, THA		HKG, THA		-	
	2		MYS, THA		TWN, AUS		MYS, IND			
	3		MAC, BRN		HKG, CAN		KOR, NZL			
Post-crisis Findings										
1	Highest silhouette	SGP, BRN, MAC	SGP, BRN, MAC	SGP, BRN, MAC	TWN, KHM	SGP, BRN, MAC				
2	Closely linked subclusters indicated by dendrograms	KOR-CAN, CHN-HKG, TWN-PHL, SGP-BRN	CHN-HKG, PHL-IND, KOR-CAN, MAC-BRN	CHN-HKG, PHL-IND, SGP-BRN	CHN-HKG, PHL-IND, TWN-KHM, KOR-CAN, SGP-BRN	KOR-CAN, HKG-MYS, TWN-THA, PHL-IND, SGP-BRN				

Cross-anchor subclusters are shown in Table 7.11. By and large, relatively substantial cross-anchor subgroups are present by the pre-crisis period, indicating greater degree of symmetry in that period. It may also be notable to find the Korea-Thailand and Thailand-Malaysia links to be stable over the periods across dollar and

yen, and basket and yen, respectively. As for the most recent period, the post-crisis period, HongKong-Vietnam, Korea-Canada, Singapore-Brunei, and Philippines-India are robust over all anchors.

Table 7.11 Maastricht-HCM cross-anchor subclusters

	PRE	CRS	PST	All		PRE	CRS	PST	All
DB	1 CHN, HKG, KOR, TWN, MYS, THA, IND, MAC, BRN, AUS, NZL, CAN	HKG, MAC, CAN, NZL	CHN, HKG, MYS, VNM	-	DY	HKG, KOR, TWN, MYS, THA, MAC, BRN, AUS, NZL, CAN	HKG, MAC, NZL, CAN	KOR, THA, AUS, KOR, CAN	THA
	2 IDN, MMR, PHL	CHN, VNM, TWN, AUS	KOR, AUS, CAN			IDN, MMR, PHL	CHN, TWN, AUS	CHN, HKG, MYS, VNM	
	3	KOR, THA, MYS, PHL	SGP, BRN, MAC			CHN, IND	KOR, THA, MYS	TWN, PHL, IND	
	4		PHL, IND					SGP, BRN, MAC	
DE	1 HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	HKG, MAC, CAN, NZL	CHN, HKG, VNM	-	DR	KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, CAN, NZL	KOR, CAN, AUS	-
	2 MYS, IND, CAN	CHN, VNM, TWN, AUS	KOR, CAN			MYS, IND, CAN	TWN, AUS	HKG, MYS, VNM	
	3 MMR, PHL	KOR, THA, MYS, PHL	PHL, IND			BRN, JPN	KOR, THA, MYS, PHL	TWN, PHL, IND	
	4	IND, JPN	SGP, BRN					SGP, BRN, MAC	
BY	1 MAC, AUS, HKG, KOR, TWN, THA, BRN, NZL, MYS, CAN	HKG, MAC, CAN, NZL	CHN, HKG, THA, TWN, MYS, VNM	THA, MYS	BE	HKG, NZL, MAC, AUS, KOR, THA, TWN, BRN	HKG, MAC, CAN, NZL, BRN	CHN, HKG, THA, VNM	-
	2 KHM, IDN, MMR, PHL	CHN, TWN, AUS	KOR, AUS, CAN			MYS, IND, CAN	CHN, TWN, AUS, VNM	PHL, IND	
	3 CHN, IND	KOR, THA, MYS	SGP, MAC, BRN			MMR, PHL	KOR, THA, MYS, PHL	KOR, CAN	
	4		PHL, IND			KHM, IDN		SGP, BRN	
BR	1 KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, CAN, NZL	KOR, CAN, AUS	-	YE	MAC, AUS, HKG, THA, BRN, NZL, KOR, TWN,	HKG, MAC, NZL, CAN	CHN, HKG, VNM, THA	-
	2 MYS, IND, CAN	TWN, AUS	HKG, MYS, VNM			MYS, CAN	CHN, TWN, AUS	MYS, PHL, IND, AUS	
	3	KOR, THA, MYS, PHL	TWN, IND			KHM, IDN	KOR, THA, MYS	TWN, KHM	
	4		SGP, BRN, MAC			MMR, PHL	PHL, VNM	KOR, CAN	
	5							SGP, BRN	
YR	1 KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, NZL, CAN	KOR, CAN, AUS	-	ER	KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, CAN, NZL	HKG, VNM	-
	2 MYS, CAN	TWN, AUS	HKG, MYS, VNM			MYS, IND, CAN	KOR, THA, MYS, PHL	PHL, IND	
	3 IND, PHL	KOR, THA, MYS	TWN, THA, PHL, IND				TWN, AUS	KOR, CAN	
	4		SGP, BRN, MAC				VNM, IND	SGP, BRN	
DBY	1 HKG, KOR, TWN, MYS, THA, MAC, BRN, AUS, NZL, CAN	HKG, MAC, CAN, NZL	CHN, HKG, MYS, VNM	-	DBE	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	HKG, MAC, CAN, NZL	CHN, HKG, VNM	-
	2 IDN, MMR, PHL	CHN, TWN, AUS	KOR, AUS, CAN			MYS, IND, CAN	CHN, VNM, TWN, AUS	KOR, CAN	
	3 CHN, IND	KOR, THA, MYS	SGP, BRN, MAC			MMR, PHL	KOR, THA, MYS, PHL	SGP, BRN	
	4		PHL, IND					PHL, IND	

Table 7.11 Maastricht-HCM cross-anchor subclusters (continued)

	PRE	CRS	PST	All		PRE	CRS	PST	All
DBR	1 KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, CAN, NZL	HKG, MYS, VNM	-	DYE	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	HKG, MAC, NZL, CAN	CHN, HKG, VNM	-
	2 MYS, IND, CAN	TWN, AUS	KOR, AUS, CAN			MYS, CAN	CHN, TWN, AUS	KOR, CAN	
	3	KOR, THA, MYS, PHL	SGP, BRN, MAC			MMR, PHL	KOR, THA, MYS	PHL, IND	
	4		PHL, IND					SGP, BRN	
DYR	1 KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, NZL, CAN	KOR, AUS, CAN	-	DER	KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, CAN, NZL	HKG, VNM	-
	2 MYS, CAN	TWN, AUS	HKG, MYS, VNM			MYS, IND, CAN	TWN, AUS	KOR, CAN	
	3	KOR, THA, MYS	TWN, PHL, IND				KOR, THA, MYS, PHL	PHL, IND	
	4		SGP, BRN, MAC					SGP, BRN	
BYE	1 MAC, AUS, HKG, KOR, TWN, THA, BRN, NZL	HKG, MAC, CAN, NZL	CHN, HKG, THA, VNM	-	BYR	KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, CAN, NZL	HKG, MYS, VNM	-
	2 MYS, CAN	CHN, TWN, AUS	KOR, CAN			MYS, CAN	TWN, AUS	THA, TWN	
	3 KHM, IDN	KOR, THA, MYS	SGP, BRN				KOR, THA, MYS	KOR, AUS, CAN	
	4 MMR, PHL		PHL, IND					SGP, MAC, BRN	
	5							PHL, IND	
BER	1 KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, CAN, NZL	HKG, VNM	-	YER	KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, NZL, CAN	HKG, VNM	-
	2 MYS, IND, CAN	TWN, AUS	PHL, IND			MYS, CAN	TWN, AUS	PHL, IND	
	3	KOR, THA, MYS, PHL	KOR, CAN				KOR, THA, MYS	KOR, CAN	
	4		SGP, BRN					SGP, BRN	
DBYE	1 HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	HKG, MAC, NZL, CAN	CHN, HKG, VNM	-	DBYR	KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, CAN, NZL	HKG, VNM	-
	2 MMR, PHL	CHN, TWN, AUS	KOR, CAN			MYS, CAN	TWN, AUS	KOR, AUS, CAN	
	3	KOR, THA, MYS	SGP, BRN				KOR, THA, MYS	SGP, BRN, MAC	
	4		PHL, IND					PHL, IND	
DBER	1 KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, CAN, NZL	HKG, VNM	-	DYER	KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, NZL, CAN	HKG, VNM	-
	2 MYS, IND, CAN	TWN, AUS	KOR, CAN			MYS, CAN	TWN, AUS	KOR, CAN	
	3	KOR, THA, MYS, PHL	SGP, BRN				KOR, THA, MYS	PHL, IND	
	4		PHL, IND					SGP, BRN	
BYER	1 KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, CAN, NZL	HKG, VNM	-	DBYER	KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, MAC, NZL, CAN	HKG, VNM	-
	2 MYS, CAN	TWN, AUS	KOR, CAN				TWN, AUS	KOR, CAN	
	3	KOR, THA, MYS	SGP, BRN				KOR, THA, MYS	SGP, BRN	
			PHL, IND					PHL, IND	

Note: D=Dollar; B=Currency Basket; Y=Yen; E=Euro/Mark; R=Yuan (Renminbi)

7.2.2 Assessment of Preparedness

This section compares the Asian-only with the Asian-plus-EMU solutions. Associations with the euroized cases are expected to infer the levels of preparedness for EMU-like currency union amongst the Asian economies. Recall that EMU1, EMU2, and EMU3 represent pre-Maastricht, post-Maastricht, and post-euro periods respectively. Associations with the latter periods may indicate higher readiness. Common subsets between the Asian-only and the Asian-plus-EMU solutions should indicate common sharing of Maastricht features and degree of preparedness.⁵⁸

Results are reported in Table 7.12. Columns ‘1’ contain the original groupings comprising of Asian cases only and columns ‘2’ contain the solutions involving the Asian and EMU cases. Cells containing EMU cases are highlighted.

Based on the number of Asian cases linked with the euroized benchmarks, the region could have been more ready for dollar and basket pegs in the pre-crisis period, for dollar and yuan pegs in the crisis period, and for basket and yen pegs in the post-crisis period. For post-crisis period, though fewer Asian cases are linked with the EMU benchmarks by dollar and yuan anchors, they are nevertheless connected with EMU3, the post-euro benchmark.

Along these lines, on the whole over the periods the region could have been comparatively prepared by dollar, basket, or yen anchor.

Obviously, the groupings of the Asian cases are somewhat different when benchmark cases are added in the analysis. Hence, it is straightforward to identify common groupings between the two results. When a subset of Asian countries in column 1 intersects with that in column 2, the common sets of countries might most probably possess common Maastricht features and levels of preparedness.

⁵⁸ Cophenetic correlations indicate that group average linkage produces the best partitions, except for the post-crisis yen and euro results where the centroid method yields the largest coefficients. Previous HCM procedures apply.

The second part of the table lists the non-singleton common subsets. Generally speaking, over the periods more sets of countries jointly share Maastricht dimensions and degree of preparedness when US is the reference.

The cross-period common sets are listed at the bottom rows. Korea-Thailand is one by the US reference while Taiwan-Australia is one by Japan reference.

The effective dollar areas of Hong Kong and Macau are placed together for the pre-crisis and crisis periods by the US reference, in line with their dollar pegs but not for the post-crisis period. They are also placed together by some reference for some period but not consecutively over periods. Regarding Singapore and Brunei, Singapore is not seen in any common set.

The cross-anchor common sets of economies are exhibited in Table 7.13. Since no subgroups are stable over all periods across all anchors, it may be worthwhile to note those which are stable over all anchors and since the post-crisis period is the most recent period, it is compelling to focus on this period. For post-crisis period HongKong-Vietnam and Philippines-India are robust across all anchors.

The characteristics of the Asian-plus-EMU groups are put together in Table 7.14. Most of the time, Singapore alone or groups containing Singapore show more conforming attributes than even some of the Asian-plus-EMU clusters. Hence, though not associated with the EMU benchmarks, Singapore might also be highly prepared for EMU-like monetary arrangement.

Table 7.12 Maastricht-HCM preparedness assessment

	Dollar		Currency Basket		Yen		Euro		Yuan	
	1	2	1	2	1	2	1	2	1	2
Pre-crisis	1 CHN, HKG, KOR, TWN, MYS, THA, IND, MAC, BRN, JPN, AUS, NZL, CAN	CHN, HKG, KOR, TWN, MYS, THA, IND, MAC, BRN, JPN, AUS, NZL, CAN, EMU1, EMU2, EMU3	MAC, HKG, KOR, TWN, THA, BRN, AUS, MYS, NZL, CAN, SGP, CHN, IND	MAC, HKG, KOR, TWN, THA, BRN, AUS, MYS, NZL, CAN, EMU1, EMU2, EMU3	MAC, AUS, HKG, THA, BRN, NZL, KOR, TWN, MYS, CAN	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL, EMU3	HKG, NZL, MAC, AUS, KOR, THA, TWN, BRN	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL, EMU3	KOR, THA, TWN, HKG, MAC, AUS, NZL	HKG, KOR, TWN, MMR, THA, MAC, BRN, AUS, NZL
	2 IDN, MMR, PHL	IDN, MMR, PHL	KHM, IDN, MMR, PHL	IDN, MMR, PHL, CHN, IND	CHN, IND, MMR, PHL, KHM, IDN	MYS, CAN, EMU1, EMU2	MYS, IND, CAN	MYS, IND, CAN, EMU1, EMU2	MYS, IND, CAN, PHL	EMU1, EMU2, EMU3
	3 SGP	SGP	LAO	SGP	SGP	CHN, MMR, PHL, IND	KHM, IDN, JPN	KHM, IDN, JPN	MMR, BRN, JPN	MYS, PHL, IND, CAN
	4 KHM	KHM	VNM	KHM	LAO	KHM, IDN	MMR, PHL	MMR, PHL	KHM	KHM, IDN, JPN
	5 LAO	LAO	LAO	VNM	SGP	SGP	SGP	IDN	SGP	
	6 VNM	VNM	VNM		LAO	LAO	LAO	LAO	LAO	LAO
	7				VNM	VNM	VNM	VNM	VNM	VNM
	8					CHN	CHN	CHN	SGP	
Crisis	1 HKG, MAC, CAN, NZL	CHN, TWN, VNM, AUS, KOR, MYS, PHL, THA, EMU1, EMU2	HKG, MAC, CAN, NZL, BRN	CHN, TWN, VNM, AUS, EMU1, EMU2	HKG, MAC, NZL, CAN	CHN, TWN, AUS, EMU1, EMU2	HKG, MAC, NZL, CAN, BRN, CHN, TWN, PHL, VNM, AUS, KOR, MYS, THA, KHM, IND, JPN, MMR	CHN, HKG, KOR, TWN, KHM, MYS, PHL, THA, VNM, IND, MAC, BRN, JPN, AUS, NZL, CAN	HKG, MAC, CAN, NZL	KOR, TWN, MYS, PHL, THA, VNM, AUS, EMU1, EMU2
	2 CHN, VNM, TWN, AUS	HKG, MAC, NZL, CAN, EMU3	CHN, TWN, AUS, VNM	HKG, MAC, BRN, NZL, CAN	CHN, TWN, AUS	KOR, MYS, PHL, THA, VNM	SGP	EMU1, EMU2, EMU3	KOR, THA, MYS, PHL	HKG, MAC, NZL, CAN, EMU3
	3 KOR, THA, MYS, PHL	KHM, MMR	KOR, THA, MYS, PHL	KOR, MYS, PHL, THA	KOR, THA, MYS	HKG, MAC, NZL, CAN	IDN	SGP	TWN, AUS	KHM, MMR
	4 IND, JPN	IND, JPN	IND	MMR	PHL, VNM	EMU3	LAO	IDN	VNM, IND	SGP, BRN
	5 KHM	SGP, BRN	KHM	IND	IND	BRN	LAO	BRN	IND, JPN	IND, JPN
	6 MMR	IDN	MMR	KHM	BRN	IND	MMR	JPN	IDN	IDN
	7 SGP	LAO	SGP	SGP	MMR	KHM		KHM	LAO	
	8 IDN		IDN	IDN	SGP	MMR		MMR		
	9 LAO		LAO	LAO	KHM	SGP		SGP		
	10 BRN			EMU3	IDN	IDN		IDN		
	11			LAO	LAO			LAO		
Post-crisis	1 KOR, CAN, THA, AUS	CHN, HKG, MYS, VNM, TWN, PHL, IND, EMU3	CHN, HKG, THA, TWN, MYS, VNM	CHN, HKG, KOR, TWN, KHM, IDN, MYS, PHL, THA, VNM, IND, AUS, NZL, CAN, EMU1, EMU2	CHN, HKG, KOR, THA, TWN, MYS, PHL, IND, VNM, AUS, CAN, KHM	CHN, HKG, KOR, TWN, KHM, IDN, MYS, PHL, THA, VNM, IND, AUS, NZL, CAN, EMU1, EMU2	CHN, HKG, VNM, THA	CHN, HKG, MYS, PHL, THA, VNM, IND, AUS, EMU2	KOR, CAN, AUS	HKG, TWN, KHM, MYS, PHL, THA, VNM, IND, EMU3
	2 CHN, HKG, MYS, VNM	KOR, THA, AUS, CAN, EMU2	KOR, AUS, CAN	SGP, MAC, BRN	SGP, BRN, MAC	SGP, MAC, BRN	MYS, PHL, IND, AUS	KOR, NZL, CAN	TWN, THA, PHL, IND	KOR, JPN, AUS, NZL, CAN, EMU1, EMU2
	3 TWN, PHL, IND	SGP, MAC, BRN	SGP, MAC, BRN	EMU3	IDN, NZL	EMU3	KOR, CAN, NZL	SGP, MAC, BRN	HKG, MYS, VNM	SGP, MAC, BRN
	4 SGP, BRN, MAC	EMU1	PHL, IND	LAO	LAO	LAO	TWN, KHM	TWN, KHM	SGP, BRN, MAC	LAO
	5 KHM	KHM	KHM	MMR	MMR	MMR	SGP, BRN	EMU3	NZL	MMR
	6 JPN	JPN	IDN				MAC	EMU1	KHM	IDN
	7 IDN	IDN	LAO				IDN	JPN		
	8 LAO	LAO	MMR				LAO	IDN	IDN	
	9 MMR	MMR	NZL				MMR	LAO	LAO	
	10 NZL	NZL					JPN	MMR	MMR	
All Periods	1 KOR, THA	CHN, HKG, KOR, TWN, MYS, THA, AUS, CAN	CHN, TWN	TWN, AUS	KOR, MYS, THA	TWN, AUS	HKG, THA	-	-	-
	2		MYS, THA		TWN, AUS		MYS, IND			
	3		MAC, BRN		HKG, CAN		KOR, NZL			
Common sets of countries										
	Dollar		Currency Basket		Yen		Euro		Yuan	
	1	2	1	2	1	2	1	2	1	2
Pre-crisis	1 CHN, HKG, KOR, TWN, MYS, THA, IND, MAC, BRN, JPN, AUS, NZL, CAN	CHN, HKG, KOR, TWN, MYS, THA, BRN, AUS, MYS, NZL, CAN	MAC, HKG, KOR, TWN, THA, BRN, AUS, MYS, NZL, CAN		MAC, AUS, HKG, THA, BRN, NZL, KOR, TWN		HKG, NZL, MAC, AUS, KOR, THA, TWN, BRN		-	
	2				MYS, CAN		MYS, IND, CAN			
Crisis	1 HKG, MAC, CAN, NZL	CHN, TWN, AUS, VNM	CHN, TWN, AUS, VNM		CHN, TWN, AUS		-		HKG, MAC, CAN, NZL	
	2 CHN, VNM, TWN, AUS								KOR, THA, MYS, PHL	
	3 KOR, THA, MYS, PHL								TWN, AUS	
Post-crisis	1 KOR, CAN, THA, AUS	CHN, HKG, THA, TWN, MYS, VNM	CHN, HKG, THA, TWN, MYS, VNM		CHN, HKG, KOR, THA, TWN, MYS, PHL, IND, VNM, AUS, CAN, KHM		CHN, HKG, VNM, THA		TWN, THA, PHL, IND	
	2 CHN, HKG, MYS, VNM	KOR, AUS, CAN	KOR, AUS, CAN		IDN, NZL		MYS, PHL, IND, AUS		HKG, MYS, VNM	
	3 TWN, PHL, IND	PHL, IND	PHL, IND						KOR, CAN, AUS	
All Periods	1 KOR, THA	-	-		TWN, AUS		-		-	

Table 7.13 Maastricht-HCM-preparedness cross-anchor subclusters

	PRE	CRS	PST	All	PRE	CRS	PST	All
DB	1	HKG, KOR, TWN, MYS, THA, VNM, AUS MAC, BRN, AUS, NZL, CAN	CHN, TWN, KOR, CAN, THA, - AUS	DY	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	CHN, TWN, AUS	KOR, CAN, THA, - AUS	
	2		CHN, HKG, MYS, VNM		MYS, CAN		CHN, HKG, MYS, VNM	
	3		TWN, PHL, IND				TWN, PHL, IND	
DE	1	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	-	CHN, HKG, VNM	-	DR	-	HKG, MAC, CAN, KOR, CAN, AUS - NZL
	2	MYS, IND, CAN		PHL, IND				KOR, THA, MYS, PHL HKG, MYS, VNM
	3							TWN, PHL, IND
BY	1	MAC, HKG, KOR, TWN, THA, BRN, AUS	CHN, TWN, AUS	CHN, HKG, THA, - TWN, MYS, VNM	BE	MAC, HKG, KOR, - TWN, THA, BRN, AUS		CHN, HKG, THA, - VNM
	2	MYS, CAN		PHL, IND		MYS, CAN		PHL, IND
	3			KOR, AUS, CAN				
BR	1	-	-	HKG, MYS, VNM	YE	MAC, AUS, HKG, - THA, BRN, NZL, KOR, TWN		CHN, HKG, THA, - VNM
	2			THA, TWN		MYS, CAN		MYS, PHL, IND, AUS
	3			KOR, AUS, CAN				
	4			PHL, IND				
YR	1	-	-	HKG, MYS, VNM	ER	-	-	HKG, VNM
	2			KOR, AUS, CAN				PHL, IND
	3			TWN, THA, PHL, IND				
DBY	1	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	CHN, TWN, AUS	KOR, CAN, THA, - AUS	DBE	HKG, KOR, TWN, - THA, MAC, BRN, AUS, NZL		CHN, HKG, VNM -
	2	MYS, CAN		CHN, HKG, MYS, VNM		MYS, CAN		PHL, IND
	3			TWN, PHL, IND				
DBR	1	-	-	KOR, CAN, AUS	DYE	HKG, KOR, TWN, - THA, MAC, BRN, AUS, NZL		CHN, HKG, VNM -
	2			HKG, MYS, VNM		MYS, CAN		PHL, IND
	3			TWN, PHL, IND				
DYR	1	-	-	KOR, CAN, AUS	DER	-	-	HKG, VNM
	2			HKG, MYS, VNM				PHL, IND
	3			TWN, PHL, IND				
BYE	1	MAC, HKG, KOR, TWN, THA, BRN, AUS	-	CHN, HKG, THA, - VNM	BYR	-	-	HKG, MYS, VNM
	2	MYS, CAN		PHL, IND				THA, TWN
	3							PHL, IND
	4							KOR, AUS, CAN
BER	1	-	-	PHL, IND	YER	-	-	HKG, VNM
	2							PHL, IND
DBYE	1	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	-	CHN, HKG, VNM	DBYR	-	-	KOR, CAN, AUS -
	2	MYS, CAN		PHL, IND				HKG, MYS, VNM
	3							TWN, PHL, IND
DBER	1	-	-	HKG, VNM	DYER	-	-	HKG, VNM
	2			PHL, IND				PHL, IND
BYER	1	-	-	HKG, VNM	DBYER	-	-	HKG, VNM
	2			PHL, IND				PHL, IND

Note: D=Dollar; B=Currency Basket; Y=Yen; E=Euro/Mark; R=Yuan (Renminbi)

Table 7.14 Maastricht-HCM preparedness clusters

Dollar					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.807	5.411	2.760	4.614	
1 CHN, HKG, KOR, TWN, MYS, THA, IND, MAC, BRN, JPN, AUS, NZL, CAN, EMU1, EMU2, EMU3	-1.490	3.211	1.740	2.644	0
2 IDN, MMR, PHL	-1.402	9.326	1.367	8.799	0
3 SGP	6.269	1.941	1.032	1.971	4
4 KHM	-3.467	2.928	10.921	9.748	0
5 LAO	-10.466	16.120	2.778	15.935	0
6 VNM	-5.860	24.109	16.810	7.797	0
Crisis					
All Cases	-1.231	7.553	3.794	4.447	
1 CHN, TWN, VNM, AUS, KOR, MYS, PHL, THA, EMU1, EMU2	-2.463	2.521	3.625	2.273	0
2 HKG, MAC, NZL, CAN, EMU3	.916	2.189	1.013	1.876	2
3 IND, JPN	-5.615	3.726	2.547	5.253	0
4 KHM, MMR	-1.097	15.640	2.039	8.425	0
5 SGP, BRN	5.867	1.712	2.439	2.289	2
6 IDN	-1.199	21.576	16.679	16.132	0
7 LAO	-4.645	67.298	11.438	21.618	0
Post-crisis					
All Cases	-.787	3.209	1.570	4.528	0
1 CHN, HKG, MYS, VNM, TWN, PHL, IND, EMU3	-2.415	2.200	.725	3.140	0
2 KOR, THA, AUS, CAN, EMU2	-.498	.909	2.251	2.113	0
3 EMU1	-3.605	2.163	3.712	1.186	1
4 NZL	3.501	.492	3.298	5.315	1
5 KHM	-2.149	2.149	.563	11.075	1
6 JPN	-7.050	2.968	2.573	4.091	0
7 SGP, MAC, BRN	6.272	2.462	.871	1.499	1
8 IDN	-1.330	6.663	3.639	9.675	0
9 LAO	-3.641	6.162	1.398	22.913	0
10 MMR	-.846	23.681	1.254	9.705	0
Currency Basket					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.829	5.968	4.248	4.917	
1 MAC, HKG, KOR, TWN, THA, BRN, AUS, MYS, NZL, CAN, EMU1, EMU2, EMU3	-1.008	3.008	2.279	2.375	0
2 IDN, MMR, PHL, CHN, IND	-2.720	9.256	3.204	7.653	0
3 SGP	6.269	1.599	1.955	1.508	4
4 KHM	-3.467	3.276	11.193	10.430	0
5 LAO	-10.466	16.519	9.182	16.008	0
6 VNM	-5.860	24.510	25.481	8.544	0
Crisis					
All Cases	-.981	7.523	5.777	4.701	
1 CHN, TWN, VNM, AUS, EMU1, EMU2	-2.681	1.972	4.069	1.917	0
2 KOR, MYS, PHL, THA	-2.135	3.335	7.704	3.480	0
3 KHM	-1.658	6.631	5.161	10.351	0
4 MMR	-.535	24.978	4.496	8.597	0
5 IND	-5.231	5.950	4.335	5.493	0
6 HKG, MAC, BRN, NZL, CAN	1.847	2.092	4.557	1.722	1
7 SGP	7.572	1.186	5.041	1.137	1
8 IDN	-1.199	21.985	17.533	17.181	0
9 LAO	-4.645	68.106	12.501	22.666	0
10 EMU3	-.491	1.030	.000	3.952	2
Post-crisis					
All Cases	-.503	3.560	2.048	4.305	
1 CHN, HKG, KOR, TWN, KHM, IDN, MYS, PHL, THA, VNM, IND, AUS, NZL, CAN, EMU1, EMU2	-1.556	2.449	2.308	3.461	0
2 SGP, MAC, BRN	6.272	2.134	1.555	.970	2
3 EMU3	-.491	1.030	.000	3.952	2
4 LAO	-3.641	7.151	2.026	22.923	0
5 MMR	-.846	24.559	1.441	9.550	0

Table 7.14 Maastricht-HCM preparedness clusters (continued)

Yen					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.829	6.766	5.591	8.295	
1 HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL, EMU3	.452	4.341	3.067	6.530	0
2 MYS, CAN, EMU1, EMU2	-4.294	2.039	3.163	3.535	0
3 CHN, MMR, PHL, IND	-3.010	11.444	3.883	11.165	0
4 KHM, IDN	-2.515	5.638	8.170	15.232	0
5 SGP	6.269	1.340	2.776	2.988	4
6 LAO	-10.466	17.197	14.842	18.874	0
7 VNM	-5.860	26.045	33.265	10.821	0
Crisis					
All Cases	-.981	7.700	5.109	8.578	
1 CHN, TWN, AUS, EMU1, EMU2	-2.560	1.675	3.588	3.942	0
2 KOR, MYS, PHL, THA, VNM	-2.366	3.718	6.167	8.467	0
3 HKG, MAC, NZL, CAN	1.268	2.082	4.072	6.423	0
4 EMU3	-.491	1.030	.000	3.952	2
5 BRN	4.162	1.032	3.757	3.594	1
6 IND	-5.231	6.971	3.655	10.506	0
7 KHM	-1.658	6.546	4.506	15.365	0
8 MMR	-.535	25.494	3.278	13.610	0
9 SGP	7.572	1.038	3.757	4.078	1
10 IDN	-1.199	22.682	16.431	22.194	0
11 LAO	-4.645	69.312	11.962	27.680	0
Post-crisis					
All Cases	-.503	4.445	2.606	7.237	
1 CHN, HKG, KOR, TWN, KHM, IDN, MYS, PHL, THA, VNM, IND, AUS, NZL, CAN, EMU1, EMU2	-1.556	3.482	2.879	6.394	0
2 SGP, MAC, BRN	6.272	1.882	2.236	4.073	1
3 EMU3	-.491	1.030	.000	3.952	3
4 LAO	-3.641	9.059	2.607	26.941	0
5 MMR	-.846	26.361	1.955	13.812	0
Euro					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.807	5.813	5.457	4.233	
1 HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL, EMU3	.452	3.681	3.121	2.054	0
2 MYS, IND, CAN, EMU1, EMU2	-4.488	2.741	3.230	2.902	0
3 KHM, IDN, JPN	-2.123	3.417	6.312	8.182	0
4 MMR, PHL	-1.322	12.480	3.324	5.381	0
5 SGP	6.269	1.264	2.772	4.229	3
6 LAO	-10.466	16.624	14.877	13.926	0
7 VNM	-5.860	23.962	33.098	7.968	0
8 CHN	-4.130	9.797	4.933	.759	1
Crisis					
All Cases	-1.199	7.144	9.697	4.436	
1 CHN, HKG, KOR, TWN, KHM, MYS, PHL, THA, VNM, IND, MAC, BRN, JPN, AUS, NZL, CAN	-1.358	2.744	10.171	3.042	0
2 MMR	-.535	25.197	9.765	6.396	0
3 EMU1, EMU2, EMU3	-2.347	1.369	2.050	2.792	2
4 SGP	7.572	.570	10.102	3.136	2
5 IDN	-1.199	22.092	19.715	14.981	0
6 LAO	-4.645	68.446	14.578	20.466	0
Post-crisis					
All Cases	-.553	3.645	2.504	4.692	
1 CHN, HKG, MYS, PHL, THA, VNM, IND, AUS, EMU2	-2.382	2.213	2.514	2.556	0
2 KOR, NZL, CAN	1.941	1.059	2.816	3.288	0
3 SGP, MAC, BRN	6.272	1.812	2.105	3.589	1
4 TWN, KHM	-2.176	1.931	2.429	7.122	0
5 EMU3	-.491	1.030	.000	3.952	2
6 EMU1	-3.605	2.163	3.712	1.186	1
7 JPN	-7.050	1.912	2.527	7.646	0
8 IDN	-1.330	7.720	3.840	6.085	0
9 LAO	-3.641	7.239	2.563	19.295	0
10 MMR	-.846	24.554	1.340	6.166	0
Yuan					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.702	9.341	6.139	4.312	
1 HKG, KOR, TWN, MMR, THA, MAC, BRN, AUS, NZL	.436	9.644	4.203	2.260	1
2 EMU1, EMU2, EMU3	-2.347	1.369	2.050	2.792	2
3 MYS, PHL, IND, CAN	-4.473	8.796	4.275	3.594	0
4 KHM, IDN, JPN	-2.123	9.771	7.359	7.992	0
5 SGP	6.269	10.232	3.987	4.651	1
6 LAO	-10.466	16.614	14.963	13.823	0
7 VNM	-5.860	23.264	32.948	7.269	0
Crisis					
All Cases	-1.140	7.934	3.795	5.247	
1 KOR, TWN, MYS, PHL, THA, VNM, AUS, EMU1, EMU2	-2.458	3.154	4.027	3.169	0
2 HKG, MAC, NZL, CAN, EMU3	.916	1.978	1.013	2.698	1
3 KHM, MMR	-1.097	16.485	2.042	10.250	0
4 SGP, BRN	5.867	1.172	2.438	.509	3
5 IND, JPN	-5.615	4.239	2.549	5.253	0
6 IDN	-1.199	23.022	16.679	17.957	0
7 LAO	-4.645	69.459	11.440	23.443	0
Post-crisis					
All Cases	-1.140	7.934	3.795	5.247	
1 HKG, TWN, KHM, MYS, PHL, THA, VNM, IND, EMU3	-2.021	4.151	2.576	4.624	0
2 KOR, JPN, AUS, NZL, CAN, EMU1, EMU2	-1.875	2.136	3.643	2.778	0
3 SGP, MAC, BRN	4.205	1.278	1.649	1.199	4
4 LAO	-4.645	69.459	11.440	23.443	0
5 MMR	-.535	25.923	1.732	9.373	0
6 IDN	-1.199	23.022	16.679	17.957	0

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^3$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Hierarchical cluster analysis. See Appendix A for data description.

