

Chapter 4 Monetary Anchor and Convergence Criteria

The preceding chapter has reviewed the relevant literature in the field of OCA. To operationalize the tenets of the OCA theory, a number of empirical authors have applied statistical correlates. Among them are Artis and Zhang (2001, 2002), Boreiko (2003), and Crowley (2008) who implemented OCA theory on European countries. The authors nominated Germany a priori as the center country and then measured the variables of individual European countries with reference to Germany. The groups identified would thus be similar in respect of their characteristics vis-à-vis the reference country.

This paper employs a similar approach. The discussion of alternative monetary anchors and sets of criteria for convergence is done in this chapter. The monetary anchors and the criteria sets are needed for all the research objectives, particularly for the first and the second research objective respectively as highlighted in Table 4.1. Attainment of the objectives is expected to provide the solutions for the corresponding research questions.

Figure 4.1 depicts the contents of the chapter. Section 4.1 discusses the alternative monetary anchors, required specifically for objective one. Section 4.2 describes the criteria by the theory of OCAs and Section 4.3 presents the criteria by the Maastricht Treaty, especially needed for objective two. Section 4.4 is chapter conclusion.

Table 4.1 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.

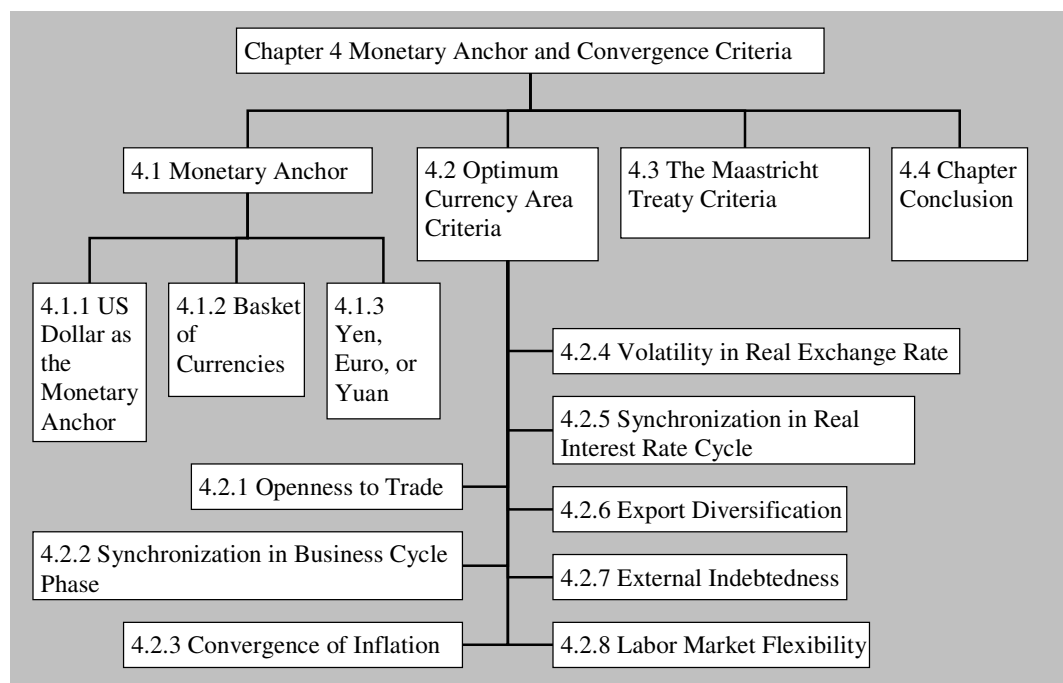


Figure 4.1 Structure of Chapter Four

4.1 Monetary Anchor

Given the influence of world's largest economies on East Asia, the proposal of a large and stable world economy as the monetary anchor country for East Asia is not only rational but also highly practical for ease of transition and enhanced credibility in the

move toward an Asian monetary union. To restate, due to absence of institutional, political, and economic groundwork such as the European Common Market, a monetary anchor would enable East Asia to leap-frog toward a currency area if the potential members including Japan were willing to use a monetary anchor such as the US dollar (Mundell, 2003). The following sections discuss the alternative monetary anchors used in this analysis.

4.1.1 US Dollar as the Monetary Anchor

The big news last week was a speech by Zhou Xiaochuan, the governor of China's central bank calling for a new 'super-sovereign reserve currency' ...
...but they (the Chinese) are apparently worried about the fact that around 70 percent of those (the Chinese) assets are dollar-denominated so a slight fall in the dollar would mean a big capital loss for China.

(Krugman, 2009)

The above is excerpted from Paul Krugman's New York Times column published in April, 2009 discussing about the interconnectedness between China and US. The article was a response to China's call to replace the US dollar as the world reserve currency amidst the recent global financial and economic crisis originated in the US. Notwithstanding the 'flaw' in the US monetary policy and its financial sector, the article asserted that the dollar would remain robust in view of the fact that significant decumulation of dollar assets by China would most likely trigger a downward spiral on the value of dollar, leading to enormous loss for the republic—the so-called 'dollar trap'.

A negative wealth effect from having the dollar fall against the renminbi would hence reduce China's domestic expenditures including imports (McKinnon & Schnabl, 2008). Investments in China would also fall because appreciation makes the country a more expensive place in which to produce. Accordingly, yuan-dollar stabilization can facilitate global rebalancing of net saving propensities between China and US.

In fact, the dominance of the dollar as the world reserve currency can be seen from

Table 4.2. The table exhibits the currency composition of official foreign currency reserves in the world and in the emerging and developing economies. Due to confidentiality of data, the amounts for individual countries are not publicly available. Despite its declining share, the US dollar is still the most dominant reserve currency till 2008 and the trend seems to be sustainable. One can also notice the decreasing role of the yen and the rising dominance of the euro.

Table 4.2 Currency composition of official foreign exchange reserves (%)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
World														
USD	59	62	65	69	71	71	72	67	66	66	67	65	64	64
Pound sterling	2	3	3	3	3	3	3	3	3	3	4	4	5	4
Deutsche mark	16	15	14	14	-	-	-	-	-	-	-	-	-	-
French francs	2	2	1	2	-	-	-	-	-	-	-	-	-	-
Japanese yen	7	7	6	6	6	6	5	4	4	4	4	3	3	3
Swiss francs	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Netherlands guilder	0	0	0	0	-	-	-	-	-	-	-	-	-	-
ECUs	9	7	6	1	-	-	-	-	-	-	-	-	-	-
Euros	-	-	-	-	18	18	19	24	25	25	24	25	26	27
Others	5	4	4	4	2	1	1	2	2	2	2	2	2	2
Emerging and developing economies														
USD	72	73	74	73	72	73	72	66	61	61	62	61	61	60
Pound sterling	2	2	2	2	2	3	3	3	4	5	5	6	6	5
Deutsche mark	15	15	14	14	-	-	-	-	-	-	-	-	-	-
French francs	2	2	2	2	-	-	-	-	-	-	-	-	-	-
Japanese yen	6	5	5	4	4	3	2	2	2	2	2	1	2	2
Swiss francs	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Netherlands guilder	0	0	0	0	-	-	-	-	-	-	-	-	-	-
ECUs	0	0	0	0	-	-	-	-	-	-	-	-	-	-
Euros	-	-	-	-	19	20	22	28	32	31	30	31	30	31
Others	2	2	2	3	1	1	1	1	2	1	1	2	1	2

Source: IMF (2009).

Krugman's stand is in line with the proposal by the OCA gurus, Mundell and McKinnon on having a dollar bloc in East Asia (see e.g. Mundell, 2003; McKinnon, 2005). Mundell has explicitly suggested the US dollar to be used as the pivotal currency for ASEAN+3 countries in the initial stage toward an Asian monetary union. The most devastating threat to an Asian bloc however, is the gyration between the yen and the dollar. Nonetheless, should Japan also fix its yen to the dollar, a fairly smooth transition to an Asian bloc would be highly possible. In light of this, in this paper Japan is also regarded as one prospective member country for monetary union.

Other than playing the crucial role of store of value, the US dollar is also important

in many ways. First, the US dollar is universally used as the unit of account and medium of exchange. Specifically, exports of homogeneous primary products tend to be invoiced in dollars with worldwide spot and forward prices formation in centralized exchanges usually in US cities like Chicago and New York, and dollar-denominated commodity exchanges in London and elsewhere (McKinnon, 2000).

In East Asia, the dollar is also the preferred invoice currency even though Japanese trade in the region is as large as the American one (McKinnon & Schnabl, 2004a). In fact, only about half of Japan's overall exports are invoiced in yen while three quarters of its imports are invoiced in dollars. When the yen-dollar rate fluctuates, Japan would suffer high variations in domestic yen prices of goods, that is, 'pass-through' is high. Other Asian countries are equally vulnerable as well. On the contrary, the US price level is fairly immune to fluctuations in the dollar rate because both its exports and imports are largely invoiced in dollars. Hence, in times of reasonable confidence in the US dollar and monetary policy, commodity prices in dollars are relatively invariant to fluctuations in the dollar rate. In contrast, domestic currency prices of commodities in any country will vary in proportion to changes in exchange rate against the dollar.

Second, the US is the most important export destination for virtually all East Asian countries. According to Kawai and Takagi (2005), from 1990 to 2002 the US had been by far the most important industrial-country destination for principal Asian exporters, such as Cambodia, the Philippines, Taiwan, Hong Kong, Thailand, Korea, Malaysia, China, and Singapore though Japan was more important for Vietnam and the resource exporting countries of Brunei and Indonesia. As for imports, Japan was the most important source country except for Brunei and Cambodia of which the EU was the most important. Based on direction of trade statistics from IMF for 2001–2007, total trade with the US (exports plus imports) had been higher than that with Japan for China, Hong Kong, Korea, Cambodia, Malaysia, the Philippines, Singapore, Vietnam, India,

Macau whereas total trade with Japan had been higher for Taiwan, Indonesia, Laos, Myanmar, Thailand, and Brunei. In short, the US and Japan are the closest trading partners for the region. Hence, fixation of the yen-dollar rate would be highly desirable.