7.2.3 Recapitulation

The section has discussed the results using hierarchical cluster analysis and Maastricht criteria. The following are the key findings.

Classifications

Based on the average silhouettes over all objects, euro solutions are most appropriately classified for pre-crisis and crisis periods and yen solution is best classified for post-crisis period.

Based on the partitioning, in general the Japan reference is associated with more convergent cluster configurations and the pre-crisis period is associated with more convergent arrangements regardless of reference country.

Amongst subgroups which are stable over periods, notably Korea and Thailand, and Thailand and Malaysia are respectively linked across dollar and yen anchors, and basket and yen anchors.

There are linkages which are stable over all anchors for the post-crisis period. These linkages are HongKong-Vietnam, Korea-Canada, Singapore-Brunei, and Philippines-India.

The effective dollar areas of Hong Kong and Macau are put together only for the pre-crisis and crisis periods. As for the monetary union members of Singapore and Brunei, they are only placed together for post-crisis period. Hence, these pairs of economies are not indicated to be consistently symmetrical over the periods despite maintaining similar exchange rate policies.

Assessment of Preparedness

Based on the number of Asian cases linked with the EMU benchmarks, overall the region could have been comparatively prepared for dollar, basket, or yen anchor.

Korea and Thailand, and Taiwan and Australia might have constantly shared common Maastricht features and degrees of preparedness over the periods by the US and the Japan reference respectively.

Hong Kong and Macau are, amongst others, placed together for the pre-crisis and crisis periods by the US reference, in line with their dollar pegs but not for the post-crisis period. Regarding Singapore and Brunei, Singapore is not indicated to share common Maastricht conditions and degree of preparedness with Brunei or with any country.

For post-crisis period, Hong Kong and Vietnam, and Philippines and India are shown to possess those common features over all anchors.

Most of the time, Singapore alone or groups containing Singapore show more conforming Maastricht attributes.

7.3 Fuzzy Clustering Results

The results by fuzzy cluster analysis are categorized into three main sections: classifications, assessment of preparedness, and a recapitulation.

7.3.1 Classifications

The section is divided into three parts: cluster validation; findings by each monetary anchor; and comparisons of findings across the anchors.

Cluster Validation

Recall that Xie-Beni's index (XBI) is used to determine the number of clusters or cluster solution for fuzzy cluster analysis. The lower the value, the better the fuzzy partition fits the structure of the data. Meantime, Normalized Dunn's Partition Coefficient (DPC) is used to measure the degree of fuzziness in the data in which a value close to 1 indicates no fuzziness whilst a value close to 0 indicates complete fuzziness. Table 7.15 exhibits the XBI and DPC values for a range of cluster solutions.

Sometimes a compromise between the two measures has to be made to ensure more interpretable results. The selected cluster solutions are highlighted.

The smallest XBI for the pre-crisis period is obtained by the yen solution. The yuan solution produces the lowest XBI for the crisis period and the euro anchor solution attains the lowest XBI for the post-crisis period. Hence, the reference country corresponding to the best partitioning is different for different period. Nevertheless, the XBI values are similar across the selected solutions, signifying similar degrees of goodness-of-fit between the partitions and data over the solutions.

Table 7.15 XBI and DPC using Maastricht criteria

<i>k</i>	Dollar						Currency Basket					
	Pre-crisis		Crisis		Post-crisis		Pre-crisis		Crisis		Post-crisis	
	XBI	DPC	XBI	DPC	XBI	DPC	XBI	DPC	XBI	DPC	XBI	DPC
2	1.91	.45	1.87	.75	1.73	.25	1.94	.57	1.62	.76	1.58	.23
3	1.72	.52	1.60	.55	2.03	.34	1.68	.56	1.49	.59	1.91	.43
4	1.38	.45	1.43	.47	1.49	.45	1.48	.52	1.18	.47	1.50	.52
5	1.44	.47	1.33	.47	1.27	.44	1.49	.44	1.22	.51	1.13	.49
6	1.44	.51	1.76	.53	1.41	.50	1.88	.60	1.34	.56	1.40	.57
7	1.24	.49	1.32	.56	1.66	.52	1.31	.54	1.26	.61	1.59	.57
8	1.49	.49	1.32	.59	1.59	.55	1.30	.57	1.40	.66	1.42	.60
9	1.41	.56	1.44	.60	2.61	.59	1.57	.61	1.56	.68	1.86	.65
10	1.47	.57	1.44	.66	1.52	.64	1.45	.61	1.46	.74	1.51	.64
11	1.40	.65	1.29	.67	1.84	.64	1.51	.67	1.52	.76	1.87	.70

<i>k</i>	Yen						Euro						Yuan					
	Pre-crisis		Crisis		Post-crisis		Pre-crisis		Crisis		Post-crisis		Pre-crisis		Crisis		Post-crisis	
	XBI	DPC	XBI	DPC	XBI	DPC	XBI	DPC	XBI	DPC	XBI	DPC	XBI	DPC	XBI	DPC	XBI	DPC
2	2.54	.47	1.76	.77	4.43	.29	1.99	.71	2.15	.79	1.49	.28	1.87	.74	2.03	.74	1.75	.26
3	1.95	.57	1.44	.59	1.23	.44	1.29	.51	2.68	.62	1.41	.46	1.69	.52	1.51	.56	1.33	.38
4	1.83	.53	1.46	.46	2.09	.46	1.34	.51	1.36	.53	1.34	.46	1.60	.53	1.24	.46	1.37	.48
5	1.92	.53	1.54	.51	2.14	.51	1.18	.51	1.21	.48	1.11	.44	1.51	.53	1.11	.49	1.35	.50
6	1.84	.58	1.32	.54	2.05	.59	1.18	.56	1.21	.61	1.12	.51	1.64	.58	1.07	.53	1.54	.52
7	1.15	.50	1.55	.65	1.65	.53	1.39	.49	1.52	.61	1.44	.55	1.46	.53	1.54	.55	1.63	.50
8	1.24	.54	1.51	.67	1.57	.57	1.45	.56	1.56	.64	1.58	.55	1.95	.55	1.42	.59	1.40	.56
9	1.22	.59	1.64	.69	1.69	.63	1.35	.57	1.50	.70	1.73	.61	1.68	.56	1.52	.62	1.38	.62
10	1.34	.61	1.52	.75	1.76	.64	1.47	.58	1.53	.69	1.58	.65	2.05	.63	1.35	.68	1.50	.61
11	1.56	.62	1.59	.74	1.95	.68	1.42	.66	1.49	.68	1.61	.64	1.78	.67	1.57	.68	1.83	.66

Note: In general, an effective representation of data requires that the number of clusters be neither too small nor too large. The number of clusters considered here should suffice for meaningful interpretations.

Source: Hierarchical cluster analysis. See Appendix A for data description.

Dollar Anchor Results

The partitions using US as the reference are discussed here. The memberships for belonging are collected in the first part of Table 7.16. The greater the coefficient for a group, the greater the belongingness to that group. The highest membership coefficients are highlighted. On the whole, the solutions provide clear-cut data partitions with significantly large degree of belongingness to only one group. The Maastricht features

are shown in the second part of the table.

XBI values indicate the presence of 7 clusters for pre-crisis and crisis periods, and 5 clusters for post-crisis period. The reduced number of clusters might indicate enhanced degree of regional symmetry against US. The average silhouettes for all objects suggest that the crisis period partition with silhouette 0.60 fits the data best.

The pre-crisis solution reveals that the Malaysia-Canada pair obtains the highest group silhouette at 0.95. Accordingly, the membership coefficients of all other countries for belonging to this group are very small, indicating that these two economies share common features which are far from being fully shared by others. In this period before the Asian turmoil, the pair's inflation is closest to the US level. Despite this, it is the first group that possesses the most number of best features.

Hong Kong and Macau retain their pre-crisis link in the crisis period setting. In combination with New Zealand and Canada, they make up the group with the greatest silhouette and 2 best attributes for the crisis period. Singapore-Brunei too has 2 best features.

For the post-crisis period, Singapore reestablishes its pre-crisis linkage with Macau. Together with Brunei, this trio with 2 most Maastricht-compliant conditions is best classified at silhouette 0.85 and hence might be comparatively prospective for adopting the US monetary policy.

Throughout the findings no countries are consistently put together in the same grouping. The reduced number and increased size of clusters in the post-crisis finding might signify greater degree of symmetry vis-à-vis US. From another perspective, economies which are clustered with Hong Kong, an effective dollar area could be relatively feasible for a hard dollar peg.

Table 7.16 Maastricht-FCM-dollar clusters

Membership coefficients (%)

	Pre-crisis							Crisis							Post-crisis				
	I	II	III	IV	V	VI	VII	I	II	III	IV	V	VI	VII	I	II	III	IV	V
1 CHN	12.01	3.09	18.59	29.13	13.18	2.51	21.49	8.68	.34	6.58	4.97	1.40	3.61	74.42	2.65	.66	2.09	5.72	88.88
2 HKG	79.47	.37	3.08	1.95	12.40	.32	2.42	83.33	.24	1.70	2.67	2.67	2.65	6.74	5.88	1.38	3.83	9.04	79.87
3 KOR	59.53	.53	8.25	3.71	23.97	.38	3.63	2.18	.24	2.52	89.17	.83	1.63	3.45	14.46	2.02	57.49	14.89	11.14
4 TWN	53.08	.77	14.83	5.16	21.01	.58	4.56	3.71	.10	1.76	2.59	.47	1.05	90.32	3.42	1.26	6.41	53.90	35.01
5 KHM	10.80	8.27	12.64	28.47	13.58	7.85	18.39	12.15	1.45	19.30	14.55	4.11	29.56	18.87	10.27	14.59	12.14	32.04	30.96
6 IDN	9.65	5.06	9.10	24.22	16.89	1.91	33.18	10.33	20.84	13.91	17.94	9.21	16.54	11.24	10.62	14.04	40.30	23.04	12.00
7 LAO	.01	99.92	.01	.02	.01	.01	.02	.06	99.58	.08	.07	.05	.11	.06	.43	97.56	.59	.80	.62
8 MYS	.90	.11	96.71	.91	.82	.07	.48	5.33	.32	5.65	69.68	1.29	2.82	14.90	4.54	2.13	6.44	30.02	56.88
9 MMR	7.39	4.53	5.47	12.40	10.58	2.51	57.11	.88	.15	.71	.74	.37	96.23	.93	17.19	24.15	17.52	20.91	20.23
10 PHL	.92	.27	.80	3.18	1.64	.14	93.05	7.65	.64	17.60	40.04	2.00	8.16	23.91	.58	.30	1.89	94.48	2.75
11 SGP	37.88	2.22	8.62	7.63	31.50	1.97	10.18	1.14	.09	.27	.45	97.09	.48	.48	92.35	.50	2.76	1.84	2.55
12 THA	19.87	.68	5.91	5.12	62.51	.43	5.48	.61	.06	1.01	96.32	.20	.48	1.31	10.55	2.17	23.55	34.67	29.06
13 VNM	.00	.01	.00	.01	.00	99.97	.01	4.45	.27	9.72	5.40	.90	2.98	76.28	4.81	2.63	4.79	19.32	68.46
14 IND	1.01	.50	2.41	91.23	1.44	.22	3.19	4.37	.62	63.63	6.99	1.31	5.14	17.93	1.80	1.53	4.34	82.54	9.78
15 MAC	74.24	.33	2.45	1.70	18.76	.25	2.27	86.24	.18	1.41	2.14	1.83	2.09	6.10	74.47	2.53	6.44	6.14	10.42
16 BRN	13.20	.51	2.60	3.28	73.67	.35	6.39	32.40	.77	3.38	6.60	42.98	6.30	7.58	94.90	.42	1.85	1.21	1.61
17 JPN	17.28	1.29	12.69	18.65	36.79	.87	12.43	1.06	.23	91.00	2.89	.39	1.37	3.07	6.50	6.94	23.41	47.41	15.73
18 AUS	76.63	.26	2.31	1.62	17.15	.21	1.82	10.10	.33	5.67	12.73	1.57	3.10	66.51	3.15	1.47	81.88	9.51	3.99
19 NZL	19.20	.18	1.39	1.28	76.01	.14	1.80	61.66	.54	3.63	9.78	7.91	5.37	11.12	13.21	4.44	62.32	12.04	7.99
20 CAN	1.81	.36	91.74	2.82	1.75	.22	1.31	95.08	.06	.49	.96	.76	.67	1.99	7.31	1.43	72.92	11.29	7.05

Maastricht Features

Cluster	Averages					
	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis						
All Cases	.25	-1.726	6.017	2.867	4.901	
1 HKG, KOR, TWN, SGP, MAC, AUS	.11	1.441	3.006	1.112	1.306	3
2 LAO	.00	-10.466	16.120	2.778	15.935	0
3 MYS, CAN	.95	-5.312	1.444	1.208	1.568	1
4 CHN, KHM, IND	-.14	-4.287	5.837	6.070	6.432	0
5 THA, BRN, JPN, NZL	.54	.212	3.425	1.586	4.243	0
6 VNM	.00	-5.860	24.109	16.810	7.797	0
7 IDN, MMR, PHL	.26	-1.402	9.326	1.367	8.799	0
Crisis						
All Cases	.60	-1.027	8.154	3.866	4.671	
1 HKG, MAC, NZL, CAN	.77	1.268	2.479	1.266	1.357	2
2 IDN, LAO	.29	-2.922	44.437	14.058	18.875	0
3 IND, JPN	.61	-5.615	3.726	2.547	5.253	0
4 KOR, MYS, PHL, THA	.67	-2.135	3.202	5.971	2.953	0
5 SGP, BRN	.34	5.867	1.712	2.439	2.289	2
6 KHM, MMR	.43	-1.097	15.640	2.039	8.425	0
7 CHN, TWN, VNM, AUS	.70	-2.384	2.331	1.553	1.622	0
Post-crisis						
All Cases	.36	-.553	3.485	1.498	4.788	
1 SGP, MAC, BRN	.85	6.272	2.462	.871	1.499	2
2 LAO, MMR	-.10	-2.243	14.922	1.326	16.309	0
3 KOR, IDN, AUS, NZL, CAN	.40	.654	1.967	2.847	4.223	1
4 TWN, KHM, PHL, THA, IND, JPN	.04	-3.268	2.083	1.471	4.826	0
5 CHN, HKG, MYS, VNM	.65	-2.265	2.536	.408	2.145	1

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Fuzzy cluster analysis. See Appendix A for data description.

Currency Basket Anchor Results

Table 7.17 reports the solutions by weighted-G3 reference. Except for a few cases, the membership coefficients are substantially large for belonging to only one group. 8, 4, and 5 clusters are present for the respective periods. Reduction in the number of clusters may indicate increased degree of symmetry against the weighted group of US, Japan,

and Germany/EMU (with respective weights of 0.47, 0.23, and 0.30 for this study). The average silhouettes for all objects signify that the post-crisis cases with silhouette 0.40 are most appropriately classified.

The most tightly classified cluster for the pre-crisis period is Malaysia-Canada at silhouette 0.94, as shown by its silhouette and membership coefficients. It demonstrates the most convergent inflation and interest rate to the G3 levels. The third group and Myanmar enjoy one most compliant condition each.

Table 7.17 Maastricht-FCM-basket clusters

Membership coefficients (%)

	Pre-crisis								Crisis				Post-crisis				
	I	II	III	IV	V	VI	VII	VIII	I	II	III	IV	I	II	III	IV	V
1 CHN	7.90	6.93	11.40	1.70	11.25	12.51	17.65	30.66	.47	10.24	5.78	83.52	1.45	.42	1.42	4.10	92.61
2 HKG	1.25	.90	79.67	.24	1.38	12.47	2.46	1.62	.56	7.95	78.88	12.61	3.66	.96	2.92	7.83	84.62
3 KOR	2.55	1.79	53.18	.37	2.15	27.96	8.12	3.89	.79	80.42	6.00	12.79	15.00	2.54	42.17	16.01	24.28
4 TWN	3.53	2.79	44.88	.60	2.86	23.07	16.76	5.52	.40	12.36	6.62	80.62	2.45	1.20	4.85	35.18	56.32
5 KHM	.34	98.76	.12	.05	.14	.16	.13	.31	2.95	42.47	16.49	38.08	8.09	13.82	11.41	42.72	23.96
6 IDN	98.36	.32	.15	.03	.32	.26	.13	.43	40.20	26.04	16.02	17.74	9.45	14.95	40.81	21.51	13.29
7 LAO	15.35	17.63	6.51	11.81	15.39	7.66	8.37	17.28	97.46	.99	.70	.84	.39	97.54	.59	.90	.58
8 MYS	.51	.45	1.19	.09	.37	1.13	95.00	1.26	.51	65.04	5.64	28.81	4.15	2.36	6.83	31.03	55.62
9 MMR	.54	.21	.25	.07	97.98	.34	.17	.44	5.97	34.39	25.35	34.29	16.32	25.05	16.36	22.53	19.74
10 PHL	17.51	6.45	6.89	1.01	25.58	11.47	5.43	25.66	.55	68.92	4.08	26.44	1.76	1.30	7.01	78.04	11.90
11 SGP	7.35	5.39	36.49	1.68	6.81	27.75	8.08	6.45	3.93	16.99	62.38	16.70	92.82	.51	2.04	1.63	3.00
12 THA	4.54	2.38	17.43	.37	2.52	63.48	4.86	4.43	.50	83.07	3.58	12.85	4.20	1.03	6.06	11.67	77.04
13 VNM	.01	.02	.01	99.92	.01	.01	.01	.01	.30	8.97	2.41	88.32	4.63	3.30	6.05	46.94	39.08
14 IND	1.25	.79	.48	.09	.66	.67	1.00	95.06	2.37	30.46	9.26	57.91	1.36	1.55	3.88	84.92	8.29
15 MAC	.46	.31	88.90	.07	.45	8.54	.74	.53	.66	10.38	71.22	17.74	93.53	.65	1.79	1.54	2.49
16 BRN	2.54	1.17	10.47	.21	1.98	79.79	1.74	2.10	.79	6.24	86.60	6.38	97.44	.23	.79	0.59	.95
17 AUS	.52	.38	87.53	.08	.46	9.44	.94	.63	.33	13.58	5.08	81.01	2.65	1.55	80.14	9.59	6.06
18 NZL	1.19	.71	19.49	.14	1.08	74.61	1.42	1.36	.29	4.68	90.27	4.76	10.21	4.18	66.31	10.34	8.95
19 CAN	.80	.77	1.49	.17	.63	1.42	92.49	2.22	.50	7.81	80.51	11.19	5.01	1.44	75.97	8.62	8.96

Maastricht Features

Cluster	Averages					
	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis						
All Cases	.18	-1.747	6.694	4.595	5.271	
1 IDN	.00	-1.563	5.516	2.659	11.585	0
2 KHM, LAO	-.36	-6.966	9.898	10.188	13.219	0
3 HKG, KOR, TWN, SGP, MAC, AUS	-.10	1.441	3.385	2.351	1.641	1
4 VNM	.00	-5.860	24.510	25.481	8.544	0
5 MMR	.00	-.640	14.949	1.836	8.800	1
6 THA, BRN, NZL	.70	.729	4.181	2.257	4.348	0
7 MYS, CAN	.94	-5.312	1.871	2.275	1.548	2
8 CHN, PHL, IND	.24	-3.799	8.605	3.842	5.959	0
Crisis						
All Cases	.36	-1.747	6.694	4.595	5.271	
1 IDN, LAO	.30	-6.014	11.018	5.921	13.796	0
2 KOR, KHM, MYS, MMR, PHL, THA	-.04	-1.871	5.850	3.797	5.915	0
3 HKG, SGP, MAC, BRN, NZL, CAN	.55	.867	3.991	2.270	1.897	4
4 CHN, TWN, VNM, IND, AUS	.65	-3.026	9.220	7.813	4.463	0
Post-crisis						
All Cases	.40	-.211	3.906	2.048	4.544	
1 SGP, MAC, BRN	.94	6.272	2.134	1.555	.970	3
2 LAO, MMR	-.24	-2.243	15.855	1.733	16.236	0
3 KOR, IDN, AUS, NZL, CAN	.25	.654	2.652	3.000	3.962	0
4 KHM, PHL, VNM, IND	.19	-3.006	3.506	1.872	6.377	0
5 CHN, HKG, TWN, MYS, THA	.65	-1.918	1.764	1.657	1.127	1

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^5$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Fuzzy cluster analysis. See Appendix A for data description.

The pre-crisis subclusters of HongKong-Singapore-Macau and Brunei-NewZealand keep their linkages in the crisis period arrangement. Merged by Canada, they share high group silhouette and all four most Maastricht-conforming conditions.

For post-crisis period, Singapore, Macau, and Brunei carry on their crisis period grouping and constitute the best classified and most feasible group for currency union which boasts silhouette 0.94 and 3 most supportive attributes. Singapore and Macau have retained their tie since the pre-crisis period.

Yen Anchor Results

The Japan-based solutions are collected in Table 7.18. The numbers of clusters for pre-crisis, crisis, and post-crisis periods are 7, 6, and 3 respectively. The remarkably fewer groupings in the post-crisis solution may indicate increased regional symmetry against Japan in that period. Signified by the average silhouettes for all objects, the post-crisis economies with average silhouette 0.45 are more appropriately clustered.

The most tightly linked cluster for the pre-crisis period is the Thailand-Brunei-NewZealand trio with 0.81 group silhouette and high membership coefficients. An equally well-classified cluster is Malaysia-Canada which boasts the highest degree of inflation convergence, exchange rate stability, and interest rate symmetry with Japan.

The HongKong-Singapore-Macau and Brunei-NewZealand subclusters from the pre-crisis period plus Canada get together and share 2 best features in the crisis period setting. The most tightly linked China-Taiwan-Australia cluster and unconnected Myanmar each display one best characteristic.

Singapore, Macau, and Brunei continue their crisis period linkage and in combination with Korea, they make up the best classified group for the post-crisis period with 0.69 group silhouette. They also share 3 most compliant conditions. Indeed, Singapore and Macau have been placed together since the pre-crisis findings. Hence, they might have been constantly sharing parallel features against Japan.

Throughout the findings, Taiwan and Australia have also always shared the same grouping.

Table 7.18 Maastricht-FCM-yen clusters

Membership coefficients (%)

	Pre-crisis							Crisis						Post-crisis		
	I	II	III	IV	V	VI	VII	I	II	III	IV	V	VI	I	II	III
1 CHN	11.93	14.03	16.56	9.15	13.22	1.73	33.37	2.45	3.73	4.50	87.92	.24	1.17	19.05	3.37	77.58
2 HKG	80.62	1.59	2.59	1.16	12.08	.27	1.68	82.44	3.63	4.02	7.14	.37	2.38	21.58	3.30	75.12
3 KOR	45.84	2.48	7.58	2.43	37.40	.39	3.89	2.22	5.61	86.02	4.19	.48	1.48	69.75	3.07	27.18
4 TWN	37.42	3.38	19.51	4.06	29.15	.70	5.78	1.81	2.06	2.36	92.95	.13	.69	28.04	5.90	66.05
5 KHM	.58	.79	.61	95.11	.86	.17	1.88	6.58	54.38	12.26	9.89	1.70	15.19	19.97	13.01	67.02
6 IDN	6.75	18.78	5.12	35.23	11.23	1.45	21.44	1.17	1.71	1.88	1.20	92.40	1.63	25.38	24.62	49.99
7 LAO	7.59	17.21	9.31	21.98	8.79	14.40	20.71	8.72	13.01	11.86	9.61	39.74	17.06	20.00	45.85	34.15
8 MYS	3.27	1.19	86.54	1.75	3.62	.27	3.35	3.14	8.95	71.19	14.56	.41	1.75	11.30	4.36	84.34
9 MMR	1.06	93.25	.66	1.25	1.37	.27	2.13	.19	.37	.20	.21	.05	98.98	5.17	88.79	6.04
10 PHL	6.40	40.19	4.42	10.45	9.89	1.00	27.65	1.21	86.12	7.29	3.66	.24	1.49	3.45	1.75	94.80
11 SGP	38.96	7.60	11.16	6.87	25.74	2.26	7.41	43.85	11.56	13.03	14.68	4.36	12.52	88.81	2.87	8.32
12 THA	12.90	2.49	3.61	3.06	73.83	.32	3.79	.65	2.35	94.46	1.92	.14	.48	40.49	6.22	53.29
13 VNM	.02	.03	.02	.03	.02	99.86	.03	4.51	39.19	14.85	36.27	.74	4.44	6.92	3.62	89.46
14 IND	.65	1.22	1.06	1.82	.95	.13	94.16	6.24	42.65	16.92	22.03	1.99	10.17	7.80	5.32	86.89
15 MAC	86.56	.66	.88	.51	10.60	.10	.69	70.99	5.98	6.54	12.56	.54	3.38	87.63	3.36	9.01
16 BRN	9.92	1.39	1.29	1.16	84.61	.16	1.47	68.64	6.35	7.62	10.02	1.49	5.87	85.02	4.35	10.63
17 AUS	81.37	.60	1.10	.57	15.52	.10	.74	1.41	2.93	3.04	91.83	.11	.67	11.54	3.60	84.86
18 NZL	18.61	1.30	1.42	1.06	75.99	.15	1.46	84.40	3.57	4.00	5.17	.42	2.43	42.49	11.37	46.13
19 CAN	3.96	1.67	84.30	2.11	3.66	.51	3.80	78.96	3.75	5.02	9.44	.46	2.37	34.29	5.59	60.12

Maastricht Features

	Averages					
Cluster	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis						
All	.17	-1.747	7.619	6.150	9.212	
1 HKG, KOR, TWN, SGP, MAC, AUS	-.25	1.441	4.185	3.417	5.598	1
2 MMR, PHL	.39	-1.322	13.500	3.493	12.597	0
3 MYS, CAN	.80	-5.312	2.540	3.250	4.858	3
4 KHM, IDN, LAO	-.33	-5.165	9.491	10.394	16.446	0
5 THA, BRN, NZL	.81	.729	4.756	3.291	8.843	0
6 VNM	.00	-5.860	26.045	33.265	10.821	0
7 CHN, IND	.40	-4.697	9.388	4.273	9.733	0
Crisis						
All	.37	-.765	8.700	5.592	9.492	
1 HKG, SGP, MAC, BRN, NZL, CAN	.26	2.801	1.733	3.967	5.560	2
2 KHM, PHL, VNM, IND	.00	-3.143	5.569	4.421	11.363	0
3 KOR, MYS, THA	.79	-2.049	3.277	7.104	7.585	0
4 CHN, TWN, AUS	.89	-2.083	1.767	3.930	5.096	1
5 IDN, LAO	.24	-2.922	45.997	14.197	24.937	0
6 MMR	.00	-.535	25.494	3.278	13.610	1
Post-crisis						
All	.45	-.211	4.931	2.694	7.939	
1 KOR, SGP, MAC, BRN	.69	5.091	2.241	2.307	4.137	3
2 LAO, MMR	.11	-2.243	17.710	2.281	20.377	1
3 CHN, HKG, TWN, KHM, IDN, MYS, PHL, THA, VNM, IND, AUS, NZL, CAN	.43	-1.530	3.793	2.876	7.196	0

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^{-2}$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Fuzzy cluster analysis. See Appendix A for data description.