Other than direct relationship with US, trade with countries from the dollar bloc is significant too. As Kawai and Akiyama (2000) pointed out, it is possible that the 'excess' stability of East Asian currencies against the US dollar beyond what can be explained by bilateral linkage is accounted for by the importance of trade with other countries in the dollar bloc. It is so because it is 'optimal' for a country to adopt an anchor currency that minimizes the sum of bilateral exchange rate volatilities, weighted by the importance of each trade partner (Oomes & Meissner, 2008). The choice of the dollar as the trade currency is straightforward because the dollar is the international standard for invoicing goods and services and for denominating the bulk of international capital flows in Asia, the Americas, the Oceania, and much of Africa (McKinnon, 2005).

In a related sense, anchoring to the international dollar is also appropriate by the following argument. As maintained by Fratianni and von Hagen (1993), the potential welfare gains for European Monetary System (EMS) countries produced by increased intra-EMS trade from reduction in exchange rate uncertainty could be offset by a potential reduction in trade between EMS members and nonmembers, leaving the overall welfare implication ambiguous. Thus, if the international dollar is used as the anchor for an Asian monetary union, trade with the rest of the world would not likely be hindered. After all, this could have been one reason why East Asia returned to soft dollar pegging after the Asian crisis (see McKinnon, 2005).

Third, American corporations play a significant role in foreign direct investment in East Asia and so does the US dollar (Kawai & Takagi, 2005). For newly industrialized economies of Hong Kong, Korea, Taiwan, and Singapore, about 23 percent of total FDI inflows during 1990–2002 came from the US, about 15 percent from the EU, and about

14 percent from Japan. For ASEAN excluding Singapore, 22 percent of the inflows came from Japan, while 18 percent and 16 percent came from EU and the US respectively. In China, the US accounted for 10 percent of the total FDI inflows, while EU and Japan accounted for 8 percent and 6 percent respectively.

Fourth, since soft pegs against the dollar are still strong and prevalent in East Asia and India (for India see Patnaik & Shah, 2008) a regional dollar bloc can greatly enhance the anchoring effect of any individual country despite the Asian financial crisis (McKinnon, 2005; Ogawa & Shimizu, 2006; Bauer & Herz, 2009) and when a large number of countries are pegging to a currency, it is difficult to break out of this pattern (Oomes & Meissner, 2008).³⁰

Before the Asian crisis, most East Asian economies had already been soft-pegging their currencies to the dollar—a move which would make them vulnerable to the depreciating yen against the dollar following loss of mercantile competitiveness to Japan. However, dollar pegs were entirely rational from the perspective of Asian economies—to facilitate hedging by merchants and banks against exchange risks particularly for their liabilities in dollars and to help central banks anchor their domestic price levels. Nevertheless, since their dollar pegs were ‘soft’, their currencies became sitting ducks for one-way speculation. With the advantage of hindsight, had their exchange rates been tightly locked to the dollar with credible arrangements, the Asian turmoil could have been prevented or at least been a milder one.

After the crisis, even though major Asian exporters have transformed from being net debtors to net creditors against the US, they still maintain their soft dollar pegs as appreciation of their currencies would: (1) impose capital losses on domestic holders of dollar assets (i.e. dollar trap) and losses for those (e.g. financial institutions, merchants)

³⁰ According to Ogawa and Shimizu (2006), the Chinese yuan, the Malaysian ringgit, the Cambodian riel, the Lao kip, the Burmese kyat, and the Vietnamese dong were pegged to the dollar in 2004 and 2005. Meanwhile, the Singaporean dollar, the Japanese yen, the Thai baht, the Korean won, the Indonesian rupiah, and the Philippine peso had about two-thirds of their currency basket weights on the dollar.

that have net liabilities in domestic currencies; (2) cause an immediate loss of mercantile competitiveness to other Asian neighbors; and (3) risk a macroeconomic slowdown followed by deflation, more so if the appreciation is repeated. This ‘conflicted virtue’ dilemma which has affected Japan (see McKinnon, 2005) could have been a factor for the resilient dollar standard during the recent global financial crisis.

Besides that, many economies including the governments in Asia still have high levels of dollar debts or debts indexed to the dollar due to the ‘original sin’ syndrome (Reinhart & Rogoff, 2009; Rogoff, 2005). Though richer countries have become net creditors, those with open capital accounts are nevertheless susceptible to contagion crisis of confidence and runs on their currencies as a result of, for instance, a debt crisis arisen from the poorer part in the region. During the Asian crisis, even the chronic international creditors (since late 1980s) of Singapore and Taiwan and the reserves rich Hong Kong were not spared from currency attacks.