Euro Anchor Results

The Germany/EMU-based clustering results are exhibited in Table 7.19. A total of 6 clusters are indicated for pre-crisis and crisis periods, and 5 clusters are present for post-crisis period. Judging by the all-case average silhouettes, the most data-fitting

partitioning is from the pre-crisis solution with average silhouette 0.55.

In the pre-crisis solution, the fourth group of nine economies which is the largest cluster obtains the highest silhouette at 0.68, a positive budget balance, and the highest degree of interest rate symmetry with Germany. The second and the third cluster each exhibit one best condition.

Table 7.19 Maastricht-FCM-euro clusters

Membership coefficients (%)

	Pre-crisis						Crisis						Post-crisis				
	I	II	III	IV	V	VI	I	II	III	IV	V	VI	I	II	III	IV	V
1 CHN	33.35	10.26	31.52	19.82	2.83	2.22	3.21	6.77	2.55	87.02	.27	.19	20.32	1.17	31.00	43.51	4.00
2 HKG	2.51	2.29	4.19	90.48	.29	.24	85.36	2.16	3.87	7.96	.39	.26	22.43	1.23	25.95	45.55	4.84
3 KOR	8.11	4.56	6.19	80.28	.49	.37	14.28	14.69	10.50	57.63	1.87	1.02	84.99	.54	4.95	6.08	3.44
4 TWN	17.34	7.89	8.61	64.46	.97	.74	3.92	3.92	2.23	89.55	.23	.16	3.01	.60	91.01	4.27	1.10
5 KHM	15.72	52.62	14.33	9.64	5.08	2.62	12.99	24.38	30.53	28.56	2.05	1.49	3.11	.81	90.83	4.11	1.15
6 IDN	4.40	81.95	8.10	3.72	1.23	.61	.00	.00	.00	.00	99.99	.00	29.54	11.94	22.11	25.49	10.91
7 LAO	.00	.00	.00	.00	99.98	.01	.00	.00	.00	.00	.00	100.0	.26	98.82	.44	.27	.21
8 MYS	74.16	6.50	6.69	10.83	1.09	.73	2.71	3.23	1.76	91.93	.22	.14	10.33	1.59	26.21	58.65	3.23
9 MMR	9.05	13.15	61.24	10.87	3.45	2.23	1.18	1.04	95.93	1.44	.21	.20	17.81	18.86	21.84	20.59	20.91
10 PHL	1.59	1.75	94.78	1.53	.21	.14	3.27	7.83	3.77	84.57	.33	.23	9.49	.85	7.58	80.08	1.99
11 SGP	12.72	20.79	17.32	43.10	3.29	2.78	48.67	9.35	17.85	16.10	4.91	3.11	2.60	.49	1.86	1.56	93.50
12 THA	6.44	5.18	5.29	82.24	.48	.36	6.52	12.12	5.72	74.30	.84	.51	22.02	2.52	30.29	30.47	14.69
13 VNM	.00	.00	.00	.00	.00	100.0	4.67	16.66	4.51	73.26	.52	.38	8.73	.88	12.42	75.60	2.38
14 IND	59.85	12.13	17.85	7.41	1.80	.96	3.15	74.99	4.53	16.14	.66	.53	8.00	1.11	11.29	77.57	2.03
15 MAC	2.45	2.05	2.83	92.14	.29	.24	82.15	2.56	4.17	10.44	.41	.28	18.85	2.30	7.60	7.95	63.30
16 BRN	9.09	17.06	17.65	54.14	1.19	.87	71.45	4.86	10.50	10.48	1.66	1.05	2.26	.48	1.50	1.32	94.44
17 JPN	9.26	72.81	7.86	8.21	1.19	.67	2.62	83.31	3.96	8.54	.90	.68	12.42	8.14	48.21	25.60	5.63
18 AUS	3.46	2.49	3.87	89.49	.38	.32	12.18	9.82	6.13	70.66	.70	.50	31.02	1.39	11.46	51.14	4.99
19 NZL	3.14	2.57	5.14	88.53	.34	.28	93.32	1.10	1.79	3.43	.22	.15	65.50	1.93	8.92	12.68	10.97
20 CAN	89.97	3.42	3.09	2.64	.56	.32	87.40	1.95	3.30	6.80	.33	.22	79.99	.93	7.62	8.48	2.98

Maastricht Features

Averages						
Cluster	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis						
All Cases	.55	-1.726	6.479	5.968	4.461	
1 CHN, MYS, IND, CAN	.49	-5.005	5.107	3.733	2.711	0
2 KHM, IDN, JPN	.58	-2.123	3.417	6.312	8.182	1
3 MMR, PHL	.61	-1.322	12.480	3.324	5.381	1
4 HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL	.68	1.203	3.707	3.429	2.089	2
5 LAO	.00	-10.466	16.624	14.877	13.926	0
6 VNM	.00	-5.860	23.962	33.098	7.968	0
Crisis						
All Cases	.50	-1.027	8.011	10.845	4.682	
1 HKG, SGP, MAC, BRN, NZL, CAN	.42	2.801	1.659	9.822	2.225	4
2 IND, JPN	.48	-5.615	3.632	10.028	5.253	0
3 KHM, MMR	.23	-1.097	15.897	9.917	7.274	0
4 CHN, KOR, TWN, MYS, PHL, THA, VNM, AUS	.76	-2.260	2.583	10.472	2.475	0
5 IDN	.00	-1.199	22.092	19.715	14.981	0
6 LAO	.00	-4.645	68.446	14.578	20.466	0
Post-crisis						
All Cases	.30	-0.553	3.645	2.504	4.692	
1 KOR, IDN, NZL, CAN	-.08	1.123	2.724	3.072	3.987	0
2 LAO	.00	-3.641	7.239	2.563	19.295	0
3 TWN, KHM, MMR, JPN	-.54	-3.062	7.582	2.181	7.014	1
4 CHN, HKG, MYS, PHL, THA, VNM, IND, AUS	.75	-2.311	2.375	2.523	2.471	1
5 SGP, MAC, BRN	.33	1.680	2.051	2.301	4.826	2

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^3$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Fuzzy cluster analysis. See Appendix A for data description.

Canada and a pre-crisis subcluster of five countries constitute group one for the crisis period, the most prospective cluster which is most compliant in all the conditions. Meantime, the best classified group is the fourth group in which most of its constituents maintain their previous linkages.

The silhouettes signify that the most tightly formed group in the post-crisis arrangement is the fourth group consisting of 8 countries with silhouette 0.75. Nevertheless, the Singapore-Macau-Brunei trio is the group which maintains more compliant attributes, the highest budget surplus and the most convergent inflation toward the German level. Singapore, Brunei, and Macau share the same grouping since the pre-crisis period.

Looking at the structure of the partitions, the configurations are largely stable over periods.

Yuan Anchor Results

The China-based solutions are put in Table 7.20. The partitions are generally clear-cut. 5, 6, and 5 clusters are respectively indicated for the three periods. Based on the all-case silhouettes, the crisis period partitioning with average silhouette 0.54 is the most data-fitting.

The pre-crisis results show that the largest group of 7 economies obtains the highest silhouette 0.83 and 2 best features: the least variable yuan rate and the most similar interest rate to the Chinese rate. The third and the fifth group obtain one best attribute each.

Singapore and Brunei not only hold on to their previous linkage but also share 3 most conforming features for the crisis period. The fourth cluster of which most of its members have been linked previously records the highest silhouette and the stablest yuan rate.

Table 7.20 Maastricht-FCM-yuan clusters

Membership coefficients (%)

	Pre-crisis					Crisis						Post-crisis				
	I	II	III	IV	V	I	II	III	IV	V	VI	I	II	III	IV	V
1 HKG	79.99	.70	6.76	3.31	9.23	1.90	1.97	1.82	92.50	.23	1.58	15.81	3.64	15.25	4.91	60.39
2 KOR	86.71	.36	5.82	1.82	5.29	1.98	81.34	6.69	5.00	1.26	3.72	4.90	0.75	87.24	2.54	4.57
3 TWN	76.51	.60	10.24	3.09	9.55	4.56	25.54	26.55	34.95	1.29	7.11	2.76	1.04	7.46	1.84	86.90
4 KHM	.24	.17	0.44	98.65	.50	4.49	18.86	26.68	14.21	2.96	32.80	10.93	17.38	14.74	10.39	46.56
5 IDN	16.96	4.16	24.70	29.20	24.98	1.55	3.07	2.24	1.84	88.33	2.97	0.74	1.04	2.12	94.90	1.20
6 LAO	1.19	91.57	1.89	3.60	1.75	6.91	11.39	11.19	8.64	44.51	17.36	0.37	97.69	0.49	0.76	0.69
7 MYS	14.69	1.32	70.13	5.76	8.09	.75	89.79	4.63	3.01	.33	1.48	7.04	3.24	11.32	4.38	74.02
8 MMR	5.94	.92	5.40	6.99	80.75	.27	.62	.71	.66	.17	97.56	14.96	24.73	17.21	23.35	19.75
9 PHL	27.25	1.32	41.70	9.90	19.83	2.22	50.81	28.07	8.37	1.40	9.13	3.51	2.08	13.69	4.58	76.14
10 SGP	32.93	3.29	11.45	12.34	40.00	94.83	.99	.70	2.30	.31	0.88	91.90	0.56	4.10	1.04	2.40
11 THA	96.62	.10	1.28	.49	1.52	.58	92.93	3.19	1.70	.36	1.23	10.53	2.18	43.57	5.06	38.67
12 VNM	11.49	39.30	13.12	21.49	14.60	1.18	8.74	79.74	5.96	.55	3.84	6.32	3.86	8.34	3.96	77.53
13 IND	4.55	.73	87.34	3.83	3.55	1.07	6.38	83.70	3.60	.76	4.48	3.68	3.48	10.01	5.30	77.53
14 MAC	90.74	.33	2.77	1.45	4.71	1.78	2.16	2.08	92.16	.24	1.58	85.71	1.62	5.49	2.23	4.95
15 BRN	6.51	.42	2.52	2.51	88.03	56.32	6.44	4.13	27.40	1.15	4.57	95.28	0.40	2.26	0.73	1.34
16 JPN	9.80	2.49	13.50	30.51	43.69	2.24	20.56	62.72	6.56	1.80	6.12	7.82	8.26	27.69	23.74	32.50
17 AUS	91.43	.31	2.85	1.38	4.03	3.30	39.96	27.17	22.02	1.11	6.44	5.62	2.96	57.91	22.59	10.91
18 NZL	71.50	.93	7.64	4.20	15.73	10.55	13.97	6.96	60.34	1.29	6.90	13.03	5.15	40.55	30.58	10.69
19 CAN	4.30	1.01	85.13	5.08	4.48	1.97	2.31	1.61	92.66	.22	1.23	1.05	0.23	96.49	0.90	1.33

Maastricht Features

Cluster	Averages					
	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis						
All Cases	.47	-1.600	10.600	6.784	4.565	
1 HKG, KOR, TWN, THA, MAC, AUS, NZL	.83	.465	8.850	4.243	1.775	2
2 LAO, VNM	.20	-8.163	19.939	23.956	10.546	0
3 MYS, PHL, IND, CAN	.54	-4.473	8.796	4.275	3.594	1
4 KHM, IDN	.18	-2.515	9.121	8.561	8.169	0
5 MMR, SGP, BRN, JPN	-.01	1.399	11.539	4.267	5.982	1
Crisis						
All Cases	.54	-.949	8.971	4.070	5.635	
1 SGP, BRN	.54	5.867	1.172	2.438	.509	3
2 KOR, MYS, PHL, THA, AUS	.60	-2.091	3.835	5.367	3.792	0
3 VNM, IND, JPN	.55	-4.840	4.279	2.163	4.957	0
4 HKG, TWN, MAC, NZL, CAN	.61	.649	2.127	1.386	2.062	1
5 IDN, LAO,	.28	-2.922	46.240	14.060	20.700	0
6 KHM, MMR	.45	-1.097	16.485	2.042	10.250	0
Post-crisis						
All Cases	.43	-.508	4.061	1.609	4.800	
1 SGP, MAC, BRN	.91	6.272	1.889	.946	.725	3
2 LAO, MMR,	-.15	-2.243	15.563	1.315	16.488	0
3 KOR, THA, JPN, AUS, NZL, CAN	.12	-.516	2.198	2.486	2.521	0
4 IDN	.00	-1.330	7.336	3.680	9.854	0
5 HKG, TWN, KHM, MYS, PHL, VNM, IND	.65	-2.795	2.836	.929	4.440	1

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Fuzzy cluster analysis. See Appendix A for data description.

Singapore and Brunei which have been linked since the pre-crisis period plus Macau constitute the most tightly linked cluster that attains group silhouette 0.91 and 3 best features in the post-crisis setting. They also share highly stable nominal renminbi rate. Meanwhile, the fifth group of 7 economies enjoys the stablest nominal yuan rate.

Other cross-period subclusters are Korea-Thailand-Australia, HongKong-Taiwan, and Malaysia-Philippines. Based on the size of the clusters, the post-crisis configuration

appears to be more symmetrical.

7.3.1.1 Comparisons across Anchors

The solutions by the anchors are collected in Table 7.21. Among all clusters, the pre-crisis US-based Malaysia-Canada pair records the highest silhouette, suggesting that this group is most appropriately classified.

Based on the average silhouette over all objects, the following reference countries are compatible with the most data-fitting partitions: for pre-crisis period the Germany/EMU reference; for crisis period the US reference; and for post-crisis period the Japan reference.

For different period, signified by the number and the structure of the configurations, different reference country corresponds to the most convergent configuration. For pre-crisis period, the China reference; for crisis period the G3 reference; and for post-crisis period the Japan reference.

To assess how the degrees of convergence might have changed, it may be appropriate to look at the configurations for each reference over the periods. It appears that the arrangement by the Japan reference has been more symmetrical with a significantly larger dominant cluster and remarkably fewer clusters in the post-crisis solution. Partition structures by other reference countries are somewhat similar over periods.

With regard to subgroupings that exist over the periods. Singapore and Macau share the same grouping across the basket, yen, and euro anchors. More cross-period subclusters are present under yuan anchor.

Also notable is the link between Singapore and Brunei, the constituents of monetary union, over the periods by the euro and yuan anchors. By other anchors, they are linked for crisis and post-crisis periods but not pre-crisis period. As for Hong Kong and Macau, they are connected for pre-crisis and crisis periods for all anchors but not for post-crisis

period. Hence, Hong Kong and Macau do not consistently share the same grouping by any anchor.

The bottom part of Table 7.21 shows some post-crisis features. The post-crisis findings show that Singapore, Macau, and Brunei contribute to the highest group silhouettes for all anchors except for euro. They also possess high belongingness to their grouping for all anchors in the post-crisis setting. With respect to countries which have highly fuzzy belongingness to more than one group, none of them are present under basket and yen anchors.

Cross-anchor subgroups are listed in Table 7.22. As mentioned above, Singapore-Macau is consistently robust across basket, yen, and euro anchors over the periods. Singapore and Macau could have jointly shared similar Maastricht features with reference to weighted-G3, Japan, and Germany/EMU through the periods.

For the post-crisis period, the most recent period, Singapore-Macau-Brunei and NewZealand-Canada are stable across all anchors.

Table 7.21 Maastricht-FCM summary

	Dollar	SW	Currency Basket	SW	Yen	SW	Euro	SW	Yuan	SW
Pre-crisis	1 HKG, KOR, TWN, SGP, MAC, AUS	.11	HKG, KOR, TWN, SGP, MAC, AUS	-.10	HKG, KOR, TWN, SGP, MAC, AUS	-.25	HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL	.68	HKG, KOR, TWN, THA, MAC, AUS, NZL	.83
	2 THA, BRN, JPN, NZL	.54	THA, BRN, NZL	.70	THA, BRN, NZL	.81	CHN, MYS, IND, CAN	.49	MMR, SGP, BRN, JPN	-.01
	3 IDN, MMR, PHL	.26	CHN, PHL, IND	.24	KHM, IDN, LAO	-.33	KHM, IDN, JPN	.58	MYS, PHL, IND, CAN	.54
	4 CHN, KHM, IND	-.14	KHM, LAO	-.36	MYS, CAN	.80	MMR, PHL	.61	KHM, IDN	.18
	5 MYS, CAN	.95	MYS, CAN	.94	MMR, PHL	.39	LAO	.00	LAO, VNM	.20
	6 VNM	.00	MMR	.00	CHN, IND	.40	VNM	.00		
	7 LAO	.00	VNM	.00	VNM	.00				
	8		IDN	.00						
Average		.25		.18		.17		.55		.47
Crisis	1 HKG, MAC, NZL, CAN	.77	KOR, KHM, MYS, MMR, PHL, THA	-.04	HKG, SGP, MAC, BRN, NZL, CAN	.26	CHN, KOR, TWN, MYS, PHL, THA, VNM, AUS	.76	HKG, TWN, MAC, NZL, CAN	.61
	2 CHN, TWN, VNM, AUS	.70	HKG, SGP, MAC, BRN, NZL, CAN	.55	KHM, PHL, VNM, IND	.00	HKG, SGP, MAC, BRN, NZL, CAN	.42	KOR, MYS, PHL, THA, AUS	.69
	3 KOR, MYS, PHL, THA	.67	CHN, TWN, VNM, IND, AUS	.65	KOR, MYS, THA	.79	KHM, MMR	.23	VNM, IND, JPN	.55
	4 SGP, BRN	.34	IDN, LAO	.30	CHN, TWN, AUS	.89	IND, JPN	.48	SGP, BRN	.54
	5 KHM, MMR	.43			IDN, LAO	.24	IDN	.00	IDN, LAO	.28
	6 IND, JPN	.61			MMR	.00	LAO	.00	KHM, MMR	.45
	7 IDN, LAO	.29								
Average		.60		.36		.37		.50		.54
Post-crisis	1 TWN, KHM, PHL, THA, IND, JPN	.04	CHN, HKG, TWN, MYS, THA	.65	CHN, HKG, TWN, KHM, IDN, MYS, PHL, THA, VNM, IND, AUS, NZL, CAN	.43	CHN, HKG, MYS, PHL, THA, VNM, IND, AUS	.75	HKG, TWN, KHM, MYS, PHL, VNM, IND	.65
	2 KOR, IDN, AUS, NZL, CAN	.40	KOR, IDN, AUS, NZL, CAN	.25	KOR, SGP, MAC, BRN	.69	TWN, KHM, MMR, JPN	-.54	KOR, THA, JPN, AUS, NZL, CAN	.12
	3 CHN, HKG, MYS, VNM	.65	KHM, PHL, VNM, IND	.19	LAO, MMR	.11	KOR, IDN, NZL, CAN	-.08	SGP, MAC, BRN	.91
	4 SGP, MAC, BRN	.85	SGP, MAC, BRN	.94			SGP, MAC, BRN	.33	LAO, MMR	-.15
	5 LAO, MMR	-.10	LAO, MMR	-.24			LAO	.00	IDN	.00
Average		.36		.40		.45		.30		.41
All Periods	1 -		SGP, MAC		TWN, AUS		SGP, MAC, BRN		KOR, THA, AUS	
	2				SGP, MAC		CHN, MYS		HKG, TWN	
	3								MYS, PHL	
									SGP, BRN	
Post-crisis Findings										
1 Highest silhouette	SGP-MAC-BRN		SGP-MAC-BRN		KOR-SGP-MAC-BRN		CHN-HKG-MYS-PHL-THA-VNM-IND-AUS		SGP-MAC-BRN	
2 Closely linked subclusters shown by membership coefficients > 50%	SGP-MAC-BRN, KOR-AUS-NZL-CAN, TWN-PHL-IND, CHN-HKG-MYS-VNM,		SGP-MAC-BRN, AUS-NZL-CAN, PHL-IND, CHN-HKG-TWN-MYS-THA		KOR-SGP-MAC-BRN, CHN-HKG-TWN-KHM-MYS-PHL-THA-VNM-IND-AUS-CAN		KOR-NZL-CAN, TWN-KHM, MYS-PHL-VNM-IND-AUS, SGP-MAC-BRN		SGP-MAC-BRN, KOR-AUS-CAN; HKG-TWN-MYS-PHL-VNM-IND	
3 High belongingness to more than one group (< 2 % difference in membership)	KHM		-		-		MMR, THA		MMR	

Table 7.22 Maastricht-FCM cross-anchor subclusters

	PRE	CRS	PST	All		PRE	CRS	PST	All
DB	1 HKG, KOR, TWN, SGP, MAC, AUS	HKG, MAC, NZL, CAN	KOR, IDN, AUS, NZL, CAN	KOR, AUS	DY	HKG, KOR, TWN, SGP, MAC	HKG, MAC, NZL, CAN	TWN, KHM, PHL, THA, IND	-
	2 THA, BRN, NZL	KOR, MYS, PHL, CHN, HKG, MYS THA				THA, BRN, NZL	CHN, TWN, AUS	CHN, HKG, MYS, VNM	
	3 MYS, CAN	CHN, TWN, VNM, AUS	SGP, MAC, BRN			MYS, CAN	KOR, MYS, THA	IDN, AUS, NZL, CAN	
	4 CHN, IND	SGP, BRN	KHM, PHL, IND			CHN, IND	SGP, BRN	SGP, MAC, BRN	
	5	KHM, MMR	LAO, MMR			MMR, PHL	IDN, LAO	LAO, MMR	
	6	IDN, LAO							
DE	1 HKG, KOR, TWN, SGP, MAC, AUS	HKG, MAC, NZL, CAN	CHN, HKG, MYS, VNM	-	DR	HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	TWN, KHM, PHL, IND	-
	2 THA, BRN, NZL	CHN, TWN, VNM, AUS	SGP, MAC, BRN			MYS, CAN	KOR, MYS, PHL, THA	KOR, AUS, NZL, CAN	
	3 MYS, CAN	KOR, MYS, PHL, TWN, KHM, JPN THA				THA, NZL	IDN, LAO	HKG, MYS, VNM	
	4 MMR, PHL	SGP, BRN	PHL, THA, IND			BRN, JPN	IND, JPN	SGP, MAC, BRN	
	5	IND, JPN	KOR, IDN				SGP, BRN	THA, JPN	
	6	KHM, MMR	NZL, CAN					LAO, MMR	
BY	1 HKG, KOR, TWN, SGP, MAC, AUS	HKG, SGP, MAC, BRN, NZL, CAN	CHN, HKG, TWN, MYS, THA	SGP, MAC	BE	HKG, KOR, TWN, SGP, MAC, AUS	HKG, SGP, MAC, BRN, NZL, CAN	CHN, HKG, MYS, THA	SGP, MAC
	2 THA, BRN, NZL	KOR, MYS, THA	KHM, PHL, VNM, IND			THA, BRN, NZL	KOR, MYS, PHL, THA	KOR, IDN, NZL, CAN	
	3 MYS, CAN	CHN, TWN, AUS	IDN, AUS, NZL, CAN			MYS, CAN	CHN, TWN, VNM, AUS	SGP, MAC, BRN	
	4 CHN, IND	KHM, PHL	SGP, MAC, BRN			CHN, IND		PHL, VNM, IND	
	5 KHM, LAO	VNM, IND	LAO, MMR						
	6	IDN, LAO							
BR	1 HKG, KOR, TWN, MAC, AUS	KOR, MYS, PHL, THA	HKG, TWN, MYS	-	YE	HKG, KOR, TWN, SGP, MAC, AUS	HKG, SGP, MAC, BRN, NZL, CAN	CHN, HKG, MYS, PHL, THA, VNM, IND, AUS	SGP, MAC
	2 THA, NZL	HKG, MAC, NZL, CAN	KOR, AUS, NZL, CAN			THA, BRN, NZL	CHN, TWN, AUS	SGP, MAC, BRN	
	3 MYS, CAN	SGP, BRN	KHM, PHL, VNM, IND			MYS, CAN	KOR, MYS, THA	TWN, KHM	
	4 PHL, IND	KHM, MMR	SGP, MAC, BRN			KHM, IDN	PHL, VNM		
	5	VNM, IND	LAO, MMR			MMR, PHL			
	6	IDN, LAO				CHN, IND			
YR	1 HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	HKG, TWN, KHM, MYS, PHL, VNM, IND	-	ER	HKG, KOR, TWN, THA, MAC, AUS, NZL	KOR, MYS, PHL, THA, AUS	HKG, MYS, PHL, THA, VNM, IND, AUS	
	2 THA, NZL	KOR, MYS, THA	SGP, MAC, BRN			MYS, IND, CAN	HKG, MAC, NZL, CAN	KOR, NZL, CAN	
	3 KHM, IDN	IDN, LAO	LAO, MMR			KHM, IDN	KHM, MMR	SGP, MAC, BRN	
	4 MYS, CAN	VNM, IND					IND, JPN	THA, AUS	
	5						SGP, BRN	TWN, KHM	
DBY	1 HKG, KOR, TWN, SGP, MAC, AUS	HKG, MAC, NZL, CAN	IDN, AUS, NZL, CAN	-	DBE	HKG, KOR, TWN, SGP, MAC, AUS	HKG, MAC, NZL, CAN	KOR, IDN, NZL, CAN	-
	2 THA, BRN, NZL	KOR, MYS, THA	SGP, MAC, BRN			THA, BRN, NZL	KOR, MYS, PHL, THA	SGP, MAC, BRN	
	3 MYS, CAN	CHN, TWN, AUS	KHM, PHL, IND			MYS, CAN	CHN, TWN, VNM, AUS	CHN, HKG, MYS	
	4 CHN, IND	SGP, BRN	CHN, HKG, MYS			CHN, IND	KHM, MMR	PHL, IND	
	5	IDN, LAO	LAO, MMR				SGP, BRN		

Table 7.22 Maastricht-FCM cross-anchor subclusters (continued)

	PRE	CRS	PST	All		PRE	CRS	PST	All
DBR	1 HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	KOR, AUS, NZL, - CAN	DYE		HKG, KOR, TWN, SGP, MAC	HKG, MAC, NZL, CAN	CHN, HKG, MYS, VNM	-
	2 MYS, CAN	KOR, MYS, PHL, SGP, MAC, BRN THA				THA, BRN, NZL	CHN, TWN, AUS	IDN, NZL, CAN	
	3 THA, NZL	SGP, BRN	KHM, PHL, IND			MYS, CAN	KOR, MYS, THA	SGP, MAC, BRN	
	4	KHM, MMR	LAO, MMR			CHN, IND	SGP, BRN	PHL, THA, IND	
	5	IDN, LAO	HKG, MYS			MMR, PHL		TWN, KHM	
DYR	1 HKG, KOR, TWN, MAC	HKG, MAC, NZL, CAN	TWN, KHM, - PHL, IND	DER		HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	HKG, MYS, VNM	-
	2 THA, NZL	KOR, MYS, THA	HKG, MYS, VNM			THA, NZL	KOR, MYS, PHL, SGP, MAC, BRN THA		
	3 MYS, CAN	SGP, BRN	AUS, NZL, CAN			MYS, CAN	SGP, BRN	TWN, KHM	
	4	IDN, LAO	SGP, MAC, BRN				IND, JPN	PHL, IND	
	5		LAO, MMR				KHM, MMR	NZL, CAN	
BYE	1 HKG, KOR, TWN, SGP, MAC, AUS	HKG, SGP, MAC, CHN, HKG, BRN, NZL, CAN	MYS, THA	SGP, MAC	BYR	HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	KHM, PHL, VNM, IND	-
	2 THA, BRN, NZL	KOR, MYS, THA	PHL, VNM, IND			THA, NZL	SGP, BRN	HKG, TWN, MYS	
	3 MYS, CAN	CHN, TWN, AUS	IDN, NZL, CAN			MYS, CAN	KOR, MYS, THA	AUS, NZL, CAN	
	4 CHN, IND		SGP, MAC, BRN				VNM, IND	SGP, MAC, BRN	
	5						IDN, LAO	LAO, MMR	
BER	1 HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	KOR, NZL, CAN -	YER		HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	HKG, MYS, PHL, - VNM, IND	
	2 THA, NZL	KOR, MYS, PHL, SGP, MAC, BRN THA				THA, NZL	KOR, MYS, THA	SGP, MAC, BRN	
	3 MYS, CAN	SGP, BRN	PHL, VNM, IND			MYS, CAN	SGP, BRN	TWN, KHM	
	4		HKG, MYS			KHM, IDN		THA, AUS	
	5								
DBYE	1 HKG, KOR, TWN, SGP, MAC, AUS	HKG, MAC, NZL, CAN	SGP, MAC, BRN -	DBYR		HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	SGP, MAC, BRN -	
	2 THA, BRN, NZL	KOR, MYS, THA	IDN, NZL, CAN			MYS, CAN	KOR, MYS, THA	AUS, NZL, CAN	
	3 CHN, IND	CHN, TWN, AUS	CHN, HKG, MYS			THA, NZL	SGP, BRN	KHM, PHL, IND	
	4 MYS, CAN	SGP, BRN	PHL, IND				IDN, LAO	HKG, MYS	
	5							LAO, MMR	
DBER	1 HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	SGP, MAC, BRN -	DYER		HKG, KOR, TWN, MAC	HKG, MAC, NZL, CAN	HKG, MYS, VNM	-
	2 MYS, CAN	KOR, MYS, PHL, KOR, NZL, CAN THA				THA, NZL	KOR, MYS, THA	SGP, MAC, BRN	
	3 THA, NZL	SGP, BRN	PHL, IND			MYS, CAN	SGP, BRN	PHL, IND	
	4	KHM, MMR	HKG, MYS					TWN, KHM	
	5							NZL, CAN	
BYER	1 HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	PHL, VNM, IND -	DBYER		HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	SGP, MAC, BRN -	
	2 THA, NZL	KOR, MYS, THA	SGP, MAC, BRN			MYS, CAN	KOR, MYS, THA	NZL, CAN	
	3 MYS, CAN	SGP, BRN	NZL, CAN			THA, NZL	SGP, BRN		
	4		HKG, MYS						

Note: D=Dollar; B=Currency Basket; Y=Yen; E=Euro/Mark; R=Yuan (Renminbi)

7.3.2 Assessment of Preparedness

Table 7.23 compares the Asian-only clusters with the Asian-plus-EMU-benchmark clusters. Columns '1' display the original Asian-only groupings and columns '2' contain the Asian-plus-EMU clusters. Cells containing EMU cases are highlighted. Common sets of countries between the clusters might be symmetrical in Maastricht conditions and degree of preparedness. The common sets of countries are provided in the second

part of the table.

Based on the number of Asian cases linked with the EMU benchmarks in columns 2, the region could have been more ready for dollar, basket, and euro pegs in the pre-crisis period, for dollar and yuan pegs in the crisis period, and for basket peg in the post-crisis period. Those which are linked with EMU3, the post-euro benchmark might have greater level of preparedness; for instance, China and Hong Kong are always connected with EMU3 in the post-crisis findings.

In light of the above, on the whole, the region could have been comparatively prepared by the dollar or by the basket anchor.

By looking at the common sets in the second part of the Table 7.23, no countries are shown to have consistently shared common Maastricht features and levels of preparedness and at the same time over the periods. Nevertheless, generally for each period more countries are indicated to share those common features when US or G3 is the reference.

The effective dollar areas in practice of Hong Kong and Macau do share those common features by the US reference for the pre-crisis and crisis periods but not for the post-crisis period. They also show those common features by some reference for some period but not consistently over periods. The actual monetary union members of Singapore and Brunei are indicated to share those common features in the pre-crisis euro solution only.

The cross-anchor common sets of countries are collected in Table 7.24. Since the post-crisis period is the most recent period, it may be of interest to see that China-HongKong is present across dollar, basket, yen, and euro (China is a reference country hence at most it can only be present over the other four references).

The features of the Asian-plus-EMU clusters are placed in Table 7.25. Clusters containing Singapore generally show attributes as good as or better than those of the

Asian-plus-EMU clusters.

Table 7.23 Maastricht-FCM preparedness assessment

	Dollar		Currency Basket		Yen		Euro		Yuan	
	1	2	1	2	1	2	1	2	1	2
Pre-crisis	1 HKG, KOR, TWN, SGP, MAC, AUS	HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL, EMU3	HKG, KOR, TWN, SGP, MAC, AUS	HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL, EMU3	HKG, KOR, TWN, SGP, MAC, AUS	MYS, CAN, EMU1, EMU2, EMU3	HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL	HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL, EMU3	HKG, KOR, TWN, THA, MAC, AUS, NZL	HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL
	2 THA, BRN, JPN, NZL	MYS, CAN, EMU1, EMU2	CHN, PHL, IND	CHN, MYS, CAN, EMU1, EMU2	THA, BRN, NZL	CHN, MMR, PHL	CHN, MYS, IND, CAN	MYS, IND, CAN, EMU1, EMU2	MMR, SGP, BRN, JPN	KHM, IDN, MMR, JPN
	3 IDN, MMR, PHL	CHN, KHM, IND, JPN	THA, BRN, NZL	KHM, IDN, LAO, MMR, PHL, IND	KHM, IDN, LAO	KHM, IDN, IND	KHM, IDN, JPN	KHM, IDN, JPN	MYS, PHL, IND, CAN	EMU1, EMU2, EMU3
	4 CHN, KHM, IND	IDN, MMR, PHL	KHM, LAO	VNM	CHN, IND	HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL	MMR, PHL	CHN, MMR, PHL	KHM, IDN	MYS, PHL, IND, CAN
	5 MYS, CAN	LAO	MYS, CAN		MMR, PHL	LAO	LAO	VNM	LAO, VNM	LAO
	6 VNM	VNM	MMR		MYS, CAN	VNM	VNM	LAO		VNM
	7 LAO		IDN		VNM					
	8		VNM							
Crisis	1 HKG, MAC, NZL, CAN	CHN, TWN, VNM, AUS, EMU1, EMU2	KOR, KHM, MYS, MMR, PHL, THA	CHN, TWN, VNM, IND, AUS, EMU1, EMU2, EMU3	HKG, SGP, MAC, BRN, NZL, CAN	CHN, TWN, AUS, EMU1, EMU2, EMU3	CHN, KOR, TWN, MYS, PHL, THA, VNM, AUS	CHN, KOR, TWN, MYS, PHL, THA, VNM, AUS	HKG, TWN, MAC, NZL, CAN	TWN, KHM, MMR, VNM, IND, JPN, AUS, EMU1, EMU2
	2 CHN, TWN, VNM, AUS	HKG, MAC, NZL, CAN, EMU3	HKG, SGP, MAC, BRN, NZL, CAN	HKG, SGP, MAC, BRN, NZL, CAN	KHM, PHL, VNM, IND	HKG, SGP, MAC, BRN, NZL, CAN	HKG, SGP, MAC, BRN, NZL, CAN	HKG, MAC, NZL, CAN	KOR, MYS, PHL, THA, AUS	HKG, MAC, NZL, CAN, EMU3
	3 KOR, MYS, PHL, THA	IDN, LAO	CHN, TWN, VNM, IND, AUS	IDN, LAO	KOR, MYS, THA	KHM, PHL, VNM, IND	IND, JPN	EMU, EMU2, EMU3	VNM, IND, JPN	KOR, MYS, PHL, THA
	4 IND, JPN	IND, JPN	IDN, LAO	KOR, MYS, PHL, THA	CHN, TWN, AUS	KOR, MYS, THA	KHM, MMR	IND, JPN	SGP, BRN	SGP, BRN
	5 SGP, BRN	KOR, MYS, PHL, THA		KHM, MMR	IDN, LAO	IDN, LAO	IDN	KHM, IDN, MMR	IDN, LAO	IDN, LAO
	6 KHM, MMR	SGP, BRN			MMR	MMR	LAO	SGP, BRN	KHM, MMR	
	7 IDN, LAO	KHM, MMR						LAO		
Post-crisis	1 TWN, KHM, PHL, THA, IND, JPN	CHN, HKG, MYS, VNM, EMU3	CHN, HKG, TWN, MYS, AUS, NZL, THA	KOR, AUS, NZL, CAN, EMU1, EMU2	CHN, HKG, TWN, KHM, IDN, MYS, PHL, THA, VNM, IND, AUS, NZL, CAN	CHN, HKG, TWN, MYS, THA, EMU2, EMU3	CHN, HKG, MYS, PHL, THA, VNM, IND, AUS	CHN, HKG, THA, EMU2, EMU3	HKG, TWN, KHM, MYS, PHL, VNM, IND	HKG, TWN, MYS, PHL, VNM, IND, EMU3
	2 KOR, IDN, AUS, NZL, CAN	KOR, AUS, NZL, CAN, EMU1, EMU2	KOR, IDN, AUS, NZL, CAN	CHN, HKG, TWN, MYS, PHL, THA, VNM, IND, EMU3	KOR, SGP, MAC, BRN	KOR, AUS, NZL, CAN, EMU1	TWN, KHM, MMR, JPN	IDN, MYS, PHL, VNM, IND, AUS, EMU1	KOR, THA, JPN, AUS, NZL, CAN	JPN, AUS, EMU1, EMU2
	3 CHN, HKG, MYS, VNM	TWN, KHM, PHL, THA, IND, JPN	KHM, PHL, VNM, IND	SGP, MAC, BRN	LAO, MMR	SGP, MAC, BRN	KOR, IDN, NZL, CAN	KOR, NZL, CAN	SGP, MAC, BRN	KOR, THA, NZL, CAN
	4 SGP, MAC, BRN	SGP, MAC, BRN	SGP, MAC, BRN	KHM, LAO		LAO, MMR	SGP, MAC, BRN	TWN, KHM, JPN	LAO, MMR	SGP, MAC, BRN
	5 LAO, MMR	IDN, MMR	LAO, MMR	MMR		KHM, PHL, VNM, IND	LAO	SGP, MAC, BRN	IDN	IDN, MMR
	6	LAO		IDN		IDN		LAO		KHM, LAO
	7							MMR		
All Periods	1 -	HKG	SGP, MAC	TWN, AUS	TWN, AUS	-	CHN, MYS	-	SGP, BRN	-
	2	AUS		CHN	SGP, MAC		SGP, MAC, BRN		KOR, THA, AUS	
	3	NZL							HKG, TWN	
	4	CAN							MYS, PHL	
Common sets of countries										
	Dollar		Currency Basket		Yen		Euro		Yuan	
	1	2	1	2	1	2	1	2	1	2
Pre-crisis	1 HKG, KOR, TWN, SGP, MAC, AUS		HKG, KOR, TWN, SGP, MAC, AUS		MYS, CAN		HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL		-	
	2 THA, BRN, NZL		THA, BRN, NZL				MYS, IND, CAN			
	3 MYS, CAN		MYS, CAN							
Crisis	1 HKG, MAC, NZL, CAN		CHN, TWN, VNM, IND, AUS		CHN, TWN, AUS		-		HKG, MAC, NZL, CAN	
	2 CHN, TWN, VNM, AUS								VNM, IND, JPN	
	3								KHM, MMR	
Post-crisis	1 KOR, AUS, NZL, CAN		CHN, HKG, TWN, MYS, THA		CHN, HKG, TWN, MYS, THA		MYS, PHL, VNM, IND, AUS		HKG, TWN, MYS, PHL, VNM, IND	
	2 CHN, HKG, MYS, VNM		KOR, AUS, NZL, CAN		AUS, NZL, CAN		CHN, HKG, THA		JPN, AUS	
	3		PHL, VNM, IND							
All Periods	1 -		-		-		-		-	

Table 7.24 Maastricht-FCM-preparedness cross-anchor subclusters

	PRE	CRS	PST	All		PRE	CRS	PST	All
DB	1 HKG, KOR, TWN, SGP, MAC, VNM, AUS	CHN, TWN, AUS	KOR, AUS, NZL, CAN	-	DY	MYS, CAN	CHN, TWN, AUS	AUS, NZL, CAN	-
	2 MYS, CAN		CHN, HKG, MYS					CHN, HKG, MYS	
	3 THA, BRN, NZL								
DE	1 HKG, KOR, TWN, SGP, MAC, AUS	-	CHN, HKG	-	DR	-	HKG, MAC, NZL, CAN	HKG, MYS, VNM	-
	2 MYS, CAN								
BY	1 MYS, CAN	CHN, TWN, AUS	AUS, NZL, CAN	-	BE	HKG, KOR, TWN, SGP, MAC, AUS		PHL, VNM, IND	-
	2		CHN, HKG, TWN, MYS, THA			THA, BRN, NZL		CHN, HKG, THA	
	3					MYS, CAN			
BR	1 -	VNM, AUS	PHL, VNM, IND	-	YE	MYS, CAN	-	CHN, HKG	-
	2		HKG, TWN, MYS						
YR	1 -	-	HKG, TWN, MYS	-	ER	-	-	MYS, PHL, VNM, IND	-
DBY	1 MYS, CAN	CHN, TWN, AUS	AUS, NZL, CAN	-	DBE	HKG, KOR, TWN, SGP, MAC, AUS		CHN, HKG	-
	2		CHN, HKG, MYS			MYS, CAN			
	3					THA, BRN, NZL			
DBR	1 -	-	HKG, MYS	-	DYE	MYS, CAN	-	CHN, HKG	-
DYR	1 -	-	HKG, MYS	-	DER	-			-
BYE	1 MYS, CAN	-	CHN, HKG, THA	-	BYR	-	-	HKG, TWN, MYS	-
BER	1 -	-	PHL, VNM, IND	-	YER	-			-
DBYE	1 MYS, CAN	-	CHN, HKG	-	DBYR	-	TWN, VNM	HKG, MYS	-
DBER	1 -	-	-	-	DYER	-	-	-	-
BYER	1 -	-	-	-	DBYER	-	-	-	-

Note: D=Dollar; B=Currency Basket; Y=Yen; E=Euro/Mark; R=Yuan (Renminbi)

Table 7.25 Maastricht-FCM preparedness clusters

Dollar					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.807	5.411	2.760	4.614	
1 HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL, EMU3	1.034	3.037	.986	2.173	2
2 MYS, CAN, EMU1, EMU2	-4.294	1.491	2.141	1.890	2
3 CHN, KHM, IND, JPN	-3.551	4.979	5.343	6.064	0
4 IDN, MMR, PHL	-1.402	9.326	1.367	8.799	0
5 LAO	-10.466	16.120	2.778	15.935	0
6 VNM	-5.860	24.109	16.810	7.797	0
Crisis					
All Cases	-1.199	7.269	3.629	4.426	
1 CHN, TWN, VNM, AUS, EMU1, EMU2	-2.681	2.067	2.061	1.819	1
2 HKG, MAC, NZL, CAN, EMU3	.916	2.189	1.013	1.876	1
3 IDN, LAO	-2.922	44.437	14.058	18.875	0
4 IND, JPN	-5.615	3.726	2.547	5.253	0
5 KOR, MYS, PHL, THA	-2.135	3.202	5.971	2.953	0
6 SGP, BRN	5.867	1.712	2.439	2.289	2
7 KHM, MMR	-1.097	15.640	2.039	8.425	0
Post-crisis					
All Cases	-.787	3.209	1.570	4.528	
1 CHN, HKG, MYS, VNM, EMU3	-.796	1.574	2.046	2.095	0
2 KOR, AUS, NZL, CAN, EMU1, EMU2	-.326	1.041	2.791	2.644	1
3 TWN, KHM, PHL, THA, IND, JPN	-3.268	2.083	1.471	4.826	0
4 SGP, MAC, BRN	6.272	2.462	.871	1.499	3
5 IDN, MMR	-1.088	15.172	2.446	9.690	0
6 LAO	-3.641	6.162	1.398	22.913	0
Currency Basket					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.829	5.968	4.248	4.917	
1 HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL, EMU3	1.034	3.388	2.088	2.499	2
2 CHN, MYS, CAN, EMU1, EMU2	-4.261	3.332	3.077	2.132	2
3 KHM, IDN, LAO, MMR, PHL, IND	-3.901	9.373	5.285	10.260	0
4 VNM	-5.860	24.510	25.481	8.544	0
Crisis					
All Cases	-.981	7.523	5.777	4.701	
1 CHN, TWN, VNM, IND, AUS, EMU1, EMU2, EMU3	-2.726	2.352	3.594	2.619	1
2 HKG, SGP, MAC, BRN, NZL, CAN	2.801	1.941	4.638	1.625	3
3 IDN, LAO	-2.922	45.046	15.017	19.924	0
4 KOR, MYS, PHL, THA	-2.135	3.335	7.704	3.480	0
5 KHM, MMR	-1.097	15.805	4.829	9.474	0
Post-crisis					
All Cases	-.503	3.560	2.048	4.305	
1 KOR, AUS, NZL, CAN, EMU1, EMU2	-.326	1.446	2.891	2.434	1
2 CHN, HKG, TWN, MYS, PHL, THA, VNM, IND, EMU3	-2.218	2.357	1.576	2.678	0
3 SGP, MAC, BRN	6.272	2.134	1.555	.970	2
4 KHM, LAO	-2.895	4.905	1.807	16.955	0
5 MMR	-.846	24.559	1.441	9.550	1
6 IDN	-1.330	7.663	3.803	9.628	0
Yen					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.829	6.766	5.591	8.295	
1 MYS, CAN, EMU1, EMU2, EMU3	-3.533	1.837	2.530	3.618	3
2 CHN, MMR, PHL	-2.258	12.690	3.981	10.944	0
3 KHM, IDN, IND	-3.431	6.327	6.644	14.097	0
4 HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL	1.203	4.375	3.375	6.409	1
5 LAO	-10.466	17.197	14.842	18.874	0
6 VNM	-5.860	26.045	33.265	10.821	0
Crisis					
All Cases	-.981	7.700	5.109	8.578	
1 CHN, TWN, AUS, EMU1, EMU2, EMU3	-2.215	1.568	2.990	3.944	3
2 HKG, SGP, MAC, BRN, NZL, CAN	2.801	1.733	3.967	5.560	1
3 KHM, PHL, VNM, IND	-3.143	5.569	4.421	11.363	0
4 KOR, MYS, THA	-2.049	3.277	7.104	7.585	0
5 IDN, LAO	-2.922	45.997	14.197	24.937	0
6 MMR	-.535	25.494	3.278	13.610	0
Post-crisis					
All Cases	-.503	4.445	2.606	7.237	
1 CHN, HKG, TWN, MYS, THA, EMU2, EMU3	-1.861	1.808	2.130	3.639	3
2 KOR, AUS, NZL, CAN, EMU1	.199	2.810	3.234	5.073	0
3 SGP, MAC, BRN	6.272	1.882	2.236	4.073	1
4 LAO, MMR	-2.243	17.710	2.281	20.377	0
5 KHM, PHL, VNM, IND	-3.006	5.099	2.721	10.420	0
6 IDN	-1.330	9.631	4.090	13.731	0

Table 7.25 Maastricht-FCM preparedness clusters (continued)

Euro					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.807	5.813	5.457	4.233	
1 HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL, EMU3	1.034	3.439	3.086	2.296	3
2 MYS, IND, CAN, EMU1, EMU2	-4.488	2.741	3.230	2.902	1
3 KHM, IDN, JPN	-2.123	3.417	6.312	8.182	0
4 CHN, MMR, PHL	-2.258	11.586	3.860	3.840	0
5 VNM	-5.860	23.962	33.098	7.968	0
6 LAO	-10.466	16.624	14.877	13.926	0
Crisis					
All Cases	-1.199	7.144	9.697	4.436	
1 CHN, KOR, TWN, MYS, PHL, THA, VNM, AUS	-2.260	2.583	10.472	2.475	0
2 HKG, MAC, NZL, CAN	1.268	2.005	9.682	1.624	1
3 SGP, BRN	5.867	.968	10.102	3.427	2
4 IND, JPN	-5.615	3.632	10.028	5.253	0
5 KHM, IDN, MMR	-1.131	17.962	13.183	9.843	0
6 LAO	-4.645	68.446	14.578	20.466	0
7 EMU, EMU2, EMU3	-2.347	1.369	2.050	2.792	1
Post-crisis					
All Cases	-.787	3.348	2.445	4.444	
1 CHN, HKG, THA, EMU2, EMU3	-1.316	1.442	1.891	3.446	0
2 IDN, MYS, PHL, VNM, IND, AUS, EMU1	-2.897	3.374	2.960	2.428	1
3 KOR, NZL, CAN	1.941	1.059	2.816	3.288	1
4 TWN, KHM, JPN	-3.800	1.925	2.462	7.297	0
5 SGP, MAC, BRN	6.272	1.812	2.105	3.589	1
6 LAO	-3.641	7.239	2.563	19.295	0
7 MMR	-.846	24.554	1.340	6.166	1
Yuan					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.702	9.341	6.139	4.312	
1 HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL	1.203	9.353	4.186	2.134	2
2 KHM, IDN, MMR, JPN	-1.753	10.542	6.554	7.408	0
3 EMU1, EMU2, EMU3	-2.347	1.369	2.050	2.792	2
4 MYS, PHL, IND, CAN	-4.473	8.796	4.275	3.594	0
5 LAO	-10.466	16.614	14.963	13.823	0
6 VNM	-5.860	23.264	32.948	7.269	0
Crisis					
All Cases	-1.140	7.934	3.795	5.247	
1 TWN, KHM, MMR, VNM, IND, JPN, AUS, EMU1, EMU2	-3.001	5.946	2.393	4.749	0
2 HKG, MAC, NZL, CAN, EMU3	.916	1.978	1.013	2.698	1
3 KOR, MYS, PHL, THA	-2.135	4.081	5.973	4.197	0
4 SGP, BRN	5.867	1.172	2.438	.509	3
5 IDN, LAO	-2.922	46.240	14.060	20.700	0
Post-crisis					
All Cases	-.759	3.694	1.669	4.527	
1 HKG, TWN, MYS, PHL, VNM, IND, EMU3	-2.558	2.604	.826	3.397	1
2 JPN, AUS, EMU1, EMU2	-3.706	1.964	2.927	2.930	0
3 KOR, THA, NZL, CAN	1.295	2.101	2.339	1.957	0
4 SGP, MAC, BRN	6.272	1.889	.946	.725	3
5 IDN, MMR	-1.088	15.618	2.482	9.869	0
6 KHM, LAO	-2.895	4.938	1.033	17.173	0

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Fuzzy cluster analysis. See Appendix A for data description.

7.3.3 Recapitulation

The section has discussed the results using fuzzy cluster analysis and Maastricht criteria. The following are the key findings.

Classifications

Based on the average silhouette over all objects, the reference country corresponding to the most appropriate partition is different for each period. Similarly, for different period different reference is compatible with the most convergent configuration. Despite the above, in the findings the configuration by the Japan reference has become more convergent over the periods.

Amongst subgroups which are stable over periods, Singapore and Macau share the same grouping across the G3, Japan, and Germany/EMU references. Generally more cross-period subgroupings are present under the China reference.

For the post-crisis period, the most recent period, Singapore-Macau-Brunei and NewZealand-Canada are stable across all anchors.

For Singapore and Brunei, the constituents of monetary union, they are placed together over the periods by the euro and yuan anchors. As for Hong Kong and Macau, they are connected for pre-crisis and crisis periods by any reference country but not for post-crisis period. Hence, Hong Kong and Macau do not consistently share the same grouping by any anchor.

Assessment of Preparedness

Based on the number of Asian countries linked with the EMU benchmarks, basically the region could have been comparatively prepared by the US or by the weighted-G3 reference.

Nonetheless, no countries are shown to have consistently shared common Maastricht features and levels of preparedness and at the same time over the periods.

Nevertheless, generally for each period more countries are indicated to share those common features when US or G3 is the reference.

The effective dollar areas in practice of Hong Kong and Macau do share those common features by the US reference for the pre-crisis and crisis periods but not for the post-crisis period. The prevailing monetary union members of Singapore and Brunei are indicated to share those common features in the pre-crisis Germany/EMU-based solution only.

For post-crisis period, China and Hong Kong are shown to share common Maastricht features and levels of preparedness across dollar, basket, yen, and euro anchors

In general, Singapore alone or groups containing Singapore show more conforming Maastricht attributes.

7.4 Model-based Clustering Results

The results by model-based cluster analysis are categorized into three main sections: classifications, assessment of preparedness, and a recapitulation.

7.4.1 Classifications

To recap, for MBC a cluster solution is selected based on the maximum BIC which indicates the best fit between the generated partitions (depending on the parameterizations of covariance matrix model discussed in Chapter 5) and the data.

In the following findings, the largest difference between the highest BIC and the second highest BIC is detected in the crisis period euro result. Its difference of about 15 is well above 10, the conventional threshold for strong statistical evidence for a chosen solution.

The remainder of the section is divided into findings by each monetary anchor and comparisons of solutions across the anchors.

Dollar Anchor Results

Figure 7.12 below displays the BIC plots based on the US reference. 2 clusters and model 5 are indicated to be ‘optimal’ for pre-crisis period, 10 clusters and model 1 for crisis period, and 5 clusters and model 4 for post-crisis period. The significantly more clusters for the crisis period could imply greater intra-regional divergence against the US at that time. Based on the average silhouette over all objects at 0.46, the pre-crisis solution should be most appropriately classified.

Table 7.26 exhibits the groupings and the group features. The highest cluster silhouettes and the most compliant attributes to the Maastricht requirements are highlighted.

For pre-crisis period, the largest group comprising of 12 economies reports the highest group silhouette 0.83, highly significant in absolute terms, signifying tight classification. The group is more compliant than the second group in all the Maastricht dimensions. Indeed, the group’s composition is in line with the prevalent Asian dollar standard which existed in the period before the Asian turmoil.

Hong Kong, Macau, New Zealand, and Canada carry on their previous link and share the highest degree of exchange rate stability and interest rate convergence with US for the crisis period. Singapore maintains the highest budget surplus and inflation convergence.

In the post-crisis solution, Korea-Malaysia-Thailand and Macau-Canada retain their linkages since the pre-crisis solution. Combined with other countries, they form the largest group which displays 2 best attributes. Nonetheless, the group only displays a marginally positive silhouette. The largest silhouette 0.55 is displayed by the second group which also boasts the stablest post-crisis dollar rate.

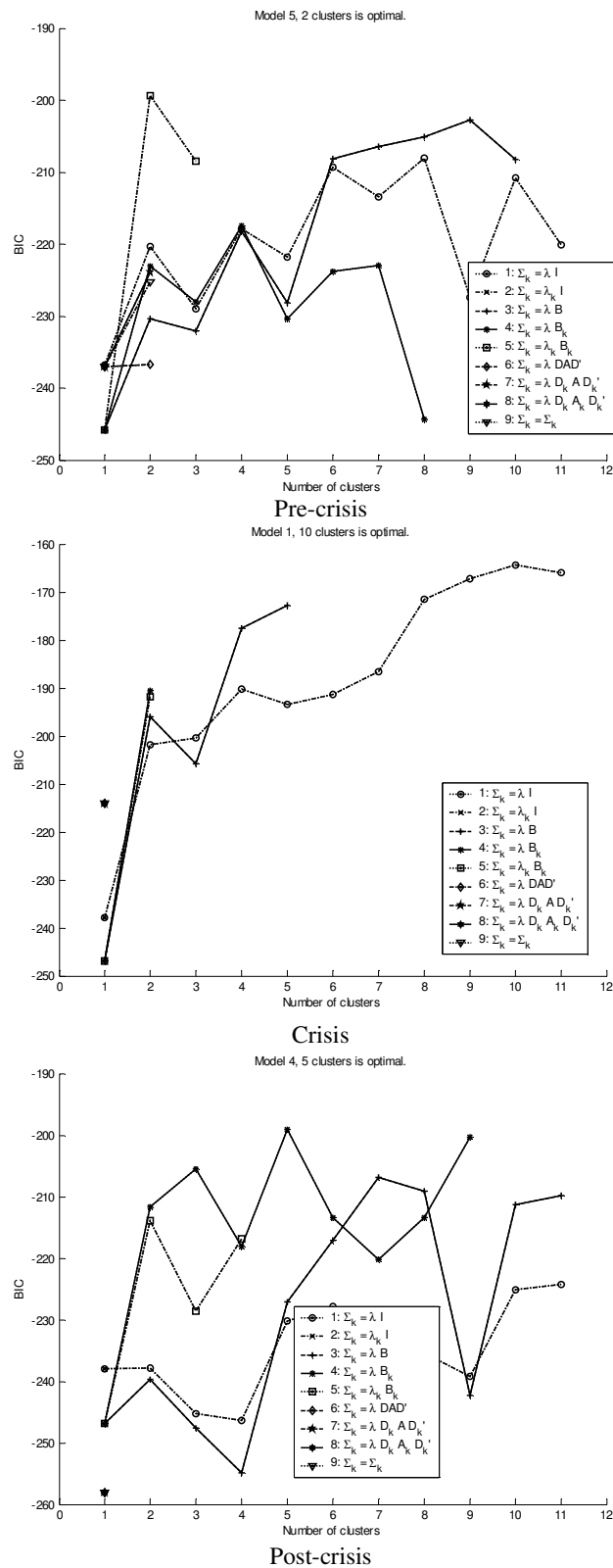


Figure 7.12 Maastricht-dollar BICs

Some other observations may also be noteworthy. Since the crisis period solution, the less developed nations particularly Indonesia, Laos, and Myanmar have

been distanced from the pack. They are predominantly distinguished by high inflation and interest rate divergence from the US.

Aside from more fragmented arrangements since the crisis period setting, the most conforming features have also been more distributed. In another respect, those which are clustered with Hong Kong, an effective dollar area have always shown stable dollar rate, a condition essential for rigid dollar peg.

Table 7.26 Maastricht-MBC-dollar clusters

			Averages			
Cluster	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis Period						
All Cases	.46	-1.726	6.017	2.867	4.901	
1 HKG, KOR, TWN, MYS, SGP, THA, MAC, BRN, JPN, AUS, NZL, CAN	.83	-.094	2.886	1.286	2.155	4
2 CHN, KHM, IDN, LAO, MMR, PHL,VNM, IND	-.10	-4.174	10.715	5.237	8.678	-
Crisis Period						
All Cases	.45	-1.027	8.154	3.866	4.671	
1 CHN, TWN, VNM, AUS	.70	-2.384	2.331	1.553	1.622	0
2 HKG, MAC, NZL, CAN	.58	1.268	2.479	1.266	1.357	2
3 KOR, MYS, PHL, THA	.67	-2.135	3.202	5.971	2.953	0
4 IND, JPN	.61	-5.615	3.726	2.547	5.253	0
5 SGP	.00	7.572	1.652	2.439	1.995	2
6 IDN	.00	-1.199	21.576	16.679	16.132	0
7 KHM	.00	-1.658	6.694	2.349	9.303	0
8 LAO	.00	-4.645	67.298	11.438	21.618	0
9 MMR	.00	-.535	24.586	1.730	7.548	0
10 BRN	.00	4.162	1.771	2.439	2.583	0
Post-crisis Period						
All Cases	.17	-.553	3.485	1.498	4.788	
1 CHN, KOR, MYS, SGP, THA, MAC, BRN, CAN	.03	1.855	1.646	1.193	1.407	2
2 HKG, TWN, KHM, PHL, VNM, IND,	.55	-2.553	2.625	.880	4.934	1
3 JPN, AUS, NZL	.19	-1.591	1.427	2.948	4.203	1
4 IDN, MMR	-.37	-1.088	15.172	2.446	9.690	0
5 LAO	.00	-3.641	6.162	1.398	22.913	0

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Model-based cluster analysis. See Appendix A for data description.