Fifth, the dollar is also the ‘safe-haven’ currency where nationals in emerging markets fly to in the face of a domestic financial crisis (McKinnon, 1999). Even when the US money manager, the Federal Reserve System had been doing quite badly during the period between the inflationary 1970s and the early 1980s (and perhaps during the recent global crisis), the dollar standard proved surprisingly resilient. McKinnon also maintained that for any country in East Asia, the more synchronized its monetary policy to the US policy (dollar exchange rate naturally stable and price level aligned with the US level), the lower will be the currency risks (e.g. from capital flight).

Sixth, anchoring domestic currencies against the multi-faceted dollar could yield many synergistic benefits. Since World War I, the dollar had emerged as the world’s currency which has remained as the predominant global unit of value, the unit of quotations for exchange rates (both spot and forward markets), the main invoice currency, the dominant international reserve medium (and official intervention

currency), the de facto unit of account for IMF transactions, and the international currency of choice for investors, travelers, and even smugglers and other illicit transactions (Mundell, 2007). Given the progress of financial liberalization and global integration in East Asia (Lee, Park, & Shin, 2004), the choice of the dollar as the external anchor would be most appropriate.

Lastly, other major currencies may not be as appropriate to serve as the anchor currency for the region. One possible currency would be the Japanese yen. Nonetheless, though Japan's influence is indisputably significant in East Asia, there are several serious impediments toward a yen bloc.

First, Japan has been facing internal macroeconomic and banking problems since the 1990s and its yen had been very unstable against the dollar (see Mundell, 2003; Kawai, 2008). The tripling of the yen's value against the dollar between 1985 and 1995 weakened corporate balance sheets (whose assets are largely in dollars and liabilities mainly in yen) and saddled the Japanese banking system with trillions of non-performing loans. Had Japan locked its exchange rate to the dollar, the prolonged stability in the yen-dollar rate would have quashed the resulted deflationary expectations that gripped the Japanese economy for almost a decade or more (McKinnon, 2005). Second, since a large part of Japanese trade is invoiced in dollars, gyrations in the yen-dollar rate would be passed through to domestic yen prices. This would make Japanese price level vulnerable to dollar rate fluctuations. Third, as discovered by Kwan (1998) and Shirono (2009), Asian countries' dependence on Japan has been declining and that the significantly different economic structure and inflation level of Japan would be a major stumbling block for a yen standard. This is vividly shown by the declining share of the yen as an official reserve currency in Table 4.2. Meanwhile, Sato, Zhang, and McAleer (2003) and Chow and Kim (2003) have detected that the Japanese real business cycle was significantly different from those in the region.

Other difficulties with the use of yen are associated with the unfamiliarity with the Japanese language and emotional issues associated with acknowledgement of Japan's culpability in World War II (Mundell, 2003).

Perhaps for the above reasons, there has not been a yen bloc in the world (see Oomes & Meissner, 2008). One possible explanation is the Japanese de facto US dollar peg from 1949 to 1977 which simply promoted the use of dollar in Asia.³¹ Another possible reason is the tight regulation which existed in the Tokyo financial market prior to the end of the 1980s.

What about the possibility of the Chinese renminbi as the anchor? At present time, the Chinese currency is not fully convertible on capital accounts and its financial system is not well developed (see Mundell, 2003, McKinnon & Schnabl, 2008). Another is the absence of a large market for yuan-denominated bonds and its limited use in transactions not involving China. Whilst some Asian economies particularly those with strong ties with China may consider pegging their currencies to the yuan as desirable from trade perspectives, but many economies with increasingly open capital accounts will have little incentive to do so because of the limited usefulness of the yuan for international settlement, clearance, financing, and liquidity holding (Kawai, 2008). As Table 4.2 shows, the yuan is not even listed as one of the major official reserve currencies.

Moreover, as the beginning of this section pointed out, having 70 percent of its reserves in dollars China is still caught by the dollar trap. In fact, as McKinnon and Schnabl (2008) revealed, because renminbi is not used significantly in international borrowing and lending, Chinese claims on foreigners are in dollars but private makers

³¹ Japan maintained a parity of 1 dollar = 360 yen from April 1949 to August 1971. Reasons why Japan preferred the dollar to the British pound were the US economic aid during the reconstruction period and the windfall demands of the Korean War which promoted dollar transactions whilst on the other hand, sterling had the disadvantage of nonconvertibility (Oomes & Meissner, 2008). Thereafter, the dollar stabilized its position as the key currency for Japan because at the same time trade in dollars also increased its share in the Asian region and trade finance in the New York money market became increasingly important (Iwami, 1994).

such as Chinese banks, insurance companies, and pension funds, all have their liabilities to depositors, policy holders, and so forth denominated in renminbi. Thus, even if the yuan-dollar rate fluctuated only randomly, Chinese institutions would be exposed to too much exchange risk. This might explain why the Chinese government has persisted to resist recent pressures to revalue its yuan against the dollar.³²

Last but not least, the choice of an internal anchor, yen or renminbi could be a source of distrust between the two rivals. As Katada (2008) put it, despite emerging signs of challenges, Japan's domestic resistance and the power rivalry between Japan and China still make the dollar the currency of choice for the medium term future.