Currency Basket Anchor Results

The G3-based BIC plots are gathered in Figure 7.13. 8 clusters and model 3 are selected for the pre-crisis period, 10 clusters and model 1 for the crisis period, and 5 clusters and model 4 for the post-crisis period. The significantly fewer clusters in the post-crisis solution might infer higher regional homogeneity against the weighted G3 countries in that period. Based on the average silhouette over all objects at 0.48, the pre-crisis solution should be most appropriately classified.

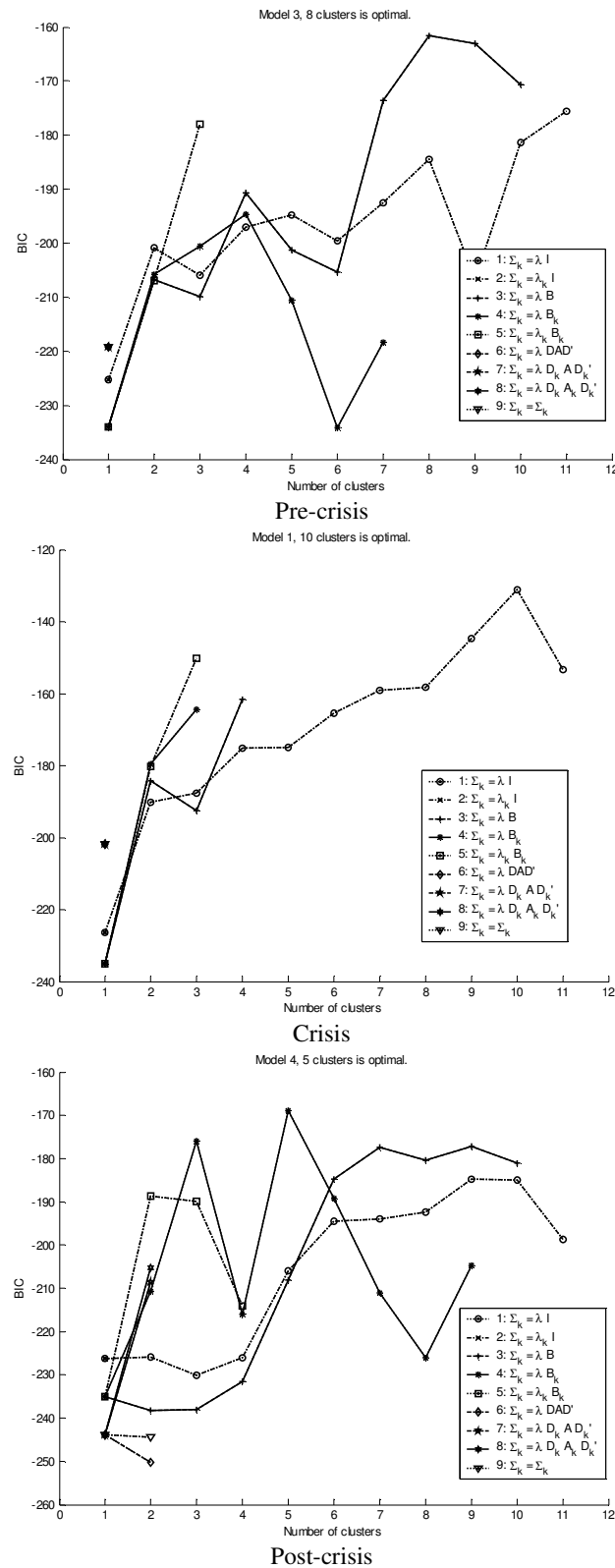


Figure 7.13 Maastricht-basket BICs

Table 7.27 reveals that Malaysia-Canada obtains the highest silhouette 0.92 for the pre-crisis period. However, the unconnected Singapore, is the most compliant cluster in

all aspects. In the crisis period configuration, Singapore, possessing 3 best features is once again the most prospective country. The pre-crisis subclusters of HongKong-Macau-NewZealand and Korea-Thailand make up parts of the best classified clusters, clusters two and three.

For post-crisis period, Hong Kong and Macau retain their link since the pre-crisis period and form part of the largest cluster which possesses 2 most compatible features but a slightly negative silhouette. Meanwhile, Korea, Australia, New Zealand, and Canada share high silhouette 0.62 and most compliant budget balance and inflation convergence. Whilst the configuration is more convergent for the post-crisis period, the best features are more distributed compared to those for the pre-crisis period.

Table 7.27 Maastricht-MBC-basket clusters

			Averages			
Cluster	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis Period						
All Cases	.48	-1.747	6.694	4.595	5.271	
1 HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	.74	.570	3.907	2.365	2.433	0
2 IDN, MMR, PHL	.20	-1.402	10.066	2.690	9.263	0
3 MYS, CAN	.92	-5.312	1.871	2.275	1.548	0
4 CHN, IND	.36	-4.697	8.042	3.975	5.237	0
5 KHM	.00	-3.467	3.276	11.193	10.430	0
6 SGP	.00	6.269	1.599	1.955	1.508	4
7 LAO	.00	-10.466	16.519	9.182	16.008	0
8 VNM	.00	-5.860	24.510	25.481	8.544	0
Crisis Period						
All Cases	.46	-.765	8.494	6.365	5.002	
1 CHN, TWN, VNM, AUS	.68	-2.384	2.189	4.566	1.770	0
2 HKG, MAC, NZL, CAN	.78	1.268	2.246	4.436	1.774	0
3 KOR, MYS, THA,	.78	-2.049	2.752	8.126	2.651	0
4 KHM, PHL	.25	-2.025	5.857	5.799	8.159	0
5 SGP	.00	7.572	1.186	5.041	1.137	3
6 BRN	.00	4.162	1.479	5.041	1.518	0
7 IND	.00	-5.231	5.950	4.335	5.493	1
8 MMR	.00	-.535	24.978	4.496	8.597	0
9 IDN	.00	-1.199	21.985	17.533	17.181	0
10 LAO	.00	-4.645	68.106	12.501	22.666	0
Post-crisis Period						
All Cases	.26	-.211	3.906	2.048	4.544	
1 CHN, HKG, MYS, SGP, THA, MAC, BRN	-.03	1.632	1.948	1.586	.748	2
2 TWN, KHM, PHL, VNM, IND	.67	-2.845	3.122	1.868	5.762	0
3 KOR, AUS, NZL, CAN	.62	1.149	1.399	2.799	2.545	2
4 IDN, MMR	-.40	-1.088	16.111	2.622	9.589	0
5 LAO	.00	-3.641	7.151	2.026	22.923	0

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Model-based cluster analysis. See Appendix A for data description.

Yen Anchor Results

Figure 7.14 displays the Japan-based BIC plots. 8 clusters and model 1 are suggested to be appropriate for the pre-crisis period; 10 clusters and model 1 for the crisis period;

and 9 clusters and model 3 for the post-crisis period. Based on the average silhouette over all objects at 0.54, the pre-crisis solution should be most appropriately classified.

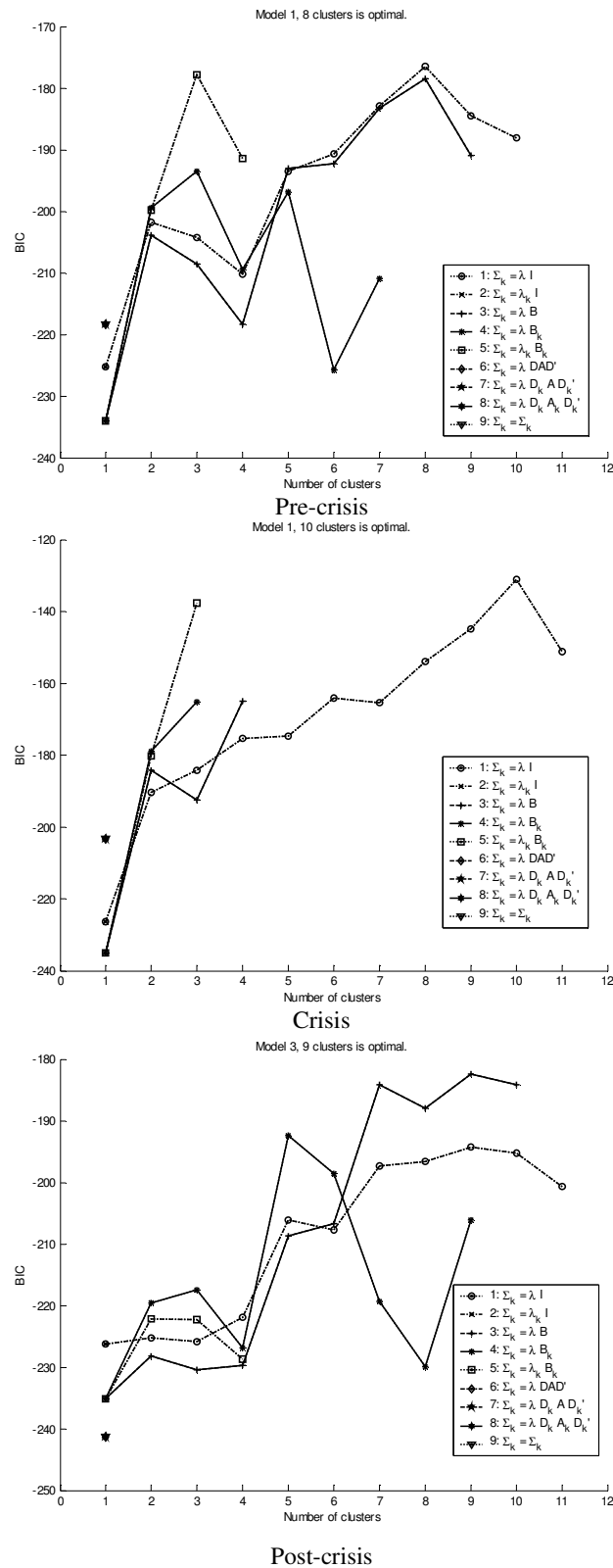


Figure 7.14 Maastricht-yen BICs

Table 7.28 shows that for pre-crisis period the most tightly classified cluster is the Malaysia-Canada pair at silhouette 0.80 and the most compliant cluster is Singapore, a single entity which maintains all 4 most supportive attributes.

Table 7.28 Maastricht-MBC-yen clusters

			Averages			
Cluster	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis						
All Cases	.54	-1.747	7.619	6.150	9.212	
1 HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	.78	.570	4.755	3.450	6.898	0
2 MMR, PHL	.39	-1.322	13.500	3.493	12.597	0
3 CHN, IND	.37	-4.697	9.388	4.273	9.733	0
4 KHM, IDN	.42	-2.515	5.638	8.170	15.232	0
5 MYS, CAN	.80	-5.312	2.540	3.250	4.858	0
6 SGP	.00	6.269	1.340	2.776	2.988	4
7 LAO	.00	-10.466	17.197	14.842	18.874	0
8 VNM	.00	-5.860	26.045	33.265	10.821	0
Crisis						
All Cases	.46	-.765	8.700	5.592	9.492	
1 HKG, MAC, NZL, CAN	.86	1.268	2.082	4.072	6.423	0
2 PHL, VNM, IND	.12	-3.637	5.244	4.392	10.029	0
3 CHN, TWN, AUS	.89	-2.083	1.767	3.930	5.096	0
4 KOR, MYS, THA	.79	-2.049	3.277	7.104	7.585	0
5 SGP	.00	7.572	1.038	3.757	4.078	1
6 BRN	.00	4.162	1.032	3.757	3.594	2
7 KHM	.00	-1.658	6.546	4.506	15.365	0
8 MMR	.00	-.535	25.494	3.278	13.610	1
9 IDN	.00	-1.199	22.682	16.431	22.194	0
10 LAO	.00	-4.645	69.312	11.962	27.680	0
Post-crisis						
All Cases	.46	-0.765	8.700	5.592	9.492	
1 CHN, HKG, KOR, TWN, MYS, THA	.51	-1.549	2.662	5.463	6.372	0
2 SGP, MAC, BRN	.83	4.205	1.232	3.801	4.830	3
3 PHL, VNM, IND	.69	-3.637	5.244	4.392	10.029	0
4 AUS, CAN	.50	-0.357	2.170	4.174	5.411	0
5 KHM	.00	-1.658	6.546	4.506	15.365	0
6 NZL	.00	1.800	1.519	4.373	7.862	0
7 IDN	.00	-1.199	22.682	16.431	22.194	0
8 LAO	.00	-4.645	69.312	11.962	27.680	0
9 MMR	.00	-0.535	25.494	3.278	13.610	1

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Model-based cluster analysis. See Appendix A for data description.

A number of countries from the previous period maintain their groupings in the crisis period arrangement. Nonetheless, none of their groupings display any best attribute. Instead, the best candidate cluster for this period might be the singleton Brunei which maintains 2 best conditions.

Only Korea and Thailand retain their grouping from pre-crisis till the post-crisis period. Despite this, for the post-crisis period it is the cluster of Singapore, Macau, and Brunei which is most aptly classified at silhouette 0.83. The group also has the most Maastricht-compliant budget balance, as well as convergent inflation and interest rate to the Japanese levels.

With slightly more clusters and reduction in the size of the dominant group, the region could have been more fragmented in the post-crisis period than that in the pre-crisis period.

Euro Anchor Results

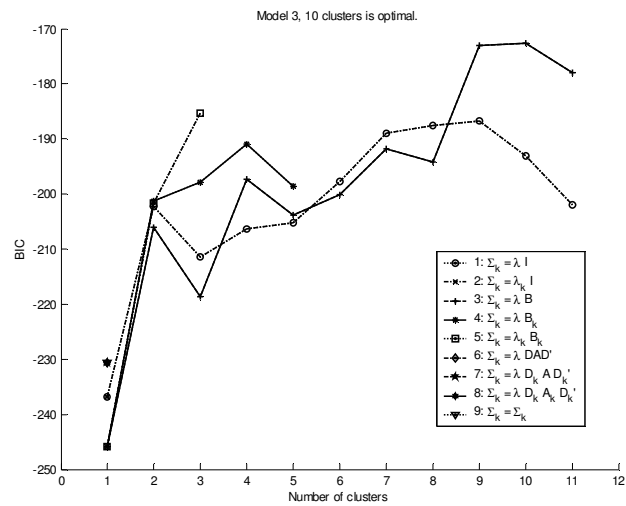
The BIC plots using Germany/EMU as the reference are arranged in Figure 7.15. 10 clusters and model 3 are indicated as optimal for the pre-crisis period; 10 clusters and model 1 for the crisis period; and 8 clusters and model 3 for the post-crisis period. Based on the average silhouette over all objects at 0.45, the crisis period solution should be most appropriately classified.

Based on the cluster silhouette 0.74, Table 7.29 reveals that the best classified cluster for the pre-crisis period is the second group consisting of Korea, Taiwan, and Thailand. Nonetheless, Singapore is the most compliant country in the first 3 dimensions whilst China maintains the most convergent interest rate toward the German rate.

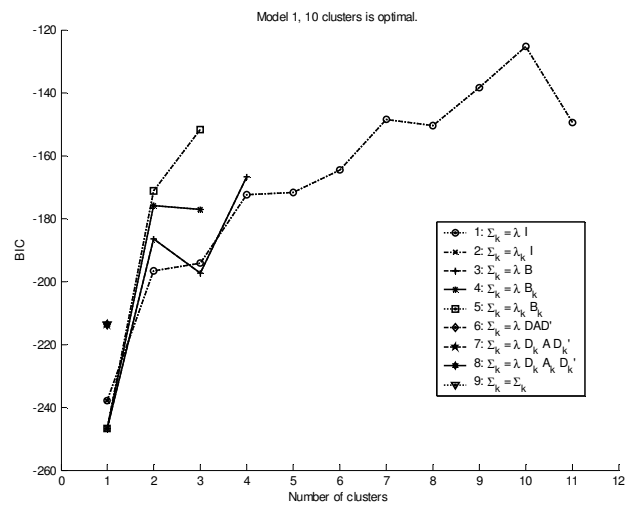
The most closely clustered group for the crisis period is made up of Hong Kong, Macau, and New Zealand which carry on their grouping from the previous period, and Canada. The group and Singapore each exhibit 2 best features.

A few cases retain their previous linkages in the post-crisis setting. For this period, it is the cluster consisting of Macau, Brunei, and Singapore which shares the highest silhouette at 0.72 and the most healthy budget balance. Groups three, five, and eight respectively record one most conforming feature.

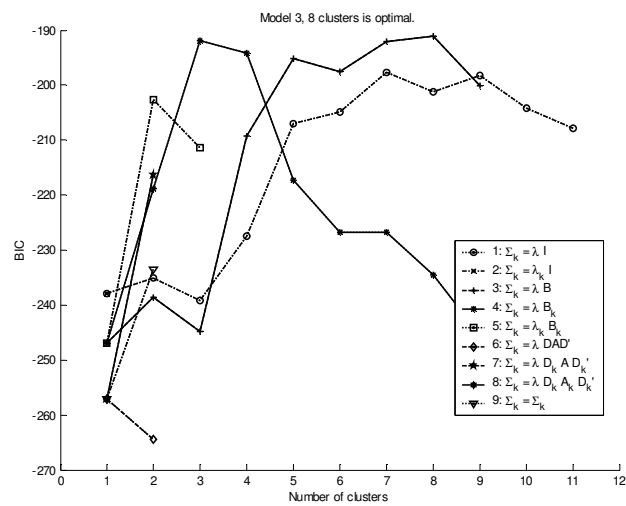
The best Maastricht conditions are more distributed across the findings and the arrangement appears to be somewhat more symmetrical in the post-crisis finding with slightly fewer clusters and fewer ungrouped cases.



Pre-crisis



Crisis



Post-crisis

Figure 7.15 Maastricht-euro BICs

Table 7.29 Maastricht-MBC-euro clusters

			Averages			
Cluster	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis						
All Cases	.35	-1.726	6.479	5.968	4.461	
1 HKG, MAC, BRN, AUS, NZL	.32	1.208	4.887	3.650	1.510	0
2 KOR, TWN, THA	.74	-.493	2.553	3.281	2.147	0
3 MYS, IND, CAN	.46	-5.296	3.543	3.334	3.362	0
4 IDN, JPN	.48	-1.452	3.614	3.774	8.040	0
5 MMR, PHL	.47	-1.322	12.480	3.324	5.381	0
6 KHM	.00	-3.467	3.023	11.387	8.466	0
7 CHN	.00	-4.130	9.797	4.933	.759	1
8 SGP	.00	6.269	1.264	2.772	4.229	3
9 LAO	.00	-10.466	16.624	14.877	13.926	0
10 VNM	.00	-5.860	23.962	33.098	7.968	0
Crisis						
All Cases	.45	-1.027	8.011	10.845	4.682	
1 CHN, TWN, PHL, VNM, AUS	.61	-2.386	2.599	9.871	2.459	0
2 HKG, MAC, NZL, CAN	.89	1.268	2.005	9.682	1.624	2
3 KOR, MYS, THA	.58	-2.049	2.555	11.473	2.501	0
4 IND, JPN	.31	-5.615	3.632	10.028	5.253	0
5 SGP	.00	7.572	.570	10.102	3.136	2
6 BRN	.00	4.162	1.365	10.102	3.718	0
7 IDN	.00	-1.199	22.092	19.715	14.981	0
8 KHM	.00	-1.658	6.598	10.070	8.151	0
9 LAO	.00	-4.645	68.446	14.578	20.466	0
10 MMR	.00	-.535	25.197	9.765	6.396	0
Post-crisis						
All Cases	.41	-.553	3.645	2.504	4.692	
1 CHN, HKG, MYS, THA	.41	-1.847	1.530	2.373	3.297	0
2 SGP, MAC, BRN	.72	6.272	1.812	2.105	3.589	1
3 PHL, VNM, IND, AUS	.39	-2.775	3.220	2.673	1.645	1
4 TWN, KHM, JPN	.29	-3.800	1.925	2.462	7.297	0
5 KOR, NZL, CAN	.62	1.941	1.059	2.816	3.288	1
6 IDN	.00	-1.330	7.720	3.840	6.085	0
7 LAO	.00	-3.641	7.239	2.563	19.295	0
8 MMR	.00	-.846	24.554	1.340	6.166	1

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty. Source: Model-based cluster analysis. See Appendix A for data description.

Yuan Anchor Results

BIC plots using China as the reference are collected in Figure 7.16. 12 clusters and model 3 are optimal for the pre-crisis period; 9 clusters and model 3 for the crisis period; and 5 clusters and model 4 for the post-crisis period. Based on the average silhouette over all objects at 0.38, the crisis period solution should be most appropriately classified.

The group silhouette of 0.50 in Table 7.30 suggests that Myanmar and Brunei are most tightly classified in the pre-crisis period. The group, however, does not exhibit any best feature. In fact, the Macau-Australia-NewZealand cluster, Malaysia, Indonesia, and Singapore exhibit one most compliant attribute each.

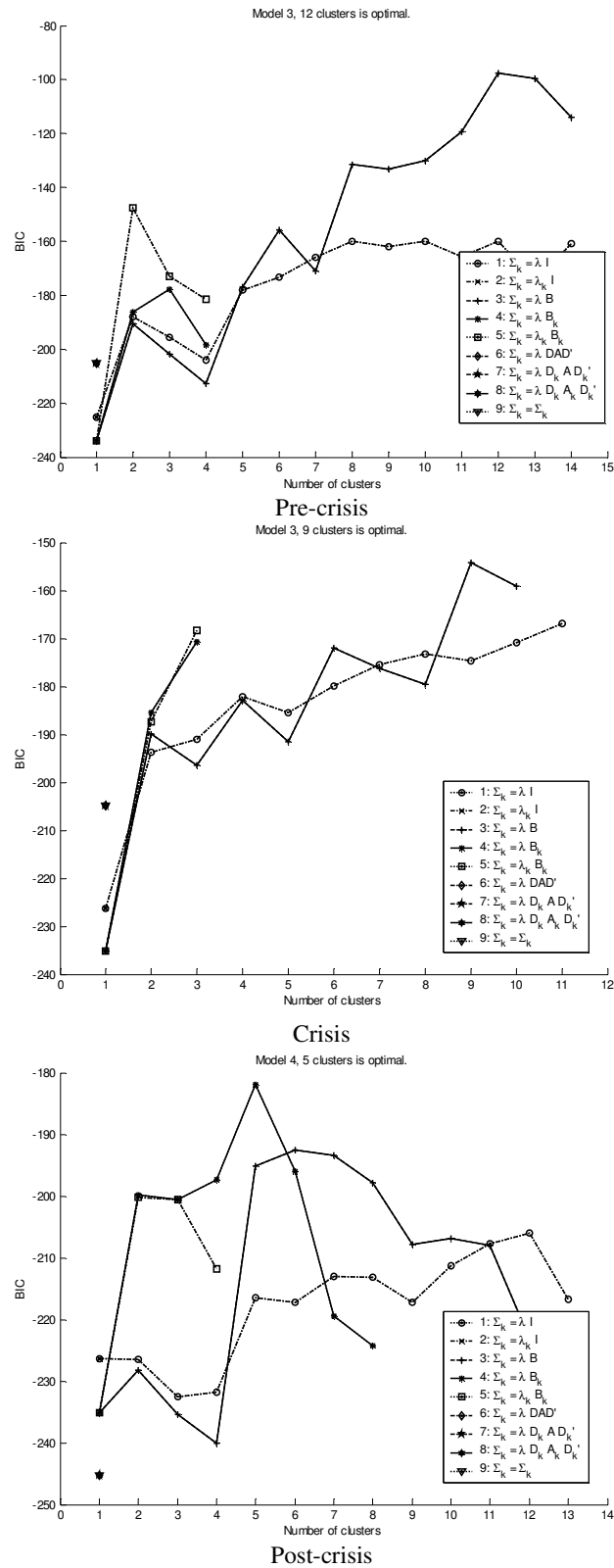


Figure 7.16 Maastricht-yuan BICs

The best classified cluster for crisis period is Taiwan-Australia which also reports the most parallel interest rate to the Chinese rate. Korea-Malaysia-Thailand, Singapore, and Indonesia display one best feature each.

Macau, Brunei, and Singapore share the highest silhouette 0.91, the most favorable budget balance, and the most stable yuan rate in the post-crisis solution. Korea and Thailand which have been linked since pre-crisis period and few others share the highest degree of inflation and interest rate convergence with China in this post-crisis setting.

The substantial reduction in the number of clusters through the findings could indicate increased degree of symmetry vis-à-vis China. Accordingly, the most conducive features have been less distributed.

Table 7.30 Maastricht-MBC-yuan clusters

Cluster	Averages					N ³
	SW	DEF (%) ¹	INF (%)	NER ²	INT (%)	
Pre-crisis						
All Cases	.26	-1.600	10.600	6.784	4.565	0
1 HKG, KOR, TWN, THA	.44	-.058	8.403	3.934	2.189	0
2 MAC, AUS, NZL	.47	1.162	9.445	4.655	1.223	1
3 MMR, BRN	.50	.334	12.426	4.063	5.658	0
4 IND, CAN	.42	-5.644	8.680	4.170	4.191	0
5 MYS	.00	-4.600	9.263	3.791	1.732	1
6 JPN	.00	-1.341	11.070	4.955	7.638	0
7 PHL	.00	-2.003	8.561	4.971	4.260	0
8 KHM	.00	-3.467	11.432	11.918	7.895	0
9 IDN	.00	-1.563	6.811	5.204	8.442	1
10 SGP	.00	6.269	10.232	3.987	4.651	1
11 LAO	.00	-10.466	16.614	14.963	13.823	0
12 VNM	.00	-5.860	23.264	32.948	7.269	0
Crisis						
All Cases	.38	-1.600	10.600	6.784	4.565	
1 HKG, MAC, BRN, NZL, CAN	.43	-.214	9.720	4.218	2.342	0
2 KOR, MYS, THA	.72	-1.706	8.752	3.866	1.987	1
3 VNM, IND, JPN	.28	-4.155	13.942	14.110	6.366	0
4 KHM, PHL	.14	-2.735	9.996	8.445	6.078	0
5 TWN, AUS	.88	.062	9.108	4.351	1.509	1
6 MMR	.00	-.640	12.857	4.141	5.658	0
7 SGP	.00	6.269	10.232	3.987	4.651	1
8 IDN	.00	-1.563	6.811	5.204	8.442	1
9 LAO	.00	-10.466	16.614	14.963	13.823	0
Post-crisis						
All Cases	.25	-1.600	10.600	6.784	4.565	
1 HKG, KOR, MYS, THA, JPN, AUS, NZL, CAN	-.09	-1.169	9.246	4.262	2.818	2
2 TWN, KHM, PHL, VNM, IND	.64	-3.511	12.040	11.649	5.124	0
3 SGP, MAC, BRN	.91	3.061	10.319	4.084	3.044	2
4 IDN, MMR	-.26	-1.101	9.834	4.672	7.050	0
5 LAO	.00	-10.466	16.614	14.963	13.823	0

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^2$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Model-based cluster analysis. See Appendix A for data description.

7.4.1.1 Comparisons across Anchors

The MBC solutions including the cluster silhouettes are collected in Table 7.31. Amongst all, the pre-crisis currency basket Malaysia-Canada pair exhibits the highest silhouette, suggesting that this group is most tightly classified. The China-based post-crisis Singapore-Macau-Brunei trio also attains comparably high silhouette.

Based on the average silhouettes for all objects, the Japan-based solution consistently provides the best classification over the periods.

The reference country consistent with the most convergent arrangement, that is, the fewest clusters is different for each period. For pre-crisis period, the US-, G3-, and Japan-based solutions generate fewer clusters; for crisis period all solutions have similar numbers of clusters; and for post-crisis period the US-, G3-, and China-based solutions. For G3 and China references, the post-crisis arrangements are more convergent in relation to those of the pre-crisis period.

Along these lines, on the whole the US and G3 references seem to be compatible with more convergent configurations.

The ‘All Periods’ rows list the stable subgroups that have stayed through the periods. Remarkably Korea and Thailand share the same cluster by the US, Japan, or China reference.

Remarkably, Hong Kong and Macau the effective dollar areas are grouped together by the basket anchor over the periods. For other references, they always share the same grouping for pre-crisis and crisis periods but not for post-crisis period. For Singapore and Brunei, they are placed together for pre-crisis dollar anchor and over all anchors for the post-crisis period. They however do not share the same grouping for the crisis period by any reference.

The bottom part of the table shows the clusters possessing the highest silhouettes for the post-crisis period. Notice that Singapore-Macau-Brunei obtains the highest

silhouette when the reference is Japan, Germany/EMU, or China.

The linkages which appear under more than one reference are put together in Table 7.32. As mentioned above, Korea and Thailand are consistently placed together across dollar, yen, and yuan anchors.

For the most recent period, the post-crisis period, Singapore-Macau-Brunei, Philippines-Vietnam-India, and Malaysia-Thailand share the same groupings regardless of anchor.