4.1.2 Basket of Currencies

Notwithstanding the above support for the US dollar to be the monetary anchor, recent developments such as the global financial crisis ('manufactured' in the US) has nevertheless reduced the attractiveness of the dollar.

Currency basket system (CBS) has gained greater appeal since July 21, 2005 when the Chinese government announced that its monetary authority would adopt a managed floating exchange rate regime with reference to a basket of currencies despite the fact that many observers found the regime to be dollar-based. So too have some Asian countries, namely Singapore, Thailand, Japan, Korea, Indonesia, and the Philippines (CBS) in recent years adopted variants of basket peg (Kawai, 2008).

In the literature, Kawai and Akiyama (2000), Ogawa and Ito (2002), and Williamson (2005) have proposed that East Asia adopt a common CBS to stabilize its intra-regional exchange rates. Under such a system, monetary authorities would use the

³² Though in recent decade, China has been under heavy pressure from US to revalue its renminbi to correct their trade imbalances, the so-called China-bashing, many economists however have pointed out that the real problem lies in the multilateral trade deficits by the US and the lack of savings by the Americans. Indeed, even when the renminbi was overvalued from 1997 to 2002, China still experienced a huge trade balance surplus most probably due to relocation of the economic resources (Peng, Lee, & Gan, 2008).

value of a basket of major currencies, that is, the dollar, yen, and euro as a reference to coordinate their exchange rate policies so as to not deviate their currencies from the common reference (Ogawa & Shimizu, 2006). In this manner, Asian countries can achieve stability of intra-regional exchange rates but joint floating against other currencies. Such arrangement can be called a G3 CBS, representing the reference countries of US, Japan, and the EMU. The most apparent benefit of the G3 CBS (with optimal weights), is that it keeps trade competitiveness within the region relatively stable because real effective exchange rates would be more stable against large shocks to their trade balances. On the contrary, a common US dollar peg would possibly deviate their effective exchange rates from desirable levels because Asian economies have strong economic relationships with not only the US but also Japan and the EMU (Kawai & Akiyama, 2000; Kawai, 2008).

Another type of CBS is individual CBS. An individual currency basket of a country is composed of its own trade partner currencies based on its own trade weights (Ogawa & Shimizu, 2006). However, too much variety would have adverse effects on stability of intra-regional exchange rates if the monetary authorities target their respective currency baskets. Empirically, Williamson (2005) discovered that a common CBS is more superior to a series of individual CBSs in reducing instability of intra-regional exchange rates. Besides, a common CBS would also preclude competitive devaluations that would exist if national monetary authorities can choose their own individual currency baskets (Rajan, 2002).

In spite of this, there are several challenges to a common basket regime. Under a common CBS, each participating country must hold or be able to borrow enough dollars, euros, or yen (rather than just one of them under a single-currency peg system) to keep their currencies sufficiently close to the target values defined by the common basket (see e.g. Kenen & Meade, 2008). This would certainly incur additional operating and

hedging costs even if a centralized monetary authority is set up. Of course in the absence of a centralized authority, the basket value of a country's currency can be stabilized by intervening in just one of the component currencies but this can only be done effortlessly if the rates between the dollar, yen, and euro were fixed.

Furthermore, under a basket system a merchant's hedging strategy would be perplexed. The following illustration from McKinnon and Schnabl (2004b) clarifies this. Because the dollar is the natural intervention currency that governments use, national authorities, say in Korea would be obligated to keep changing the won-dollar rate as the dollar fluctuates against the yen and euro. This then would confuse merchant's hedging strategy—particularly if the weights of the major currencies in the basket were somewhat uncertain and the timing of official changes in the won-dollar rate in order to track the yen or the euro was also uncertain. In effect, people who argue that basket pegging would reduce risk are only looking at movements in spot exchange rates as if merchants could not hedge. That is, they are not accounting for the forward hedging strategies that almost all merchants use.

According to McKinnon and Schnabl, picking the appropriate official weights for a currency basket will also be problematic. A simple trade-weighted basket would not reflect the dollar's overwhelming predominance as a currency of invoice. External dollar prices of goods and services are sticky and do not vary much with changes in the dollar-euro rate. A trade-weighted basket would also not reflect the denomination of financial securities and the dominance of dollar in international capital markets outside the euro bloc.

As echoed by Kenen and Meade (2008), no simple set of trade weights will give optimal results because optimality itself is a multi-dimensional notion and no one really knows enough about the relevant parameters to modify the trade weights in a satisfactory way. For instance, Korea trades far more heavily with Japan than do most

ASEAN countries. Within ASEAN, Indonesia and Thailand trade more heavily with Japan than with the US whilst Singapore trades more heavily with the US

Quite the opposite, a dollar anchor would be better than a basket peg in the following ways (see McKinnon & Schnabl, 2004b). First, exchange rate fixation to just one pivotal currency helps individual merchants and bankers better hedge their own foreign exchange risks. Because of the missing bond and forward exchange markets in many developing countries, governments would provide an informal hedge by keeping the domestic currency stable against the dollar. In the case of East Asia, if Japan fixes its currency to the dollar, this would leave merchants to the 'extraneous' fluctuations in the dollar-euro rate which can be hedged by making use of the well-developed forward markets between dollar and euro. Since virtually all traders today use forward hedging strategies, this should not be a problem.

In short, views on the plausibility of a CBS for East Asia are mixed. Viewed in this light, analysis using a common basket peg is also demonstrated in this study. The currency weights used here are those suggested by the well-cited Williamson (2005) where a weight of 0.47 is given to the US dollar, 0.23 to yen, and 0.30 to euro.³³

According to Williamson, the weight of the dollar is supplemented by trade with the rest of Western hemisphere, the rest of non-Japan East Asia, and two-thirds of the rest of the world. These economies have traditionally pegged to, or measured their exchange rates in terms of the US dollar. The weight of the euro is supplemented by one-third of the trade with the rest of the world, reflecting the fact that a number of other countries peg to the euro or influenced by the euro.

The weights suggested by Williamson do reflect the currency composition of official currency reserves reported in Table 4.2 whereby the dollar is the most dominant reserve currency, which is followed by euro and yen.

³³ Huang and Guo (2006) have used weights of 0.4, 0.3, and 0.3, for dollar, yen, and euro respectively, which represent the broad geographical composition of trade and FDI in East Asia. The weights used here are similar.

4.1.3 Yen, Euro, and Yuan

While the choice of the US dollar or the currency basket as the monetary anchor may be reasonably persuasive, other currencies such as euro, yen, and yuan have received comparatively little attention.

Given that economic ties of East Asia with the EU are significantly smaller when compared to those with the US or Japan, a sole euro anchor for East Asia is very unlikely. Indeed, as McKinnon and Schnabl (2004a) pointed out, the euro rate has not significantly directed exchange rate intervention policies in East Asia before or after the Asian crisis. Nonetheless, albeit the recent debt crisis in eurozone, the euro has great potential to be an international currency rivaling the dollar.

As for yen, recently Shirono (2009) has concluded that Japan in comparison to US has not gained much ground in regional currency arrangements over the past decades. In contrast, based on a two-decade dataset, Kawai and Motonishi (2005) detected that the degree of emerging East Asia's real economic interdependence with Japan is greater than that with US while the degrees of its nominal interdependence with Japan and US are equally strong. Meantime, Ahn, Kim, and Chang (2006) were able to find a substantial number of East Asian countries sharing common trends in real exchange rate movements against the Japanese yen.

Meantime, the renminbi has just begun to internationalize with the issuance of yuan-denominated bonds in Hong Kong in 2009. Other reasons for the choice of dollar over yen or renminbi have been discussed earlier. Despite this, unquestionably the Chinese currency has gained much ground in recent years especially since China became one of the largest economies and since the global financial crisis.

Against this backdrop, it may be compelling to compare the findings across the anchor candidates. For this purpose, the US dollar, the currency basket, the Japanese yen, the euro, and the Chinese yuan are set as the monetary anchor sequentially in the

analysis. The respective reference countries are the US, the weighted-G3, Japan, Germany/EMU, and China.

4.2 Optimum Currency Area Criteria

Upon discussing the choice of monetary anchor, the next step would be identifying the relevant dimensions to be measured relative to the monetary anchor country. Accordingly, this section discusses the criterion-variables used in the analysis. As mentioned before, these criteria are adopted from current applied OCA studies. The criteria are: (1) openness to trade, (2) synchronization in business cycle phase, (3) convergence of inflation, (4) volatility in the real exchange rate, (5) synchronization in real interest rate cycle, (6) export diversification, (7) external indebtedness, and (8) labor market flexibility. In general, these criteria can be categorized into facets as shown in Table 4.3.

Table 4.3 Categories of OCA criteria

Criterion	Anchor Dependency*	Economic Sector	Benefit/Cost
1 Openness to trade	Yes	Real	Benefit
2 Synchronization in business cycle phase	Yes	Real	Cost
3 Convergence of inflation	Yes	Monetary	Cost
4 Volatility in the real exchange rate	Yes	Monetary	Cost
5 Synchronization in real interest rate cycle	Yes	Monetary	Cost
6 Export diversification	No	Real	Cost
7 External indebtedness	No	Financial	Benefit
8 Labor market flexibility	No	Real	Cost

Note: *Whether a variable is measured vis-à-vis a reference.

Anchor dependency means whether a criterion is measured against a reference country corresponding to the chosen monetary anchor. The first five variables are measured relative to a reference. At the same time, the criteria pertaining to trade, business cycle, export, and labor are basically dimensions of the real economy. Those concerning inflation, exchange rate, and interest rate are essentially dimensions of the monetary sector while the debt criterion is primarily a financial dimension. In this regard, the present work has contemplated the real and monetary/financial aspects of the macroeconomy.