Table 7.31 Maastricht-MBC summary

	Dollar	SW	Currency Basket	SW	Yen	SW	Euro	SW	Yuan	SW
Pre-crisis	1 HKG, KOR, TWN, MYS, SGP, THA, MAC, BRN, JPN, AUS, NZL, CAN	.83	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	.74	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	.78	HKG, MAC, BRN, AUS, NZL	.32	HKG, KOR, TWN, THA	.44
	2 CHN, KHM, IDN, LAO, MMR, PHL, VNM, IND	-.10	IDN, MMR, PHL	.20	MMR, PHL	.39	KOR, TWN, THA	.74	MAC, AUS, NZL	.47
	3		MYS, CAN	.92	CHN, IND	.37	MYS, IND, CAN	.46	MMR, BRN	.50
	4		CHN, IND	.36	KHM, IDN	.42	IDN, JPN	.48	IND, CAN	.42
	5		KHM	.00	MYS, CAN	.80	MMR, PHL	.47	MYS	.00
	6		SGP	.00	SGP	.00	KHM	.00	JPN	.00
	7		LAO	.00	LAO	.00	CHN	.00	PHL	.00
	8		VNM	.00	VNM	.00	SGP	.00	KHM	.00
	9					.00	LAO	.00	IDN	.00
	10					.00	VNM	.00	SGP	.00
	11							.00	LAO	.00
	12							.00	VNM	.00
Average		.46		.48		.54		.35		.26
Crisis	1 CHN, TWN, VNM, AUS	.70	CHN, TWN, VNM, AUS	.68	HKG, MAC, NZL, CAN	.86	CHN, TWN, PHL, VNM, AUS	.61	HKG, MAC, BRN, NZL, CAN	.43
	2 HKG, MAC, NZL, CAN	.58	HKG, MAC, NZL, CAN	.78	PHL, VNM, IND	.12	HKG, MAC, NZL, CAN	.89	KOR, MYS, THA	.72
	3 KOR, MYS, PHL, THA	.67	KOR, MYS, THA	.78	CHN, TWN, AUS	.89	KOR, MYS, THA	.58	VNM, IND, JPN	.28
	4 IND, JPN	.61	KHM, PHL	.25	KOR, MYS, THA	.79	IND, JPN	.31	KHM, PHL	.14
	5 SGP	.00	SGP	.00	SGP	.00	SGP	.00	TWN, AUS	.88
	6 IDN	.00	BRN	.00	BRN	.00	BRN	.00	MMR	.00
	7 KHM	.00	IND	.00	KHM	.00	IDN	.00	SGP	.00
	8 LAO	.00	MMR	.00	MMR	.00	KHM	.00	IDN	.00
	9 MMR	.00	IDN	.00	IDN	.00	LAO	.00	LAO	.00
	10 BRN	.00	LAO	.00	LAO	.00	MMR	.00		.00
Average		.45		.46		.46		.45		.38
Post-crisis	1 CHN, KOR, MYS, SGP, THA, MAC, BRN, CAN	.03	CHN, HKG, MYS, SGP, THA, MAC, BRN	-.03	CHN, HKG, KOR, TWN, MYS, THA	.51	CHN, HKG, MYS, THA	.41	HKG, KOR, MYS, THA, JPN, AUS, NZL, CAN	-.09
	2 HKG, TWN, KHM, PHL, VNM, IND	.55	TWN, KHM, PHL, VNM, IND	.67	SGP, MAC, BRN	.83	SGP, MAC, BRN	.72	TWN, KHM, PHL, VNM, IND	.64
	3 JPN, AUS, NZL	.19	KOR, AUS, NZL, CAN	.62	PHL, VNM, IND	.69	PHL, VNM, IND, AUS	.39	SGP, MAC, BRN	.91
	4 IDN, MMR	-.37	IDN, MMR	-.40	AUS, CAN	.50	TWN, KHM, JPN	.29	IDN, MMR	-.26
	5 LAO	.00	LAO	.00	KHM	.00	KOR, NZL, CAN	.62	LAO	.00
	6				NZL	.00	IDN	.00		
	7				IDN	.00	LAO	.00		
	8				LAO	.00	MMR	.00		
	9				MMR	.00				
Average		.17		.26		.46		.41		.25
All Periods		1 KOR, MYS, THA	HKG, MAC	KOR, THA	-			KOR, THA		
		2 MAC, CAN								
Post-crisis Findings										
1 Highest silhouette		HKG-TWN-KHM-PHL-VNM-IND	TWN-KHM-PHL-VNM-IND	SGP-MAC-BRN	SGP-MAC-BRN	SGP-MAC-BRN	SGP-MAC-BRN	SGP-MAC-BRN	SGP-MAC-BRN	SGP-MAC-BRN

Table 7.32 Maastricht-MBC cross-anchor subclusters

	PRE	CRS	PST	All		PRE	CRS	PST	All
DB	1 HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	CHN, TWN, VNM, AUS	CHN, MYS, SGP, THA, MAC, BRN	-	DY	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	HKG, MAC, NZL, CAN	CHN, KOR, MYS, THA	KOR, THA
	2 IDN, MMR, PHL	HKG, MAC, NZL, CAN	TWN, KHM, PHL, VNM, IND			MMR, PHL	KOR, MYS, THA	SGP, MAC, BRN	
	3 CHN, IND	KOR, MYS, THA	AUS, NZL			CHN, IND	CHN, TWN, AUS	PHL, VNM, IND	
	4		IDN, MMR			KHM, IDN		HKG, TWN	
	5					MYS, CAN			
DE	1 HKG, MAC, BRN, AUS, NZL	CHN, TWN, VNM, AUS	CHN, MYS, THA	-	DR	HKG, KOR, TWN, THA	TWN, AUS	TWN, KHM, PHL, VNM, IND	KOR, THA
	2 KOR, TWN, THA	HKG, MAC, NZL, CAN	SGP, MAC, BRN			MAC, AUS, NZL	HKG, MAC, NZL, CAN	KOR, MYS, THA, CAN	
	3 MYS, CAN	KOR, MYS, THA	PHL, VNM, IND				KOR, MYS, THA	JPN, AUS, NZL	
	4 MMR, PHL	IND, JPN	TWN, KHM				IND, JPN	SGP, MAC, BRN	
	5		KOR, CAN					IDN, MMR	
BY	1 HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	CHN, TWN, AUS	CHN, HKG, MYS, THA	-	BE	HKG, MAC, BRN, AUS, NZL	CHN, TWN, VNM, AUS	CHN, HKG, MYS, THA	-
	2 MMR, PHL	HKG, MAC, NZL, CAN	SGP, MAC, BRN			KOR, TWN, THA	HKG, MAC, NZL, CAN	SGP, MAC, BRN	
	3 CHN, IND	KOR, MYS, THA	PHL, VNM, IND			MYS, CAN	KOR, MYS, THA	PHL, VNM, IND	
	4 MYS, CAN		AUS, CAN			MMR, PHL		KOR, NZL, CAN	
	5							TWN, KHM	
BR	1 HKG, KOR, TWN, THA	TWN, AUS	TWN, KHM, PHL, VNM, IND	-	YE	HKG, MAC, BRN, AUS, NZL	HKG, MAC, NZL, CAN	CHN, HKG, MYS, THA	-
	2 MAC, AUS, NZL	HKG, MAC, NZL, CAN	SGP, MAC, BRN			KOR, TWN, THA	CHN, TWN, AUS	SGP, MAC, BRN	
	3	KOR, MYS, THA	HKG, MYS, THA			MYS, CAN	KOR, MYS, THA	PHL, VNM, IND	
	4	KHM, PHL	AUS, NZL, CAN				PHL, VNM		
	5		IDN, MMR						
	2 MAC, AUS, NZL	KOR, MYS, THA	PHL, VNM, IND	-		MAC, AUS, NZL	KOR, MYS, THA	SGP, MAC, BRN	-
	3	TWN, AUS	AUS, CAN			IND, CAN	TWN, AUS	PHL, VNM, IND	
	4	VNM, IND	HKG, KOR				IND, JPN	KOR, NZL, CAN	
	5		MYS, THA					TWN, KHM	
	6								
DBY	1 HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	HKG, MAC, NZL, CAN	CHN, MYS, THA	--	DBE	HKG, MAC, BRN, AUS, NZL	CHN, TWN, VNM, AUS	CHN, MYS, THA	-
	2 CHN, IND	KOR, MYS, THA	SGP, MAC, BRN			KOR, TWN, THA	HKG, MAC, NZL, CAN	SGP, MAC, BRN	
	3 MMR, PHL	CHN, AUS	PHL, VNM, IND			MMR, PHL	KOR, MYS, THA	PHL, VNM, IND	
	4							TWN, KHM	
DBR	1 HKG, KOR, TWN, THA	HKG, MAC, NZL, CAN	TWN, KHM, PHL, VNM, IND	-	DYE	HKG, MAC, BRN, AUS, NZL	HKG, MAC, NZL, CAN	CHN, MYS, THA	-
	2 MAC, AUS, NZL	KOR, MYS, THA	SGP, MAC, BRN			KOR, TWN, THA	KOR, MYS, THA	SGP, MAC, BRN	
	3	TWN, AUS	AUS, NZL			MMR, PHL	CHN, TWN, AUS	PHL, VNM, IND	
	4		IDN, MMR			MYS, CAN			
	5		MYS, THA						
DYR	1 HKG, KOR, TWN, THA	HKG, MAC, NZL, CAN	KOR, MYS, THA	KOR, THA	DER	MAC, AUS, NZL	HKG, MAC, NZL, CAN	SGP, MAC, BRN	-
	2 MAC, AUS, NZL	KOR, MYS, THA	SGP, MAC, BRN			KOR, TWN, THA	KOR, MYS, THA	PHL, VNM, IND	
	3	TWN, AUS	PHL, VNM, IND				IND, JPN	TWN, KHM	
	4						TWN, AUS	KOR, CAN	
	5							MYS, THA	
BYE	1 HKG, MAC, BRN, AUS, NZL	CHN, TWN, AUS	CHN, HKG, MYS, THA	-	BYR	HKG, KOR, TWN, THA	HKG, MAC, NZL, CAN	HKG, MYS, THA	-
	2 MMR, PHL	HKG, MAC, NZL, CAN	SGP, MAC, BRN			MAC, AUS, NZL	KOR, MYS, THA	SGP, MAC, BRN	
	3 MYS, CAN	KOR, MYS, THA	PHL, VNM, IND				TWN, AUS	PHL, VNM, INS	
	4							AUS, CAN	
BER	1 KOR, TWN, THA	TWN, AUS	HKG, MYS, THA	-	YER	MAC, AUS, NZL	HKG, MAC, NZL, CAN	HKG, MYS, THA	-
	2 MAC, AUS, NZL	HKG, MAC, NZL, CAN	SGP, MAC, BRN			KOR, TWN, THA	KOR, MYS, THA	SGP, MAC, BRN	
	3	KOR, MYS, THA	PHL, VNM, IND				TWN, AUS	PHL, VNM, IND	
	4		KOR, NZL, CAN						
	5		TWN, KHM						
DBYE	1 HKG, MAC, BRN, AUS, NZL	HKG, MAC, NZL, CAN	CHN, MYS, THA	-	DBYR	HKG, KOR, TWN, THA	HKG, MAC, NZL, CAN	SGP, MAC, BRN	-
	2 KOR, TWN, THA	KOR, MYS, THA	SGP, MAC, BRN			MAC, AUS, NZL	KOR, MYS, THA	PHL, VNM, IND	
	3 MMR, PHL	CHN, AUS	PHL, VNM, IND					MYS, THA	
DBER	1 MAC, AUS, NZL	HKG, MAC, NZL, CAN	SGP, MAC, BRN	-	DYER	KOR, TWN, THA	HKG, MAC, NZL, CAN	MYS, THA	-
	2 KOR, TWN, THA	KOR, MYS, THA	PHL, VNM, IND			MAC, AUS, NZL	KOR, MYS, THA	SGP, MAC, BRN	
	3	TWN, AUS	TWN, KHM				TWN, AUS	PHL, VNM, IND	
	4		MYS, THA						
BYER	1 MAC, AUS, NZL	HKG, MAC, NZL, CAN	HKG, MYS, THA	-	DBYER	MAC, AUS, NZL	HKG, MAC, NZL, CAN	SGP, MAC, BRN	-
	2	KOR, MYS, THA				KOR, TWN, THA	KOR, MYS, THA	PHL, VNM, IND	
	3	TWN, AUS						MYS, THA	

Note: D=Dollar; B=Currency Basket; Y=Yen; E=Euro/Mark; R=Yuan (Renminbi)

7.4.2 Assessment of Preparedness

Table 7.33 compares the solutions comprising of Asian cases only with those comprising of Asian and EMU cases. Associations with the EMU benchmarks are expected to infer the level of preparedness for EMU-like currency union. Common sets between the two solutions should indicate sharing of Maastricht features and degree of preparedness. Columns ‘1’ display the original Asian-only groupings and columns ‘2’ contain the Asian-plus-EMU clusters. The later part of the table displays the common sets by anchor.

Based on the number of Asian cases linked with the EMU benchmarks in columns 2, the region could have been more ready for dollar and euro pegs in the pre-crisis period, for dollar peg in the crisis and the post-crisis period. Those which are linked with EMU3, the post-euro benchmark might have greater level of preparedness.

In light of this, on the whole the region could have been comparatively prepared by the US reference.

By looking at the common sets of countries placed in the second part of the table, against the US reference, Korea and Thailand are shown to have been symmetrical in the Maastricht dimensions and the degree of preparedness over the periods. For each period more countries are indicated to share those common features when US is the reference.

Amongst the common sets, the effective dollar areas of Hong Kong and Macau are placed together by the US reference for pre-crisis and crisis periods but not for the post-crisis period. They also share the same grouping by other references but not over successive periods. The actual monetary union members of Singapore and Brunei are only indicated to share common Maastricht features and level of preparedness for the pre-crisis period by the US reference.

Table 7.34 lists the cross-anchor common sets. No linkages are constantly present

over more than one anchor and at the same time over the periods. Notably, for the most recent period, the post-crisis period China-Malaysia-Thailand and HongKong-Malaysia subgroups are present across three alternative references.

Table 7.35 exhibits the features of the Asian-plus-EMU clusters. Once again, Singapore or clusters containing Singapore are associated with more Maastricht-compliant characteristics.

Table 7.33 Maastricht-MBC preparedness assessment

	Dollar		Currency Basket		Yen		Euro		Yuan	
	1	2	1	2	1	2	1	2	1	2
Pre-crisis	1 HKG, KOR, TWN, MYS, SGP, THA, MAC, BRN, JPN, AUS, NZL, CAN	HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL, EMU3	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL, EMU3	HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL	MYS, CAN, EMU1, EMU2	HKG, MAC, BRN, AUS, NZL	HKG, KOR, TWN, MYS, SGP, THA, IND, MAC, BRN, AUS, NZL, CAN, EMU1, EMU2	HKG, KOR, TWN, THA	HKG, KOR, TWN, MYS, MMR, PHL, SGP, THA, IND, MAC, BRN, AUS, NZL, CAN
	2 CHN, KHM, IDN, LAO, MMR, PHL, VNM, IND	CHN, MYS, IND, JPN, CAN, EMU1, EMU2	IDN, MMR, PHL	MYS, CAN, EMU1, EMU2	MMR, PHL	TWN, EMU3	KOR, TWN, THA	CHN, KHM, IDN, MMR, PHL, JPN, EMU3	MAC, AUS, NZL	EMU1, EMU2, EMU3
	3	IDN, MMR, PHL	MYS, CAN	IDN, MMR, PHL	CHN, IND	HKG, KOR, THA, MAC, BRN, AUS, NZL	MYS, IND, CAN	LAO, VNM	MMR, BRN	KHM, IDN, JPN
	4	LAO, KHM	CHN, IND	CHN, IND	KHM, IDN	MMR, PHL	IDN, JPN		IND, CAN	LAO
	5	KHM	KHM	KHM	MYS, CAN	CHN, IND	MMR, PHL		MYS	VNM
	6	VNM		SGP	SGP				KHM	
	7		LAO	LAO	LAO	LAO	CHN		PHL	
	8		VNM	VNM	VNM	VNM	SGP		KHM	
	9					IDN	LAO		IDN	
	10					KHM	VNM		SGP	
	11								LAO	
	12								VNM	
Crisis	1 CHN, TWN, VNM, AUS	CHN, HKG, KOR, TWN, KHM, MYS, PHL, THA, VNM, IND, MAC, JPN, AUS, NZL, CAN, EMU1, EMU2, EMU3	CHN, TWN, VNM, AUS	CHN, TWN, VNM, AUS, EMU1, EMU2	HKG, MAC, NZL, CAN	HKG, MAC, NZL, CAN	CHN, TWN, PHL, VNM, AUS	CHN, KOR, TWN, MYS, PHL, THA, VNM, AUS	HKG, MAC, BRN, NZL, CAN	HKG, MAC, CAN, EMU3
	2 HKG, MAC, NZL, CAN	SGP, BRN	HKG, MAC, NZL, CAN	HKG, MAC, NZL, CAN	PHL, VNM, IND	PHL, VNM, IND	HKG, MAC, NZL, CAN	HKG, MAC, NZL, CAN	KOR, MYS, THA	TWN, AUS, EMU1, EMU2
	3 KOR, MYS, PHL, THA	IDN, MMR	KOR, MYS, THA	KOR, MYS, THA	CHN, TWN, AUS	CHN, TWN, AUS	KOR, MYS, THA	EMU1, EMU2, VNM, IND, JPN	VNM, IND, JPN	
	4 IND, JPN	LAO	KHM, PHL	KHM, PHL	KOR, MYS, THA	KOR, MYS, THA	IND, JPN	SGP, BRN	KHM, PHL	KOR, MYS, THA
	5 SGP		SGP	SGP, BRN	SGP	EMU1, EMU2, EMU3	SGP	IND, JPN	TWN, AUS	KHM, PHL
	6 IDN		BRN	IND	BRN	SGP	BRN	LAO	MMR	SGP, BRN
	7 KHM		IND	MMR	KHM	BRN	IDN	MMR	SGP	MMR
	8 LAO		MMR	IDN	MMR	KHM	KHM	IDN	IDN	NZL
	9 MMR		IDN	LAO	IDN	MMR	LAO	EMU3	LAO	IDN
	10 BRN		LAO	EMU3	LAO	IDN	MMR	KHM		LAO
	11					LAO				

Table 7.33 Maastricht-MBC preparedness assessment (continued)

	Dollar		Currency Basket		Yen		Euro		Yuan	
	1	2	1	2	1	2	1	2	1	2
Post-crisis	1 CHN, KOR, MYS, SGP, THA, MAC, BRN, CAN	CHN, HKG, KOR, TWN, KHM, IDN, MYS, PHL, THA, VNM, IND, JPN, AUS, NZL, CAN, EMU1, EMU2, EMU3	CHN, HKG, MYS, SGP, THA, MAC, BRN	TWN, AUS, NZL, CAN, EMU1, EMU2, EMU3	CHN, HKG, KOR, TWN, MYS, THA	CHN, HKG, KOR, TWN, MYS, THA, EMU2	CHN, HKG, MYS, THA	CHN, HKG, MYS, PHL, THA, VNM, IND, AUS, EMU2	HKG, KOR, MYS, THA, JPN, AUS, NZL, CAN	HKG, TWN, MYS, EMU3
	2 HKG, TWN, KHM, PHL, VNM, IND	SGP, MAC, BRN	TWN, KHM, PHL, VNM, IND	CHN, HKG, KOR, MYS, SGP, THA, MAC, BRN	SGP, MAC, BRN	SGP, MAC, BRN	SGP, MAC, BRN	KOR, NZL, CAN	TWN, KHM, PHL, VNM, IND	JPN, AUS, EMU1, EMU2
	3 JPN, AUS, NZL	LAO, MMR	KOR, AUS, NZL, CAN	KHM, PHL, VNM, IND	PHL, VNM, IND	KHM, PHL, VNM, IND	PHL, VNM, IND, AUS	TWN, KHM, JPN	SGP, MAC, BRN	KOR, THA, CAN
	4 IDN, MMR		IDN, MMR	IDN, MMR	AUS, CAN	AUS, NZL, CAN	TWN, KHM, JPN	SGP, MAC, BRN	IDN, MMR	PHL, VNM, IND
	5 LAO		LAO	LAO	KHM	IDN	KOR, NZL, CAN	LAO	LAO	SGP, MAC, BRN
	6				NZL	LAO	IDN	MMR		NZL
	7				IDN	MMR	LAO	IDN		KHM
	8				LAO	EMU1	MMR	EMU1		IDN
	9				MMR	EMU3		EMU3		LAO
	10									MMR
All Periods	1 KOR, MYS, THA	HKG, KOR, TWN, THA, AUS, NZL	HKG, MAC	TWN, AUS	KOR, THA	-	-	-	KOR, THA	-
	2 MAC, CAN	CHN, MYS, IND, JPN, CAN								
Common sets of countries										
	Dollar		Currency Basket		Yen		Euro		Yuan	
	1	2	1	2	1	2	1	2	1	2
Pre-crisis	1 HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL		HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL		MYS, CAN		HKG, MAC, BRN, AUS, NZL		-	
	2 MYS, JPN, CAN		MYS, CAN				KOR, TWN, THA			
	3 CHN, IND						MYS, IND, CAN			
	4						IDN, JPN			
	5						MMR, PHL			
Crisis	1 CHN, TWN, VNM, AUS		CHN, TWN, VNM, AUS		-		-		HKG, MAC, CAN	
	2 HKG, MAC, NZL, CAN								TWN, AUS	
	3 KOR, MYS, PHL, THA									
	4 IND, JPN									
Post-crisis	1 CHN, KOR, MYS, THA, CAN		AUS, NZL, CAN		CHN, HKG, KOR, TWN, MYS, THA		CHN, HKG, MYS, THA		HKG, MYS	
	2 HKG, TWN, KHM, PHL, VNM, IND						PHL, VNM, IND, AUS		JPN, AUS	
	3 JPN, AUS, NZL									
All Periods	1 KOR, THA		-		-		-		-	

Table 7.34 Maastricht-MBC-preparedness cross-anchor subclusters

	PRE	CRS	PST	All	PRE	CRS	PST	All
DB	1 HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL 2 MYS, CAN	CHN, TWN, VNM, AUS	AUS, NZL	- DY	MYS, CAN	-	CHN, KOR, MYS, THA	-
							HKG, TWN	
DE	1 HKG, MAC, BRN, - AUS, NZL 2 KOR, TWN, THA 3 MYS, IND, CAN		CHN, MYS, THA -	DR	-	TWN, AUS	JPN, AUS	-
			PHL, VNM, IND			HKG, MAC, CAN		
BY	1 MYS, CAN 2 3	-	-	BE	HKG, MAC, BRN, - AUS, NZL KOR, TWN, THA MYS, CAN	-	-	-
BR	1 -	TWN, AUS	-	YE	MYS, CAN	-	CHN, HKG, MYS, THA	-
YR	1 -	-	HKG, MYS	ER	-	-	HKG, MYS	-
DBY	1 MYS, CAN 2 3	-	-	DBE	HKG, MAC, BRN, - AUS, NZL KOR, TWN, THA MYS, CAN	-	-	-
DBR	1 -	TWN, AUS	-	DYE	MYS, CAN	-	CHN, MYS, THA	-
DYR	1 -	-	-	DER	-	-	-	-
BYE	1 MYS, CAN	-	-	BYR	-	-	-	-
BER	1 -	-	-	YER	-	-	HKG, MYS	-
DBYE	1 MYS, CAN	-	-	DBYR	-	-	-	-
DBER	1 -	-	-	DYER	-	-	-	-
BYER	1 -	-	-	DBYER	-	-	-	-

Note: D=Dollar; B=Currency Basket; Y=Yen; E=Euro/Mark; R=Yuan (Renminbi)

Table 7.35 Maastricht-MBC preparedness clusters

Dollar					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.807	5.411	2.760	4.614	
1 HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL, EMU3	1.034	3.037	.986	2.173	3
2 CHN, MYS, IND, JPN, CAN, EMU1, EMU2	-3.987	3.279	2.717	3.152	0
3 IDN, MMR, PHL	-1.402	9.326	1.367	8.799	0
4 LAO	-10.466	16.120	2.778	15.935	0
5 KHM	-3.467	2.928	10.921	9.748	1
6 VNM	-5.860	24.109	16.810	7.797	0
Crisis					
All Cases	-1.199	7.269	3.629	4.426	
1 CHN, HKG, KOR, TWN, KHM, MYS, PHL, THA, VNM, IND, MAC, JPN, AUS, NZL, CAN, EMU1, EMU2, EMU3	-1.830	2.795	2.708	2.884	0
2 SGP, BRN	5.867	1.712	2.439	2.289	4
3 IDN, MMR	-.867	23.081	9.204	11.840	0
4 LAO	-4.645	67.298	11.438	21.618	0
Post-crisis					
All Cases	-0.787	3.209	1.570	4.528	
1 CHN, HKG, KOR, TWN, KHM, IDN, MYS, PHL, THA, VNM, IND, JPN, AUS, NZL, CAN, EMU1, EMU2, EMU3	-1.802	2.032	1.714	3.724	1
2 SGP, MAC, BRN	6.272	2.462	.871	1.499	3
3 LAO, MMR	-2.243	14.922	1.326	16.309	0
Currency Basket					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.829	5.968	4.248	4.917	
1 HKG, KOR, TWN, THA, MAC, BRN, AUS, NZL, EMU3	.452	3.587	2.103	2.623	0
2 MYS, CAN, EMU1, EMU2	-4.294	1.705	2.675	1.880	0
3 IDN, MMR, PHL	-1.402	10.066	2.690	9.263	0
4 CHN, IND	-4.697	8.042	3.975	5.237	0
5 KHM	-3.467	3.276	11.193	10.430	0
6 SGP	6.269	1.599	1.955	1.508	4
7 LAO	-10.466	16.519	9.182	16.008	0
8 VNM	-5.860	24.510	25.481	8.544	0

Table 7.35 Maastricht-MBC preparedness clusters (continued)

Currency Basket					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Crisis					
All Cases	-981	7.523	5.777	4.701	
1 CHN, TWN, VNM, AUS, EMU1, EMU2	-2.681	1.972	4.069	1.917	0
2 HKG, MAC, NZL, CAN	1.268	2.246	4.436	1.774	0
3 KOR, MYS, THA	-2.049	2.752	8.126	2.651	0
4 KHM, PHL	-2.025	5.857	5.799	8.159	0
5 SGP, BRN	5.867	1.333	5.041	1.327	2
6 IND	-5.231	5.950	4.335	5.493	0
7 MMR	-5.35	24.978	4.496	8.597	0
8 IDN	-1.199	21.985	17.533	17.181	0
9 LAO	-4.645	68.106	12.501	22.666	0
10 EMU3	-4.91	1.030	.000	3.952	2
Post-crisis					
All Cases	-503	3.560	2.048	4.305	
1 TWN, AUS, NZL, CAN, EMU1, EMU2, EMU3	-885	1.378	2.411	2.994	1
2 CHN, HKG, KOR, MYS, SGP, THA, MAC, BRN	1.622	1.910	1.678	.768	3
3 KHM, PHL, VNM, IND	-3.006	3.506	1.872	6.377	0
4 IDN, MMR	-1.088	16.111	2.622	9.589	0
5 LAO	-3.641	7.151	2.026	22.923	0
Yen					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.829	6.766	5.591	8.295	
1 MYS, CAN, EMU1, EMU2	-4.294	2.039	3.163	3.535	0
2 TWN, EMU3	-.727	1.484	1.663	4.791	1
3 HKG, KOR, THA, MAC, BRN, AUS, NZL	.788	5.010	3.383	6.902	0
4 MMR, PHL	-1.322	13.500	3.493	12.597	0
5 CHN, IND	-4.697	9.388	4.273	9.733	0
6 SGP	6.269	1.340	2.776	2.988	3
7 LAO	-10.466	17.197	14.842	18.874	0
8 VNM	-5.860	26.045	33.265	10.821	0
9 IDN	-1.563	6.960	4.844	16.080	0
10 KHM	-3.467	4.317	11.495	14.383	0
Crisis					
All Cases	-981	7.700	5.109	8.578	
1 HKG, MAC, NZL, CAN	1.268	2.082	4.072	6.423	0
2 PHL, VNM, IND	-3.637	5.244	4.392	10.029	0
3 CHN, TWN, AUS	-2.083	1.767	3.930	5.096	0
4 KOR, MYS, THA	-2.049	3.277	7.104	7.585	0
5 SGP	7.572	1.038	3.757	4.078	1
6 BRN	4.162	1.032	3.757	3.594	1
7 KHM	-1.658	6.546	4.506	15.365	0
8 MMR	-.535	25.494	3.278	13.610	0
9 IDN	-1.199	22.682	16.431	22.194	0
10 LAO	-4.645	69.312	11.962	27.680	0
11 EMU1, EMU2, EMU3	-2.347	1.369	2.050	2.792	2
Post-crisis					
All Cases	-503	4.445	2.606	7.237	
1 CHN, HKG, KOR, TWN, MYS, THA, EMU2	-1.570	2.135	2.490	3.692	0
2 SGP, MAC, BRN	6.272	1.882	2.236	4.073	1
3 KHM, PHL, VNM, IND	-3.006	5.099	2.721	10.420	0
4 AUS, NZL, CAN	1.017	2.856	3.313	6.618	0
5 IDN	-1.330	9.631	4.090	13.731	0
6 LAO	-3.641	9.059	2.607	26.941	0
7 MMR	-.846	26.361	1.955	13.812	0
8 EMU1	-3.605	2.163	3.712	1.186	1
9 EMU3	-4.91	1.030	.000	3.952	2
Euro Anchor					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All	-1.807	5.813	5.457	4.233	
1 HKG, KOR, TWN, MYS, SGP, THA, IND, MAC, BRN, AUS, NZL, CAN, EMU1, EMU2	-.829	3.362	3.358	2.401	4
2 CHN, KHM, IDN, MMR, PHL, JPN, EMU3	-1.948	6.577	4.359	5.717	0
3 LAO, VNM	-8.163	20.293	23.988	10.947	0
Crisis					
All Cases	-1.199	7.144	9.697	4.436	
1 CHN, KOR, TWN, MYS, PHL, THA, VNM, AUS	-2.260	2.583	10.472	2.475	0
2 HKG, MAC, NZL, CAN	1.268	2.005	9.682	1.624	1
3 EMU1, EMU2	-3.275	1.538	3.075	2.212	0
4 SGP, BRN	5.867	.968	10.102	3.427	2
5 IND, JPN	-5.615	3.632	10.028	5.253	0
6 LAO	-4.645	68.446	14.578	20.466	0
7 MMR	-.535	25.197	9.765	6.396	0
8 IDN	-1.199	22.092	19.715	14.981	0
9 EMU3	-.491	1.030	.000	3.952	1
10 KHM	-1.658	6.598	10.070	8.151	0
Post-crisis					
All Cases	-.787	3.348	2.445	4.444	
1 CHN, HKG, MYS, PHL, THA, VNM, IND, AUS, EMU2	-2.382	2.213	2.514	2.556	0
2 KOR, NZL, CAN	1.941	1.059	2.816	3.288	0
3 TWN, KHM, JPN	-3.800	1.925	2.462	7.297	0
4 SGP, MAC, BRN	6.272	1.812	2.105	3.589	1
5 LAO	-3.641	7.239	2.563	19.295	0
6 MMR	-.846	24.554	1.340	6.166	0
7 IDN	-1.330	7.720	3.840	6.085	0
8 EMU1	-3.605	2.163	3.712	1.186	1
9 EMU3	-.491	1.030	.000	3.952	2

Table 7.35 Maastricht-MBC preparedness clusters (continued)

Yuan Anchor					
Cluster	DEF (%) ¹	INF (%)	NER ²	INT (%)	N ³
Pre-crisis					
All Cases	-1.702	9.341	6.139	4.312	
1 HKG, KOR, TWN, MYS, MMR, PHL, SGP, THA, IND, MAC, BRN, AUS, NZL, CAN	-.550	9.444	4.208	2.854	1
2 EMU1, EMU2, EMU3	-2.347	1.369	2.050	2.792	3
3 KHM, IDN, JPN	-2.123	9.771	7.359	7.992	0
4 LAO	-10.466	16.614	14.963	13.823	0
5 VNM	-5.860	23.264	32.948	7.269	0
Crisis					
All Cases	-1.140	7.934	3.795	5.247	
1 HKG, MAC, CAN, EMU3	.695	2.009	.420	2.467	1
2 TWN, AUS, EMU1, EMU2	-2.573	1.927	2.740	1.842	0
3 VNM, IND, JPN	-4.840	4.279	2.163	4.957	0
4 KOR, MYS, THA	-2.049	3.545	6.491	3.348	0
5 KHM, PHL	-2.025	6.368	3.384	8.935	0
6 SGP, BRN	5.867	1.172	2.438	.509	3
7 MMR	-.535	25.923	1.732	9.373	0
8 NZL	1.800	1.852	3.386	3.625	0
9 IDN	-1.199	23.022	16.679	17.957	0
10 LAO	-4.645	69.459	11.440	23.443	0
Post-crisis					
All Cases	-.759	3.694	1.669	4.527	
1 HKG, TWN, MYS, EMU3	-2.009	1.808	.569	2.106	2
2 JPN, AUS, EMU1, EMU2	-3.706	1.964	2.927	2.930	0
3 KOR, THA, CAN	.560	2.108	2.006	.779	0
4 PHL, VNM, IND	-3.292	3.665	1.167	5.118	0
5 SGP, MAC, BRN	6.272	1.889	.946	.725	2
6 NZL	3.501	2.083	3.338	5.494	0
7 KHM	-2.149	2.651	.722	11.254	0
8 IDN	-1.330	7.336	3.680	9.854	0
9 LAO	-3.641	7.225	1.345	23.092	0
10 MMR	-.846	23.901	1.285	9.884	0

Note: 1 Positive value indicates surplus. 2 Standard deviation ($\times 10^5$) of the log difference in bilateral nominal exchange rate. 3 Number of variables with highest degree of conformity to Maastricht Treaty.

Source: Fuzzy cluster analysis. See Appendix A for data description.

7.4.3 Recapitulation

The section has discussed the results using model-based cluster analysis and Maastricht criteria. The following observations may be noteworthy.

Classifications

Based on the average silhouettes over all objects, the Japan-based solution consistently provides the best classification for all the periods and based on the structure of the partitioning, on the whole the US and G3 references are compatible with more convergent configurations.

Amongst subgroups which are stable over periods, notably Korea and Thailand share the same cluster by the US, Japan, or China reference. There are also linkages which are stable over all anchors for the post-crisis period: Singapore, Macau, and Brunei; Philippines, Vietnam, and India; and Malaysia and Thailand.

Remarkably, by the basket anchor Hong Kong and Macau the effective dollar areas

are grouped together over the periods. For Singapore and Brunei, they are placed together for pre-crisis dollar anchor and over all anchors for the post-crisis period.

Assessment of Preparedness

Based on the number of Asian cases linked with the EMU benchmarks, on the whole the region could have been comparatively prepared by the US reference.

Korea and Thailand are shown to have been symmetrical in the Maastricht dimensions and the degree of preparedness over the periods by the US reference.

The effective dollar areas of Hong Kong and Macau are placed together by the US reference for pre-crisis and crisis periods but not for the post-crisis period. The actual monetary union members of Singapore and Brunei are only indicated to share common Maastricht features and level of preparedness for the pre-crisis period by the US reference.

For the post-crisis period, China, Malaysia, and Thailand, and Hong Kong and Malaysia are present across three alternative reference countries.

By and large, Singapore alone or groups containing Singapore show more conforming Maastricht attributes.

7.5 Comparisons across Methods

The previous sections have presented the results from three cluster analysis methods, namely hierarchical cluster analysis (HCM), fuzzy cluster analysis (FCM), and model-based cluster analysis (MBC) using Maastricht dimensions and the findings are somewhat different over the methods, most probably due to differences in the methodologies and algorithms used by the methods. The following general observations may be noteworthy.

- Based on the average silhouettes over all objects, the reference country consistent with best partitioning differs depending on period for HCM and FCM but for MBC the Japan-based solution consistently provides the best classification over the periods.
- By HCM, the Japan reference is associated with more convergent arrangements; by FCM, that kind of reference differs for different period; and by MBC, the US and G3 references are compatible with more convergent configurations.
- Based on the number of countries associated with EMU benchmarks, the region could have been more prepared for dollar, basket, or yen peg by HCM; for dollar or basket peg by FCM; and for dollar peg by MBC. Dollar peg seems to be commonly indicated as more feasible.
- By HCM, Korea and Thailand, and Taiwan and Australia are suggested to have constantly shared common Maastricht features and degrees of preparedness by the US and the Japan reference respectively. By FCM, no countries are shown to have consistently shared those common features and simultaneously over the periods. By MBC, Korea and Thailand are shown to have always possessed those common features by the US reference, similar to that found by HCM.

The succeeding discussions compare the findings across the methods in greater detail and identify the subgroupings which are robust over the methods.

7.5.1 Classifications and PCA

The first part of Table 7.36 collects the individual silhouettes of the countries by HCM, FCM, and MBC. Similar to the OCA analysis, silhouette width is used here to assess the results over clustering methods. A high positive silhouette for an object indicates that it is more appropriately classified, that is, more tightly associated with its assigned cluster.

The second part of Table 7.36 shows the average number of clusters and some measures based on the silhouettes by reference country, period, and method.

Looking at the first item, the average number of clusters over methods, increasingly convergent configuration approximated by consistently fewer clusters over the periods can be observed when the reference of Germany/EMU is used. Meantime, the greatest reduction in the number of clusters from the pre-crisis to the post-crisis period is shown by China reference. Based on the averages over periods, the smallest number of clusters is seen by the US and the G3 reference.

From the second item, the average number of clusters over periods by method, over the reference countries FCM is associated with the fewest clusters. Akin to the OCA findings, this could be due to the ‘fuzziness’ partitioning approach employed by FCM.

Based on the rest of the items which are measured over periods, the percentage of positive individual silhouettes, mean silhouette, and median silhouette, the euro anchor and the HCM are consistent with the most fitting partitions as signified by generally higher silhouettes associated with them though more positive silhouettes are produced by FCM.

In brief, on average the US and G3 references are relatively consistent with most symmetrical solutions whilst the Germany/EMU reference and HCM are relatively compatible with partitions that best fit the inherent structure of the data.

Despite the above, it is still compelling to compare the cluster solutions across the methods and identify subsets of countries which consistently appear across the three

methods. These subgroupings can be regarded as ‘robust’ over the clustering methods.

Table 7.37 compares the US-based solutions over the methods. Figure 7.17 exhibits the principal component analysis (PCA) plots, one way to view the spatial distances between the objects. Tables E.17-E.20 and Figures E.5-E.8 in Appendix E present the findings by the rest of the anchors.

Similar to the OCA findings, when PCA plot is used as a reference, the clustering methods appear to have partitioned the data quite differently, justifying the importance to recognize linkages of countries which are robust over the methods. For instance, in Table 7.37, for the pre-crisis period, MBC generates only two clusters; HCM produces one large cluster and a few small clusters; while FCM produces a more ‘descending’ distributed configuration. The ways the objects are partitioned can hence be observed by comparing the configuration structures produced by cluster analysis against the PCA plots.

Subclusters of countries which stay intact regardless of clustering method are collected by monetary anchor in Table 7.38. No links are consistently present over the periods. Hence, it may be useful instead to recognize the links which are robust over the anchors. Table 7.39 displays the cross-method-and-anchor subclusters.

Amongst the subclusters which are robust across all the anchors, it may be worthwhile to note those for the post-crisis period; Singapore-Brunei and Philippines-India. Recall that Singapore and Brunei share common monetary standards in practice.

Notably, notice also that Hong Kong and Macau with prevailing effective dollar pegs share the same clusters over all anchors except for yuan anchor in the pre-crisis setting and over all anchors in the crisis period setting. For post-crisis period, Macau is almost always linked with Singapore and Brunei.

Table 7.36 Maastricht silhouettes

HCM	Dollar			Currency Basket			Yen			Euro			Yuan		
	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST
Clusters	6	10	10	4	9	9	5	11	5	8	4	10	8	11	10
1 CHN	.10	.78	.65	.12	.86	.73	-.04	.89	.77	.00	.88	.52	n.a. ¹	n.a.	n.a.
2 HKG	.03	.74	.67	.71	.74	.72	.53	.93	.75	.87	.55	.70	.81	.75	.50
3 KOR	.66	.81	.68	.75	.76	.60	.81	.81	.12	.82	.80	.40	.81	.74	.64
4 TWN	.65	.80	.53	.76	.83	.05	.76	.91	.69	.69	.87	.90	.73	.89	.46
5 KHM	.00	.00	.00	.35	.00	.00	.41	.00	.28	.57	.78	.92	.00	.00	.00
6 IDN	.49	.00	.00	.54	.00	.00	.56	.00	.55	.57	.00	.00	.00	.00	.00
7 LAO	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
8 MYS	.65	.64	-.10	.58	.45	.09	.55	.60	.83	.53	.86	.04	.57	.28	.31
9 MMR	.63	.00	.00	.40	.00	.00	.50	.00	.00	.71	.63	.00	.78	.00	.00
10 PHL	.48	.38	.81	.37	.02	.76	.58	.32	.74	.23	.88	.60	.06	.09	.68
11 SGP	.00	.00	.74	.51	.00	.90	.00	.00	.88	.00	.00	.87	.00	.00	.84
12 THA	.50	.84	-.02	.57	.77	.54	.61	.84	.52	.85	.85	.55	.89	.76	.25
13 VNM	.00	.66	.07	.00	.29	-.01	.00	.08	.79	.00	.87	.00	.00	.07	.05
14 IND	-.25	.50	.75	-.40	.00	.81	.49	.00	.72	.38	.83	.60	.74	.32	.44
15 MAC	-.07	.75	.81	.70	.66	.95	.56	.90	.84	.84	.63	.00	.88	.70	.88
16 BRN	.24	.00	.85	.45	.10	.96	.59	.00	.92	.62	-.72	.84	.40	.00	.91
17 JPN	.50	.72	.00	n.a. ²	n.a.	n.a.	n.a.	n.a.	n.a.	.49	.78	.00	.22	.00	.00
18 AUS	.25	.56	.10	.72	.75	.46	.66	.74	.46	.85	.84	.20	.90	.85	.32
19 NZL	.45	.05	.00	.62	.81	.00	.66	.81	.23	.84	.31	.57	.77	.20	.00
20 CAN	.56	.77	.73	.49	.76	.75	.48	.79	.45	.78	.55	.60	.74	.69	.77
Average	.29	.45	.36	.43	.41	.44	.46	.45	.55	.52	.56	.42	.49	.33	.37

FCM	Dollar			Currency Basket			Yen			Euro			Yuan		
	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST
Clusters	7	7	5	8	4	5	7	6	3	6	6	5	5	6	5
1 CHN	-.38	.78	.80	.38	.77	.81	.41	.90	.37	.27	.76	.80	n.a.	n.a.	n.a.
2 HKG	.42	.77	.78	.08	.44	.75	.01	.04	.32	.77	.25	.81	.83	.80	.57
3 KOR	-.10	.81	.20	-.34	.20	-.36	-.54	.87	.23	.60	.70	-.50	.81	.77	.36
4 TWN	.01	.80	-.37	-.04	.66	.40	-.21	.94	.29	.49	.84	-.81	.73	.07	.66
5 KHM	.27	.29	-.08	-.72	.03	.42	-.39	.10	.50	.64	-.02	-.75	.28	.30	.63
6 IDN	.08	.11	.33	.00	.07	.36	-.67	.07	.47	.57	.00	.22	.09	.09	.00
7 LAO	.00	.47	-.30	.00	.54	-.44	.08	.41	-.04	.00	.00	.00	-.05	.47	-.30
8 MYS	.94	.64	.48	.94	-.38	.54	.75	.60	.61	.55	.87	.82	.57	.79	.73
9 MMR	.50	.57	.09	.00	.01	-.03	.70	.00	.26	.77	.49	.01	.37	.60	-.01
10 PHL	.21	.41	.31	.00	-.05	-.04	.08	-.07	.72	.45	.76	.74	.06	.43	.50
11 SGP	.09	.72	.83	.00	.66	.91	.23	.62	.86	.56	.63	.85	-.06	.78	.89
12 THA	.60	.84	-.25	.70	-.05	.72	.81	.89	-.03	.74	.77	.59	.89	.78	-.36
13 VNM	.00	.66	.53	.00	.74	-.03	.00	-.38	.62	.00	.63	.80	.45	.40	.81
14 IND	-.32	.50	.31	.35	.44	.39	.40	.35	.71	.50	.30	.76	.78	.75	.66
15 MAC	.25	.75	.81	-.08	.30	.95	-.47	-.21	.81	.84	.05	.76	.90	.82	.90
16 BRN	.56	-.05	.90	.79	.80	.97	.87	.72	.86	.60	.75	.91	.09	.29	.93
17 JPN	.60	.72	.30	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	.53	.66	-.63	-.44	.51	-.08
18 AUS	.01	.56	.48	-.23	.62	.43	-.53	.84	.67	.79	.77	.67	.90	.21	.31
19 NZL	.39	.70	.64	.63	.60	.62	.77	.39	.05	.74	.53	.02	.79	.54	-.06
20 CAN	.96	.85	.33	.95	.48	.22	.84	.00	.33	.65	.28	-.07	.76	.81	.58
Average	.25	.60	.36	.18	.36	.40	.17	.37	.45	.55	.50	.30	.47	.54	.41

MBC	Dollar			Currency Basket			Yen			Euro			Yuan		
	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST	PRE	CRS	PST
Clusters	2	10	5	8	10	5	8	10	9	10	10	8	12	9	5
1 CHN	-.48	.78	-.52	.35	.86	-.29	.41	.90	.70	.00	.78	.55	n.a.	n.a.	n.a.
2 HKG	.88	.74	.24	.73	.86	-.06	.77	.93	.71	.60	.91	.54	.24	.57	-.59
3 KOR	.91	.81	.20	.75	.86	.41	.79	.87	.37	.74	.78	.50	.63	.85	.18
4 TWN	.90	.80	.59	.46	.83	.67	.46	.93	.70	.79	.68	.04	.33	.92	.55
5 KHM	.00	.00	.59	.00	.53	.66	.55	.00	.00	.00	.00	.35	.00	.48	.66
6 IDN	-.39	.00	-.76	.20	.00	-.71	.28	.00	.00	.38	.00	.00	.00	.00	-.54
7 LAO	.46	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
8 MYS	.75	.64	-.71	.92	.59	-.68	.75	.60	-.08	.23	.20	-.06	.00	.43	-.66
9 MMR	-.09	.00	.01	.45	.00	-.09	.70	.00	.00	.71	.00	.00	.30	.00	.02
10 PHL	-.46	.38	.51	-.05	-.02	.56	.08	-.23	.77	.23	.27	.71	.00	-.19	.53
11 SGP	.76	.00	.52	.00	.00	.39	.00	.00	.83	.00	.00	.79	.00	.00	.89
12 THA	.87	.84	-.07	.75	.89	-.25	.77	.89	.66	.67	.76	.60	.55	.88	-.21
13 VNM	.37	.66	.69	.00	.29	.71	.00	.04	.62	.00	.68	-.01	.00	-.34	.76
14 IND	-.35	.50	.67	.37	.00	.77	.34	.55	.70	.38	.04	.54	.45	.64	.72
15 MAC	.89	.75	.37	.78	.88	.40	.85	.90	.77	.31	.93	.50	.43	.45	.90
16 BRN	.81	.00	.50	.72	.00	.30	.82	.00	.90	.09	.00	.86	.70	.01	.93
17 JPN	.78	.72	-.05	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	.58	.59	.49	.00	.54	-.24
18 AUS	.90	.56	.55	.83	.75	.59	.89	.84	.38	.10	.64	.34	.49	.85	.29
19 NZL	.88	.05	.08	.86	.54	.72	.87	.81	.00	.49	.86	.73	.49	.54	.15
20 CAN	.64	.77	-.07	.93	.84	.76	.84	.79	.63	.78	.85	.64	.38	.56	.36
Average	.46	.45	.17	.48	.46	.26	.54	.46	.46	.35	.45	.41	.26	.38	.25

Note: 1 'n.a.' for not applicable.

Table 7.36 Maastricht silhouettes (continued)

Aggregate measures		Dollar	Basket	Yen	Euro	Yuan	Average
1 Average number of clusters over methods	Pre-crisis	5.0	6.7	6.7	8.0	8.3	6.9
	Crisis	9.0	7.7	9.0	6.7	8.7	8.2
	Post-crisis	6.7	6.3	5.7	7.7	6.7	6.6
	Average	6.9	6.9	7.1	7.5	7.9	
2 Average number of clusters over periods	HCM	8.7	7.3	7.0	7.3	9.7	8.0
	FCM	6.3	5.7	5.3	5.7	5.3	5.7
	MBC	5.7	7.7	9.0	9.3	8.7	8.1
	Average	6.9	6.9	7.1	7.5	7.9	
3 Positive individual silhouettes (%) over periods	HCM	66.7	73.7	77.2	76.7	68.4	72.5
	FCM	83.3	66.7	75.4	81.7	84.2	78.3
	MBC	68.3	66.7	71.9	73.3	64.9	69.0
	Average	72.8	69.0	74.8	77.2	72.5	
4 Mean silhouette over periods	HCM	.37	.43	.49	.50	.40	.44
	FCM	.44	.31	.33	.45	.47	.40
	MBC	.40	.40	.49	.40	.30	.40
	Average	.40	.38	.43	.45	.39	
5 Median silhouette over periods	HCM	.49	.51	.56	.60	.32	.50
	FCM	.48	.38	.37	.60	.57	.48
	MBC	.51	.46	.63	.49	.36	.49
	Average	.49	.45	.52	.56	.42	

Table 7.37 Maastricht-dollar cross-method subclusters

	HCM	SW	FCM	SW	MBC	SW	Cross-method
Pre-crisis	1 CHN, HKG, KOR, TWN, MYS, THA, IND, MAC, BRN, JPN, AUS, NZL, CAN	.33	HKG, KOR, TWN, SGP, MAC, AUS	.11	HKG, KOR, TWN, MYS, SGP, THA, MAC, BRN, JPN, AUS, NZL, CAN	.83	HKG, KOR, TWN, MAC, AUS
	2 IDN, MMR, PHL	.53	THA, BRN, JPN, NZL	.54	CHN, KHM, IDN, LAO, MMR, PHL, VNM, IND	-.10	THA, BRN, JPN, NZL
	3 SGP	.00	CHN, KHM, IND	-.14			IDN, MMR, PHL
	4 KHM	.00	IDN, MMR, PHL	.26			CHN, IND
	5 LAO	.00	MYS, CAN	.95			MYS, CAN
	6 VNM	.00	LAO	.00			
	7		VNM	.00			
Average		.29		.25		.46	
Crisis	1 HKG, MAC, NZL, CAN	.58	HKG, MAC, NZL, CAN	.77	HKG, MAC, NZL, CAN	.58	HKG, MAC, NZL, CAN
	2 CHN, TWN, VNM, AUS	.70	CHN, TWN, VNM, AUS	.70	CHN, TWN, VNM, AUS	.70	CHN, TWN, VNM, AUS
	3 KOR, THA, MYS, PHL	.67	KOR, THA, MYS, PHL	.67	KOR, MYS, PHL, THA	.67	KOR, THA, MYS, PHL
	4 IND, JPN	.61	IND, JPN	.61	IND, JPN	.61	IND, JPN
	5 SGP	.00	SGP, BRN	.34	SGP	.00	
	6 BRN	.00	KHM, MMR	.43	BRN	.00	
	7 KHM	.00	IDN, LAO	.29	KHM	.00	
	8 MMR	.00			MMR	.00	
	9 IDN	.00			IDN	.00	
	10 LAO	.00			LAO	.00	
Average		.45		.60		.45	
Post-crisis	1 KOR, CAN, THA, AUS	.37	TWN, KHM, PHL, THA, IND, JPN	.04	CHN, KOR, MYS, SGP, THA, MAC, BRN, CAN	.03	SGP, BRN, MAC
	2 CHN, HKG, MYS, VNM	.00	KOR, IDN, AUS, NZL, CAN	.40	HKG, TWN, KHM, PHL, VNM, IND	.55	TWN, PHL, IND
	3 TWN, PHL, IND	.70	CHN, HKG, MYS, VNM	.65	JPN, AUS, NZL	.19	KOR, CAN
	4 SGP, BRN, MAC	.33	SGP, BRN, MAC	.85	IDN, MMR	-.37	CHN, MYS
	5 KHM	.00	LAO, MMR	-.10	LAO	.00	HKG, VNM
	6 MMR	.00					
	7 IDN	.80					
	8 LAO	.00					
	9 JPN	.00					
	10 NZL	.00					
Average		.36		.36		.17	
All Periods	1 KOR, THA	-			KOR, MYS, THA	-	
	2				MAC, CAN		

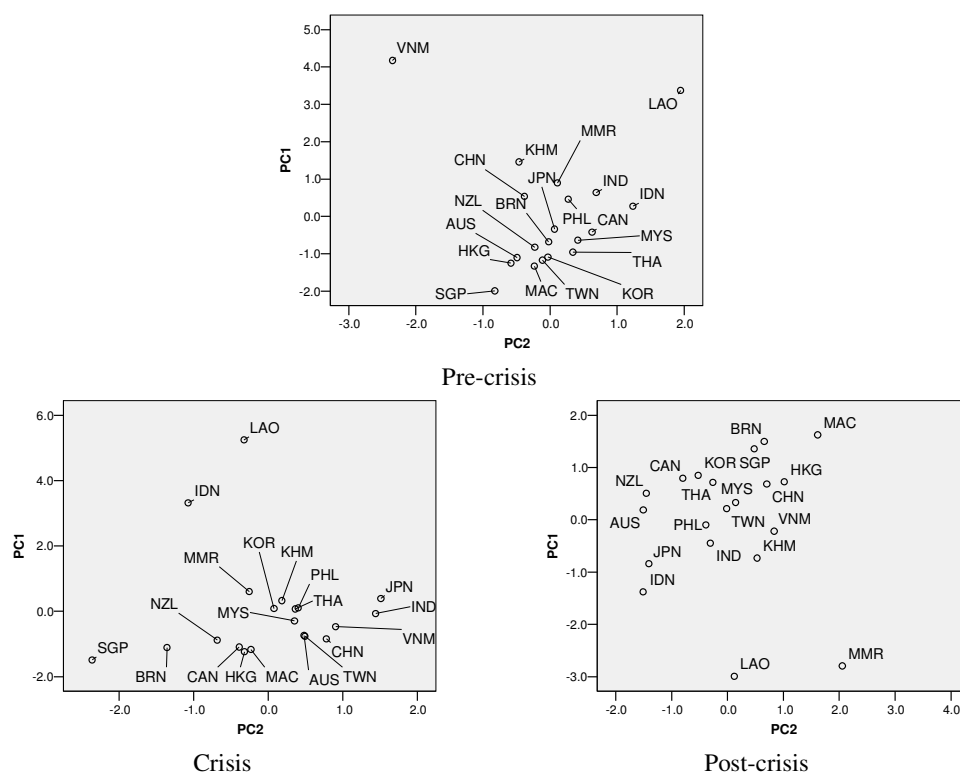


Figure 7.17 Maastricht-dollar PCA plots

Table 7.38 Maastricht cross-method subclusters

	Dollar	Currency Basket	Yen	Euro	Yuan
Pre-crisis	1 HKG, KOR, TWN, MAC, AUS	HKG, KOR, TWN, MAC, AUS	HKG, KOR, TWN, MAC, AUS	HKG, MAC, BRN, AUS, NZL	HKG, KOR, TWN, THA
	2 THA, BRN, JPN, NZL	THA, BRN, NZL	THA, BRN, NZL	KOR, TWN, THA	MAC, AUS, NZL
	3 IDN, MMR, PHL	MYS, CAN	KHM, IND	MYS, IND, CAN	MMR, BRN
	4 CHN, IND	CHN, IND	MMR, PHL	IND, JPN	IND, CAN
	5 MYS, CAN		MYS, CAN	MMR, PHL	
	6		CHN, IND		
Crisis	1 HKG, MAC, NZL, CAN	HKG, MAC, NZL, CAN	HKG, MAC, NZL, CAN	CHN, TWN, PHL, VNM, AUS	HKG, MAC, NZL, CAN
	2 CHN, TWN, VNM, AUS	CHN, TWN, VNM, AUS	CHN, TWN, AUS	HKG, MAC, NZL, CAN	KOR, MYS, THA
	3 KOR, THA, MYS, PHL	KOR, THA, MYS	KOR, THA, MYS	KOR, THA, MYS	VNM, IND
	4 IND, JPN		PHL, VNM	IND, JPN	
Post-crisis	1 SGP, BRN, MAC	CHN, HKG, THA, MYS	CHN, HKG, TWN, MYS, THA	CHN, HKG, THA	KOR, CAN, AUS
	2 TWN, PHL, IND	KOR, AUS, CAN	SGP, BRN, MAC	PHL, IND, AUS	TWN, PHL, IND
	3 KOR, CAN	SGP, BRN, MAC	PHL, VNM, IND	KOR, NZL, CAN	SGP, MAC, BRN
	4 CHN, MYS	PHL, IND	AUS, CAN	SGP, BRN	HKG, MYS
	5 HKG, VNM			TWN, KHM	
All Periods	1 -	-	-	-	-

Table 7.39 Maastricht cross-method-anchor subclusters

	PRE	CRS	PST	All		PRE	CRS	PST	All
DB	1 HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN, MAC	-	DY	HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN, MAC	-
	2 THA, BRN, NZL	CHN, TWN, VNM, PHL, IND				THA, BRN, NZL	CHN, TWN, AUS	PHL, IND	
	3 CHN, IND	KOR, THA, MYS	KOR, CAN			MMR, PHL	KOR, THA, MYS	CHN, MYS	
	4 MYS, CAN					CHN, IND			
	5					MYS, CAN			
DE	1 HKG, MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN	-	DR	HKG, KOR, TWN	HKG, MAC, NZL, CAN	SGP, MAC, BRN	-
	2 KOR, TWN	CHN, TWN, VNM, PHL, IND				MAC, AUS	KOR, MYS, THA	TWN, PHL, IND	
	3 MMR, PHL	KOR, THA, MYS	KOR, CAN					KOR, CAN	
	4	IND, JPN							
	5 MYS, CAN								
BY	1 HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	CHN, HKG, THA, MYS	-	BE	HKG, MAC, AUS	HKG, MAC, NZL, CAN	CHN, HKG, THA	-
	2 THA, BRN, NZL	CHN, TWN, AUS	AUS, CAN			KOR, TWN	CHN, TWN, VNM, AUS	KOR, CAN	
	3 MYS, CAN	KOR, THA, MYS	SGP, BRN, MAC			MYS, CAN	KOR THA, MYS	SGP, BRN	
	4 CHN, IND		PHL, IND					PHL, IND	
BR	1 HKG, KOR, TWN	HKG, MAC, NZL, CAN	HKG, MYS	-	YE	HKG, MAC, AUS	HKG, MAC, NZL, CAN	CHN, HKG, THA	-
	2 MAC, AUS	KOR, THA, MYS	KOR, AUS, CAN			KOR, TWN	CHN, TWN, AUS	SGP, BRN	
	3		SGP, MAC, BRN			MMR, PHL	KOR, THA, MYS	PHL, IND	
	4					MYS, CAN	PHL, VNM		
YR	1 HKG, KOR, TWN	HKG, MAC, NZL, CAN	SGP, MAC, BRN	-	ER	KOR, TWN, THA	HKG, MAC, NZL, CAN	PHL, IND	-
	2 MAC, AUS	KOR, THA, MYS	HKG, MYS			MAC, AUS, NZL	KOR, THA, MYS	KOR, CAN	
	3		AUS, CAN			IND, CAN		SGP, BRN	
DBY	1 HKG, KOR, TWN, MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN, MAC	-	DBE	HKG, MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN	-
	2 THA, BRN, NZL	CHN, TWN, AUS	PHL, IND			KOR, TWN	CHN, TWN, VNM, AUS	PHL, IND	
	3 MYS, CAN	KOR, THA, MYS				BRN, NZL	KOR, THA, MYS	KOR, CAN	
	4 CHN, IND					MYS, CAN			
	5 MYS, CAN								
DBR	1 HKG, KOR, TWN	HKG, MAC, NZL, CAN	SGP, MAC, BRN	-	DYE	HKG, MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN	-
	2 MAC, AUS	KOR, THA, MYS	PHL, IND			KOR, TWN	CHN, TWN, AUS	PHL, IND	
	3		KOR, CAN			BRN, NZL	KOR, THA, MYS		
	4					MMR, PHL			
	5					MYS, CAN			
DYR	1 HKG, KOR, TWN	HKG, MAC, NZL, CAN	SGP, MAC, BRN	-	DER	MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN	-
	2 MAC, AUS	KOR, THA, MYS	PHL, IND			KOR, TWN	KOR, THA, MYS	PHL, IND	
	3							KOR, CAN	
BYE	1 HKG, MAC, AUS	HKG, MAC, NZL, CAN	CHN, HKG, THA	-	BYR	HKG, KOR, TWN	HKG, MAC, NZL, CAN	SGP, MAC, BRN	-
	2 KOR, TWN	CHN, TWN, AUS	SGP, BRN			MAC, AUS	KOR, THA, MYS	AUS, CAN	
	3 BRN, NZL	KOR, THA, MYS	PHL, IND					HKG, MYS	
	4 MYS, CAN							PHL, IND	
BER	1 MAC, AUS	HKG, MAC, NZL, CAN	KOR, CAN	-	YER	MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN	-
	2 KOR, TWN	KOR, THA, MYS	SGP, BRN			KOR, TWN	KOR, THA, MYS	PHL, IND	
	3		PHL, IND						
DBYE	1 HKG, MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN	-	DBYR	HKG, KOR, TWN	HKG, MAC, NZL, CAN	SGP, MAC, BRN	-
	2 KOR, TWN	CHN, TWN, AUS	PHL, IND			MAC, AUS	KOR, THA, MYS	PHL, IND	
	3 BRN, NZL	KOR, THA, AUS							
	4 MYS, CAN								
DBER	1 MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN	-	DYER	MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN	-
	2 KOR, TWN	KOR, THA, MYS	PHL, IND			KOR, TWN	KOR, THA, MYS	PHL, IND	
	3		KOR, CAN						
BYER	1 MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN	-	DBYER	MAC, AUS	HKG, MAC, NZL, CAN	SGP, BRN	-
	2 KOR, TWN	KOR, THA, MYS	PHL, IND			KOR, TWN	KOR, THA, MYS	PHL, IND	

Note: D=Dollar; B=Currency Basket; Y=Yen; E=Euro/Mark; R=Yuan (Renminbi)

7.5.2 Assessment of Preparedness

Table 7.40 puts together the US-based subsets of countries which are suggested to share similar Maastricht features and degrees of preparedness (in Maastricht terms) by method. The cross-method subsets are also shown. Those by other anchors are placed in Tables E.21-E.24, Appendix E.