Following Artis and Zhang (2001), the OCA criteria can also be classified into those measuring the ‘benefit’ and the ‘cost’ aspects of integration. The trade and debt criteria can be regarded as measurements of benefit whereas the rest are in effect measurements of cost.

The following subsections will discuss the criteria and explain why they can be considered as measurements of benefit or cost. Precise data definitions and sources of variables can be found in Appendix A.

4.2.1 Openness to Trade

When countries move from relatively closed to open economies, flexible exchange rates become less compelling as an adjustment device for external balance but more damaging to internal price-level stability (McKinnon, 1963). As Nguyen (2007) echoed, the more open the economy, the less the usefulness of domestic currency and a separate exchange rate, the greater the benefits of monetary unification. This argument is also true for East Asia which is deeply intertwined with the rest of the world in real and financial markets.

OCA theory suggests that countries which trade a great deal with each other are good candidates for monetary unification in view of the benefits resulted from elimination of exchange rate uncertainty (McKinnon, 1963). The associated benefits have been discussed earlier. As Bayoumi and Eichengreen (1997) noted, European countries which witnessed the greatest increase in bilateral trade have also experienced the greatest increase in their readiness for monetary union.

Indeed, the larger the initial trade between countries, the more connected will be the economies, the smaller will be the size of required price and wage adjustments to regain competitiveness from asymmetric shocks to export demand (Krugman, 1990). Trade integration leads to more-highly-correlated business cycles because of common demand shocks and greater intra-industry trade, lessening the need of country-specific monetary

policies (Frankel & Rose, 1998; Alesina, Barro, & Tenreyro, 2002).

Based on these arguments, it is reasonable to postulate that the larger the trade linkage between an East Asian economy with the reference country, the greater will be the benefits for adopting the monetary standards of the reference country. As Edison and Melvin (1990) suggested, in choosing which currency to peg against, a country should first consider bilateral trade criterion. Following Artis and Zhang (2001), this facet is viewed as a measurement of benefit.

In applied literature, this criterion has been used as an OCA criterion by for instance, Bayoumi and Eichengreen (1997), Artis and Zhang (2001, 2002), Boreiko (2003), Bénassy-Quéré and Coupet (2005), Huang and Guo (2006), Nguyen (2007), Ibrahim (2008) and Tsangarides and Qureshi (2008).

On measurement, the bilateral trade intensity measure implemented by Artis and Zhang (2001, 2002), Boreiko (2003), Nguyen (2007), and Tsangarides and Qureshi (2008) is adopted here to measure trade openness with a reference country. For an Asian country i , trade openness is measured by $(x_{i,US} + m_{i,US})/(x_i + m_i)$ where x_i and m_i are the exports and imports of goods and subscript US indicates destination to or source from the US, the reference country. The same is used for other reference countries. For each country, the values are averaged over time. Due to data constraints, only trade in products is considered.

4.2.2 Synchronization in Business Cycle Phase

When business cycles are synchronized between economies, the argument for flexible nominal exchange rates to absorb asymmetric shocks becomes largely irrelevant (see e.g. Tavlas, 1993). When real business cycles are sufficiently synchronized, the need for adjustments in domestic prices and wages will be significantly reduced (see Mundell, 1961). Hence, the higher the degree of synchronicity in real business cycles, the easier will be the adjustment to asymmetric shocks, the more irrelevant will be the need for

flexible exchange rates, the stronger will be the case for fixed exchange rates. Therefore, business cycle symmetry is in effect a measurement of cost.

In particular, as discovered by Tavlas, Dellas, and Stockman (2008), for developing countries, pegged exchange rates are positively associated with real growth and lower inflation but greater output volatility. Hence, if a source of output volatility, asymmetry of business cycles with the anchor country is lower, a developing country might be able to enjoy as much benefits from stable exchange rates with lesser output volatility than otherwise would be.

For an Asian economy in this study, the higher the degree of symmetry of output variations with a reference country, the lower will be the cost of adjustment to asymmetric shocks with the reference country, the higher will be the readiness to adopt the reference country's monetary standards. Cluster analysis results would indicate groups of countries with symmetric business cycle relationships vis-à-vis the reference country.

This criterion has been widely used in empirical OCA studies and can be found in among others, Artis and Zhang (1996, 1997a, 1997b, 2001, 2002), Crowley (2002, 2004), Boreiko (2003), Bénassy-Quéré and Coupet (2005), Font-Vilalta and Costa-Font (2006), and Tsangarides and Qureshi (2008).