Table 7.41 lists the cross-method subclusters by anchor. These subsets of countries should share common Maastricht features and levels of readiness regardless of the clustering method. For every period, more substantial sets are seen under the US-based dollar anchor. No linkages which are robust to method are also robust to period. Nevertheless, the following findings may be notable.

For pre-crisis period, Malaysia and Canada share the same grouping across dollar, basket, yen, and euro anchors. Meantime, the effective dollar areas of Hong Kong and Macau are placed together over dollar, basket, and euro anchors. Hong Kong and Macau are still linked over dollar and yuan anchors for crisis period but are not placed together for the post-crisis period under any anchor. Singapore and Brunei, the monetary union constituents are not seen together in any solution.

Table 7.40 Maastricht-dollar-preparedness cross-method subclusters

		HCM	FCM	MBC	Cross-method
Pre-crisis	1	CHN, HKG, KOR, TWN, MYS, THA, IND, MAC, BRN, JPN, AUS, NZL, CAN	HKG, KOR, TWN, SGP, MAC, AUS	HKG, KOR, TWN, SGP, THA, MAC, BRN, AUS, NZL	HKG, KOR, TWN, MAC, AUS
	2		THA, BRN, NZL	MYS, JPN, CAN	THA, BRN, NZL
	3		MYS, CAN	CHN, IND	MYS, CAN
Crisis	1	HKG, MAC, CAN, NZL	HKG, MAC, NZL, CAN	CHN, TWN, VNM, AUS	HKG, MAC, NZL, CAN
	2	CHN, VNM, TWN, AUS	CHN, TWN, VNM, AUS	HKG, MAC, NZL, CAN	CHN, TWN, VNM, AUS
	3	KOR, THA, MYS, PHL		KOR, MYS, PHL, THA	
	4			IND, JPN	
Post-crisis	1	KOR, CAN, THA, AUS	KOR, AUS, NZL, CAN	CHN, KOR, MYS, THA, CAN	CHN, MYS
	2	CHN, HKG, MYS, VNM	CHN, HKG, MYS, VNM	HKG, TWN, KHM, PHL, VNM, IND	HKG, VNM
	3	TWN, PHL, IND		JPN, AUS, NZL	KOR, CAN
All Periods	1	KOR, THA	-	KOR, THA	-

Table 7.41 Maastricht-preparedness cross-method subclusters

	Dollar	Currency Basket	Yen	Euro	Yuan
Pre-crisis	1 HKG, KOR, TWN, MAC, AUS	HKG, KOR, TWN, MAC, MYS, CAN AUS		HKG, MAC, BRN, AUS, - NZL	
	2 THA, BRN, NZL	THA, BRN, NZL		KOR, TWN, THA,	
	3 MYS, CAN	MYS, CAN		MYS, IND, CAN	
Crisis	1 HKG, MAC, NZL, CAN	CHN, TWN, VNM, AUS -		-	HKG, MAC, CAN
	2 CHN, TWN, VNM, AUS				
Post-crisis	1 CHN, MYS	AUS, CAN	CHN, HKG, TWN, MYS, CHN, HKG, THA THA		HKG, MYS
	2 HKG, VNM			PHL, IND, AUS	
	3 KOR, CAN				
All Periods	1 -	-	-	-	-

7.5.3 Recapitulation

The section has assessed and compared the Maastricht findings across the cluster analysis methods as well as detected subsets of countries which are robust over the methods in the original classification and the preparedness assessment analysis. The following are the main general findings from the original classifications:

- On average, over methods; increasingly convergent configuration approximated by consistently fewer clusters over the periods can be observed when Germany/EMU is the reference country. Meantime, the greatest reduction in the number of clusters (between pre-crisis and post-crisis periods) is shown by the China reference.
- On average, over methods and periods; the smallest number of clusters, hence the most symmetrical configuration is seen by the US and the weighted-G3 reference.
- On average, over methods and periods; the Germany/EMU reference is compatible with greatest number of positive and higher silhouettes.
- On average, over anchors and periods; HCM generates the highest silhouettes whilst FCM produces the greatest number of positive silhouettes.

Based on the subgroupings which simultaneously present in the Asian-only and the Asian-plus-benchmark clusters and at the same time stay intact over the methods, the US reference could be more appropriate as a monetary anchor for the periods.

Other key findings, including some notable cross-method subsets of countries will

be revisited in Chapter 8 Discussion and Conclusion. The following section compares the OCA and the Maastricht results.

7.6 OCA and Maastricht Criteria Results Compared

Remember that OCA criteria predominantly represent the real dimensions of convergence whereas the Maastricht criteria concern more about the nominal facets of convergence, therefore the differences in the findings are not unexpected. Table 7.42 compares the general findings from the previous discussions. Recall that weighted criteria and subsidiary analysis on the variables are not implemented for the Maastricht criteria; hence, comparisons are done on the original classifications and the preparedness assessment only.

Table 7.42 General findings by OCA and by Maastricht criteria

OCA	Maastricht
Original Classification	
<ul style="list-style-type: none"> Based on the average silhouette over all objects, the reference country consistent with best partitioning differs depending on period for HCM and FCM but for MBC the weighted-G3 reference virtually corresponds to the most appropriate partitions over the periods. 	<ul style="list-style-type: none"> Based on the average silhouette over all objects, the reference country consistent with best partitioning differs depending on period for HCM and FCM but for MBC the Japan reference consistently corresponds to the most appropriate partitions over the periods.
<ul style="list-style-type: none"> By HCM, the G3 reference is associated with relatively convergent arrangements; by FCM, the Germany/EMU reference; and by MBC the G3 reference once again. 	<ul style="list-style-type: none"> By HCM, the Japan reference is associated with relatively convergent arrangements; by FCM, it differs for different period; and by MBC, the US and G3 references appear to be compatible with more convergent configurations.
Preparedness Assessment	
<ul style="list-style-type: none"> From preparedness assessment, the region could have been more prepared for basket peg by HCM, for dollar peg by FCM, and for dollar, basket, or euro peg by MBC. 	<ul style="list-style-type: none"> From preparedness assessment, the region could have been more prepared for dollar, basket, or yen peg by HCM; for dollar or basket peg by FCM; and for dollar peg by MBC. Hence, dollar peg appears to be commonly indicated as more feasible.
<ul style="list-style-type: none"> By HCM, Singapore and Malaysia, and Singapore, Korea, Malaysia, and Taiwan are suggested to have constantly shared common OCA features and degrees of preparedness by the dollar and the basket anchor respectively. By FCM no countries are shown to have consistently shared those common features over the periods. By MBC, Hong Kong and Macau, and Singapore and Malaysia are shown to have always possessed those common features by the dollar anchor; the same Singapore-Malaysia link found by HCM. 	<ul style="list-style-type: none"> By HCM, Korea and Thailand, and Taiwan and Australia are suggested to have constantly shared common Maastricht features and degrees of preparedness by the US and the Japan reference respectively. By FCM, no countries are shown to have consistently shared those common features simultaneously over the periods. By MBC, Korea and Thailand are shown to have always possessed those common features by the US reference, similar to that found by HCM.

Other than the above, it is also informative to compare the solutions between the sets of criteria in greater detail and identify groupings of countries which are robust to set of criteria, that is, groupings characterized by similar real OCA and nominal Maastricht dimensions. The following discussion compares the findings in more detail over anchors, periods, and methods.

7.6.1 Classifications

Table 7.43 puts together some measures of the original Asian-only results using the original unweighted variables by OCA and by Maastricht criteria. These measures have been discussed separately before.

The first item shows the average number of clusters over the clustering methods. Based on this measure, over the anchors on average, by OCA criteria the number of clusters falls consistently through the periods (without the post-crisis labor criterion) whilst by Maastricht criteria the number of clusters is smallest for the post-crisis period but more clusters are present for the crisis period. On this evidence, the OCA criteria appear to be relatively compatible with increasingly symmetrical configurations.

The second item displays the average number of clusters over the periods. By any method, most of the time OCA dimensions are associated with fewer clusters for all anchors. Over periods and methods, the averages show that OCA criteria are linked with smaller number of clusters for all anchors except for the dollar anchor. On the average over the anchors, for both sets of criteria, FCM generates the fewest clusters.

The third, fourth, and fifth items respectively show the percentage of positive individual silhouettes, mean silhouette, and median silhouette, all of them measured over periods. Based on these measures, over the anchors, by OCA criteria MBC are compatible with better classifications whilst by Maastricht criteria HCM generally provides better partitions. Based on the same measures, over the methods, Maastricht criteria virtually produce better partitioning for all anchors.

Along these lines, in general OCA dimensions are in line with fewer clusters; hence more convergent configurations whereas Maastricht criteria are associated with better silhouette measures, hence more appropriate partitioning.

In spite of the above, it is still informative to look at the groupings which are commonly present in both OCA and Maastricht solutions, these subsets of countries should be robust to the sets of criteria. For this reason, Tables 7.44, 7.45, and 7.46 respectively bring together the cross-criteria subclusters by HCM, FCM, and MBC. For post-crisis period, OCA solutions by 7 and by 8 variables are compared to the Maastricht solutions.

Here are some remarkable findings. By HCM, using 7 variables throughout the periods Macau and Brunei are found to constantly share the same grouping by the G3 reference. By MBC, Hong Kong and Macau, the effective dollar areas are placed together over the periods by the G3 reference regardless of the labor criterion. By FCM, no such stable links can be found. Indeed, the cross-criteria subgroups are substantially different across methods.

In light of the differences across the methods, it may be compelling to recognize the cross-criteria subclusters which are also stable across the methods. Table 7.47 displays the cross-criteria-method subclusters. Countries belonging to the same subclusters should closely share common OCA and Maastricht features even when different criteria and/or different cluster analysis approach is used.

No cross-criteria-method subclusters are also robust over periods. The following groupings which are found over few anchors however may be worth mentioning.

For pre-crisis period, Korea and Taiwan are always connected when measured against G3, Germany/EMU, and China. Korea and Taiwan, two of the Asian Tigers could have been highly symmetrical in OCA and Maastricht dimensions against each of those references before the Asian crisis.

In the crisis period solution, Korea is consistently linked with Malaysia against US, G3, and Japan. In the pre-crisis setting, Korea is associated with Taiwan against G3, Germany/EMU, and China. Combining the pre-crisis and crisis period findings, it demonstrates that Korea might have closely shared those dimensions with Taiwan against G3, Germany/EMU, and China in the pre-crisis period but with Malaysia against US, G3, and Japan in the crisis period. Hence, it is possible that an Asian economy closely shares OCA and Maastricht features with a different Asian economy against each of a different set of reference economies in a different period.

In the post-crisis 7V solutions, the Chinese economies of China and Hong Kong are linked by the basket, the yen, and the euro anchor. Hence, they might have been highly symmetrical in the OCA and Maastricht facets vis-à-vis each of those major economies in the post-crisis period. In post-crisis 8V setting, China is associated with Taiwan, another close neighbor, against the G3 and the Japan reference.

How about economies associated with fixed exchange rates in practice? As shown by the findings, the effective dollar areas of Hong Kong and Macau are indicated to closely share common OCA and Maastricht dimensions against US in the pre-crisis and crisis periods regardless of method. The two neighboring economies are also linked against Japan in the pre-crisis setting and against China in the crisis period setting. This exhibits that two Asian economies with similar exchange rate policies (in this case Hong Kong and Macau with effective dollar pegs) could jointly experience similar OCA and Maastricht features vis-à-vis each of a different set of reference economies in a different period (US and Japan for pre-crisis period and US and China for crisis period).

Singapore and Brunei, the prevailing monetary union members are not shown to share any robust groupings here.

Table 7.43 OCA and Maastricht solutions compared

		OCA						Maastricht					
		Dollar	Basket	Yen	Euro	Yuan	Avg.	Dollar	Basket	Yen	Euro	Yuan	Avg.
1 Average number of clusters over methods	PRE	7.3	4.7	8.0	5.7	8.7	6.9	5.0	6.7	6.7	8.0	8.3	6.9
	CRS	7.0	6.0	5.3	7.3	6.3	6.4	9.0	7.7	9.0	6.7	8.7	8.2
	PST ¹	7.0	5.3	5.0	5.7	6.0	5.8	6.7	6.3	5.7	7.7	6.7	6.6
	Average	7.1	5.3	6.1	6.2	7.0	6.3	6.9	6.9	7.1	7.5	7.9	7.3
2 Average number of clusters over periods	HCM	8.3	6.7	7.7	10.3	10.0	8.6	8.7	7.3	7.0	7.3	9.7	8.0
	FCM	5.7	5.0	4.3	3.7	5.0	4.7	6.3	5.7	5.3	5.7	5.3	5.7
	MBC	7.3	4.3	6.3	4.7	6.0	5.7	5.7	7.7	9.0	9.3	8.7	8.1
	Average	7.1	5.3	6.1	6.2	7.0	6.3	6.9	6.9	7.1	7.5	7.9	7.3
3 Positive individual silhouettes (%) over periods	HCM	70.0	77.2	70.2	68.3	66.7	70.5	66.7	73.7	77.2	76.7	68.4	72.5
	FCM	68.3	77.2	75.4	70.0	71.9	72.6	83.3	66.7	75.4	81.7	84.2	78.3
	MBC	75.0	87.7	64.9	81.7	71.9	76.2	68.3	66.7	71.9	73.3	64.9	69.0
	Average	71.1	80.7	70.2	73.3	70.2	73.1	72.8	69.0	74.8	77.2	72.5	73.3
4 Mean silhouette over periods	HCM	.32	.37	.34	.29	.30	.32	.37	.43	.49	.50	.40	.44
	FCM	.22	.24	.26	.26	.21	.24	.44	.31	.33	.45	.47	.40
	MBC	.41	.44	.28	.34	.39	.37	.40	.40	.49	.40	.30	.40
	Average	.32	.35	.29	.30	.30	.31	.40	.38	.43	.45	.39	.41
5 Median silhouette over periods	HCM	.38	.43	.43	.26	.36	.37	.49	.51	.56	.60	.32	.50
	FCM	.31	.32	.36	.32	.23	.31	.48	.38	.37	.60	.57	.48
	MBC	.48	.51	.41	.39	.49	.46	.51	.46	.63	.49	.36	.49
	Average	.39	.42	.40	.32	.36	.38	.49	.45	.52	.56	.42	.49

Note: 1 To ensure consistency over periods, 7-variable post-crisis OCA results are used.

Table 7.44 HCM cross-criteria subclusters

		Dollar	Currency Basket	Yen	Euro	Yuan
Pre-crisis	1	HKG, TWN, KOR, MYS, MAC	KOR, MYS, SGP, IND, TWN, CHN, NZL, AUS	TWN, KOR, MYS, AUS	KOR, TWN, THA	KOR, TWN
	2	CHN, IND, AUS, NZL	HKG, MAC, BRN, THA	PHL, IND	MYS, CAN	PHL, IND
	3	JPN, THA	IDN, KHM	HKG, MAC		HKG, MAC
Crisis	1	KOR, MYS, THA, PHL	KOR, MYS	HKG, MAC, NZL, CAN	HKG, JPN, KHM, TWN	MYS, THA
	2	HKG, MAC	CHN, VNM	KOR, THA, MYS	CHN, PHL, MAC	HKG, MAC
	3	TWN, VNM	MAC, BRN	PHL, VNM	KOR, MYS, THA	KOR, PHL
	4				VNM, NZL	
Post-crisis 7V	1	CHN, HKG, MYS, VNM	CHN, HKG, THA, TWN, CHN, TWN, MYS, MYS, VNM	HKG, THA, VNM, PHL	CHN, HKG	TWN, IND
	2	TWN, IND	SGP, MAC, BRN	IND, CAN	TWN, KHM	
	3		PHL, IND			
All Periods 7V		1 -	MAC, BRN	-	-	-
Post-crisis 8V	1	MYS, CHN, VNM	MYS, THA, CHN, TWN, CHN, MYS, TWN, THA, KHM, TWN	PHL, VNM, IND		MYS, VNM
	2	TWN, IND		HKG, KHM	HKG, THA	THA, IND
	3			SGP, MAC		
All Periods 8V		1 -	-	-	-	-

Table 7.45 FCM cross-criteria subclusters

		Dollar	Currency Basket	Yen	Euro	Yuan
Pre-crisis	1	HKG, TWN, SGP, MAC	KOR, TWN, SGP	CHN, IND	HKG, KOR, TWN, SGP, KOR, TWN	THA, MAC
	2	THA, BRN, JPN	PHL, IND	HKG, MAC	KHM, JPN	SGP, BRN
	3	MYS, CAN	THA, BRN	KOR, TWN	CHN, IND	LAO, VNM
	4			SGP, AUS	AUS, NZL	MMR, JPN
	5			KHM, LAO		HKG, MAC
	6			THA, BRN		PHL, IND
	7					MYS, CAN
	8					AUS, NZL
Crisis	1	KOR, MYS	MMR, PHL, THA	KOR, MYS, THA	KOR, TWN	HKG, MAC
	2	SGP, BRN	CHN, VNM	SGP, BRN	THA, VNM, AUS	KOR, PHL
	3	HKG, MAC	MAC, BRN	NZL, CAN	SGP, BRN, CAN	TWN, CAN
	4	IDN, LAO	KOR, KHM, MYS	HKG, MAC	CHN, PHL	MYS, THA
	5		SGP, CAN			
	6		IND, AUS			

Table 7.45 FCM cross-criteria subclusters (continued)

Post-crisis 7V	1	CHN, HKG, MYS	TWN, MYS, THA	CHN, HKG, TWN, MYS, PHL, THA, VNM	CHN, HKG, MYS, PHL, AUS, NZL, CAN
	2	IDN, AUS, NZL	IDN, AUS, NZL	KHM, IND, CAN	SGP, BRN
	3	THA, IND	CHN, HKG	IDN, AUS, NZL	IDN, NZL
	4	TWN, JPN	LAO, MMR	LAO, MMR	TWN, JPN
	5	KHM, PHL		SGP, MAC	VNM, IND
	6			KOR, BRN	
<hr/>					
All Periods 7V 1 - - - - -					
Post-crisis 8V	1	TWN, KHM, PHL	CHN, TWN	CHN, TWN, IDN, THA, VNM, IND	CHN, MYS, PHL, THA, TWN, VNM, IND
	2	MAC, BRN	KHM, VNM	HKG, KHM, MYS, CAN	KHM, JPN
	3	CHN, VNM	IDN, CAN	SGP, MAC	SGP, BRN
	4	THA, IND	MYS, THA	KOR, BRN	
	5	IDN, CAN	AUS, NZL	LAO, MMR	LAO, MMR
	6	HKG, MYS		AUS, NZL	
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All Periods 8V 1 - - - - -					

Table 7.46 MBC cross-criteria subclusters

		Dollar	Currency Basket	Yen	Euro	Yuan
Pre-crisis	1	HKG, KOR, TWN, MYS, SGP, MAC	KOR, TWN, AUS, NZL	HKG, TWN, MAC	HKG, MAC, BRN	KOR, TWN
	2	CHN, IND	HKG, THA, MAC, BRN	KOR, AUS	KOR, TWN, THA	AUS, NZL
	3	AUS, NZL	CHN, IND		MYS, CAN	
	4	KHM, IDN			AUS, NZL	
	5	THA, JPN				
Crisis	1	KOR, MYS, PHL, THA	CHN, TWN, VNM, AUS	KOR, MYS, THA	CHN, TWN, PHL	TWN, AUS
	2	TWN, AUS	HKG, MAC, NZL	NZL, CAN	HKG, MAC	NZL, CAN
	3	HKG, MAC	KOR, MYS, THA		MYS, THA	HKG, MAC
	4		KHM, PHL		IND, JPN	
Post-crisis 7V	1	CHN, MYS, SGP, THA, MAC	CHN, HKG, MYS, SGP, THA, MAC, BRN	CHN, HKG, TWN, MYS, THA	CHN, HKG, MYS, THA	TWN, KHM, PHL, VNM, IND
	2	HKG, TWN, KHM, PHL, VNM, IND	TWN, KHM, PHL, VNM, IND	PHL, VNM, IND	TWN, KHM, JPN	HKG, MYS, THA, JPN
	3	KOR, BRN	AUS, NZL	SGP, MAC	NZL, CAN	KOR, AUS, NZL, CAN
	4	AUS, NZL		AUS, CAN	SGP, MAC	SGP, MAC
	5				PHL, VNM	IDN, MMR
	6				IND, AUS	
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All Periods 7V 1 - HKG, MAC - - -						
Post-crisis 8V	1	CHN, MYS, THA	CHN, HKG, MYS, SGP, THA, MAC, BRN	CHN, HKG, TWN, MYS, THA	HKG, MYS, THA	HKG, JPN
	2	TWN, VNM, IND	AUS, NZL	PHL, VNM, IND	KHM, JPN	TWN, KHM
	3	KHM, PHL		AUS, CAN	VNM, IND	MYS, THA
	4	AUS, NZL		SGP, MAC		VNM, IND
	5					AUS, NZL
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All Periods 8V 1 - HKG, MAC - - -						

Table 7.47 Cross-criteria-method subclusters

		Dollar	Currency Basket	Yen	Euro	Yuan
Pre-crisis	1	HKG, TWN, MAC	KOR, TWN	HKG, MAC	KOR, TWN, THA	KOR, TWN
	2	THA, JPN	THA, BRN			
Crisis	1	KOR, MYS	KOR, MYS	KOR, MYS, THA	CHN, PHL	HKG, MAC
	2	HKG, MAC	CHN, VNM	NZL, CAN		
Post-crisis 7V	1	CHN, MYS	CHN, HKG	CHN, TWN, MYS, HKG, THA	CHN, HKG	-
	2		MYS, THA	VNM, PHL		
<hr/>						
All Periods 7V 1 - - - - -						
Post-crisis 8V	1	-	CHN, TWN	CHN, TWN, THA	-	-
	2		MYS, THA	VNM, IND		
	3			SGP, MAC		
<hr/>						
All Periods 8V 1 - - - - -						

7.6.2 Preparedness Assessment

Table 7.48 collects the subclusters of countries which share common Asian-only and Asian-plus-benchmark groupings across all clustering methods by OCA and by Maastricht criteria. Singletons are omitted. Regardless of the post-crisis labor criterion, no subsets of countries are consistently robust over the periods though relatively more subsets are seen by the dollar anchor. On the whole, more of these subclusters can be found by the Maastricht criteria, hence Maastricht criteria are associated with more subclusters which not only indicated to be symmetrical in respect of convergence features and levels of preparedness but also which are robust to method.

To view the subgroupings across criteria by method, the cross-criteria sets of countries are arranged in Table 7.49. Notice that no common sets of countries are present over all methods or over all periods. Thus, no subsets of countries which are indicated to be symmetrical in the features and levels of preparedness in both OCA and Maastricht terms are also at the same time signified to be robust to method or period.

Table 7.48 Preparedness cross-method subclusters

	Dollar		Currency Basket		Yen		Euro		Yuan	
	OCA	Maastricht	OCA	Maastricht	OCA	Maastricht	OCA	Maastricht	OCA	Maastricht
Pre-crisis	1 CHN, AUS, NZL	HKG, KOR, TWN, MAC, PHL, IND, AUS,	TWN, MYS, HKG, KOR, - TWN, MAC, AUS	-	MYS, CAN	PHL, IND, AUS	HKG, MAC, - BRN, AUS, NZL	-	-	-
	2 KOR, MYS	THA, BRN, NZL	CHN, AUS	THA, BRN, NZL	-	MYS, CAN	MYS, IND, CAN	-	-	-
	3 HKG, SGP	MYS, CAN	-	MYS, CAN	-	-	KOR, TWN, THA	-	-	-
Crisis	1 KOR, MYS, SGP, BRN	HKG, MAC, - NZL, CAN	CHN, TWN, - VNM, AUS	-	-	-	-	-	HKG, MAC, CAN	-
	2 THA, NZL	CHN, TWN, VNM, AUS	-	-	-	-	-	-	-	-
	3 PHL, VNM	-	-	-	-	-	-	-	-	-
Post-crisis 7V	1 KHM, PHL, MAC	CHN, MYS, THA, VNM	AUS, CAN	-	CHN, HKG, - TWN, MYS, THA	PHL, IND, AUS	VNM, IND	HKG, MYS	-	-
	2	KOR, CAN	PHL, BRN	-	-	CHN, HKG, AUS, NZL	THA	-	-	-
	3	HKG, VNM	-	-	-	-	-	-	-	-
All Periods 7V	1 -	-	-	-	-	-	-	-	-	-
Post-crisis 8V	1 CHN, THA, VNM, IND	CHN, MYS	-	AUS, CAN	VNM, IND	CHN, HKG, TWN, MYS, THA	PHL, IND, AUS	VNM, IND	HKG, MYS	-
	2 HKG, SGP, JPN	KOR, CAN	-	-	-	CHN, HKG, THA	-	-	-	-
	3 KHM, MAC	HKG, VNM	-	-	-	-	-	-	-	-
All Periods 8V	1 -	-	-	-	-	-	-	-	-	-

Table 7.49 Preparedness cross-criteria subclusters

	Dollar				Currency Basket				Yen				Euro				Yuan			
	HCM	FCM	MBC	All	HCM	FCM	MBC	All	HCM	FCM	MBC	All	HCM	FCM	MBC	All	HCM	FCM	MBC	All
PRE	HKG, HKG, HKG, -				KOR, -		KOR, -		-	-	-	-	KOR, MYS, HKG, -				-	-	-	-
	TWN, SGP, KOR,				MYS,		TWN,						TWN, CAN MAC,							
	KOR, MAC TWN,				NZL		NZL						THA		BRN					
	MYS SGP, MAC																			
	CHN, THA, CHN,				HKG,		HKG,						KOR,							
CRS	IND, BRN IND				THA		THA,						TWN,							
	AUS, NZL						MAC,						THA							
							BRN													
PST 7V	KOR, -	KOR, -			CHN, IND, -				-	-	-	-	-	-	-		HKG, -	HKG, -		
	THA, MYS, PHL	MYS, PHL, THA			VNM AUS												MAC	MAC		
		HKG, MAC															MYS, THA	TWN, AUS		
																	KOR, PHL			
PST 8V	CHN, -	HKG, -			CHN, -				CHN, -				VNM, IND, -				TWN, HKG, -			
	HKG, MYS, VNM	TWN, KHM, PHL, VNM, IND			HKG, THA, TWN, MYS, VNM				TWN, MYS, HKG, THA, VNM				IND AUS				MYS, MYS VNM, IND			
	TWN, IND	CHN, MYS, THA			PHL, IND															
PST 8V	CHN, AUS, MYS, NZL	CHN, - MYS, THA			MYS, AUS, THA, CHN, TWN, VNM		AUS, - NZL		CHN, - MYS, TWN, PHL, VNM, IND		CHN, - HKG, TWN, MYS, THA		VNM, HKG, - IND MYS, THA				MYS, TWN, - VNM VNM, IND			
	TWN, IND	CHN, VNM, IND							HKG, KHM				VNM, IND				THA, IND			
		HKG, KHM, MYS																		
All 8V	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

7.6.3 Recapitulation

The section has assessed and compared the OCA- and Maastricht-based findings as well as attempted to detect subsets of countries which are robust across the sets of criteria in respect of the original classification and the preparedness assessment. The following are the main general findings from the original classifications:

- On average, over anchors and methods; OCA criteria are associated with consistently fewer clusters over the periods.

- On average, over anchors, methods, and periods; OCA dimensions are associated with smaller number of clusters.
- On average, over anchors, methods and periods; Maastricht criteria are compatible with greater number of positive and higher silhouettes.

Along these lines, OCA criteria are generally associated with more convergent configurations whilst Maastricht criteria are generally related with better classifications.

From assessment of preparedness, Maastricht criteria appear to be associated with more subclusters which not only indicated to be symmetrical in respect of convergence features and levels of preparedness but also which commonly present over the methods.

Other findings, including some notable cross-criteria subsets of countries will be revisited in Chapter 8 Discussion and Conclusion.

7.7 Chapter Conclusion

Chapter 7 has presented and discussed the findings using Maastricht Treaty criteria including classifications and assessment of preparedness analyses. Akin to the OCA-based analysis, the results are compared and contrasted across anchors and periods as well as over methods. Another important content of this chapter is the final section comparing the findings between the OCA and Maastricht criteria.

Next chapter, Chapter 8 Discussion and Conclusion will, among others, revisit the key findings from the analysis chapters and deliver some insights gained.