In terms of measurement, since the 1990s it has become popular to implement criterion related to symmetry of output shocks by studying the cross-correlation of the cyclical components of output (de Grauwe & Vanhaverbeke, 1991). In accordance with Artis and Zhang (2001, 2002), the method of Gerlach (1988) and Baxter and Stockman (1989) is adopted here. Symmetry in output shocks is identified with cross-correlation with a displacement of zero in the cyclical components of annual GDP series, detrended by applying Hodrick-Prescott (H-P) filter³⁴. A recent application of this approach can be

³⁴ In more detail, the definition of the business cycle employed in this paper is that of the growth cycle,

seen in Artis and Okubo (2010). For the countries under review, annual GDP series are used since GDP deflator which is used to compute real GDP is only available on annual basis.³⁵ Moreover, other than annual series, majority of the Asian cases do not have higher frequency GDP series.

4.2.3 Convergence of Inflation

Whilst traditional OCA literature offers principally real variables as criteria, Artis and Zhang (2001, 2002), Boreiko (2003), Nguyen (2007), and Ibrahim (2008) have supplemented them with a measure of inflation convergence.

When inflation rates between countries are similar over time, the terms of trade will be fairly stable, underplaying the need for separate exchange rates (Nguyen, 2007). Also, since similar inflation rates result from similarities in monetary and fiscal stance, and parallels in economic structure, the cost of joining a monetary union is presumably low when inflation rates are similar across countries (Mundell, 2000). On the contrary, inflation rate differentials will change the purchasing power of currencies of potential members disproportionately (Zhang & Lan, 2005). In another respect, as discussed in Chapter 3 high-inflation countries can reap the benefits of inflation reduction upon adhering to a credible fixed exchange regime.

Convergence in inflation also reflects similarity in the degree of trade union aggressiveness and labor costs which means lesser need for flexibility in nominal exchange rates to adjust current account imbalances (Fleming, 1971). Fleming also argued that equilibrated flows of current account transactions are more likely to take

representing cyclical movements around the long-run growth trend of an economy. The decomposition of observed series into a trend movement and cyclical component is crucial in business cycle research. The three most widely used techniques are the phase-average-trend estimation procedure proposed by Boschan and Ebanks (1978), the filter proposed by Hodrick and Prescott (1997), and linear trending. Artis and Zhang (1997b) have assessed the robustness/sensitivity of each filter and found no evidence that conclusions are sensitive to the choice of filter. Most researchers have adhered to Hodrick and Prescott (1997) and used the value of 1600 for the dampening parameter for quarterly data. Meanwhile, Ravn and Uhlig (2002) suggest 6.25 for annual data and 129600 for monthly data. The latter parameters are used for this research.

³⁵ Due to data availability, GDP is used though industrial production index is also an option.

place in a currency area with convergent inflation

Inflation convergence would also translate into convergence in real cost of capital which could reduce the likeliness of malinvestments in high growth member countries. The following explanation by Kroger and Redonnet (2001) clearly exemplifies this.

Consider two countries, A and B. Country A is a mature economy while country B is at early stage of development with higher growth. In a monetary union between the two countries under which a regional central bank has been assigned the objective of price stability, country B could face the following situation: (i) higher expected rates of return on investment; (ii) low real interest rates in country B (because of productivity differentials, country B would likely have a higher inflation rate than country A so that a given area-wide nominal interest rate leads to a lower real interest rate in country B); (iii) with free movement of capital, factors (i) and (ii) can lead to overly optimistic income expectations, a ‘wrong’ incentive structure of investment (i.e. investment in high-risk projects that would not have been undertaken in the absence of low real interest rates) and excessive domestic demand; and (iv) in light of the above, country B may eventually be faced with the need to undergo a prolonged deflation in order to regain competitiveness.

Against this backdrop, this dimension can be regarded as a measurement of cost in which the more convergent the inflation rates, the lesser the degree of asymmetries in the economic structure, the greater the case for fixed exchange rates. Since the present study is about identifying homogenous groups of countries, countries within a group would have relatively symmetric levels of inflation convergence with the reference country.

This dimension is measured by absolute inflation differential, $|x_i - x_{US}|$ where x_i and x_{US} is the rate of inflation in country i and the US respectively. Absolute value is used since the magnitude of difference is of concern here. In Artis and Zhang (2001,

2002), Boreiko (2003), Nguyen (2007), and Ibrahim (2008), the use of absolute values has not been indicated.³⁶

Differentials are averaged over time period. The smaller the average differential, the greater the inflation convergence. Inflation rates are computed from monthly consumer price indexes (CPI) as performed by Artis and Zhang (1997a, 2001, 2002), Crowley (2002, 2004), Boreiko (2003), Nguyen (2007), and Tsangarides and Qureshi (2008).

4.2.4 Volatility in Real Exchange Rate

The OCA approach identifies the cost of currency area membership with the loss of an independent monetary policy or more specifically the loss of a separate exchange rate (Artis & Zhang, 2001, 2002). It is real exchange rate that is at issue here even though monetary policy can only directly influence the nominal rate. Real exchange rate movements are highly correlated in the short and medium run with nominal exchange rate movements, except when very high inflation rates are involved (Cooper, 2000).

According to proponents of flexible rates, monetary policy could drive real exchange rates to move in the right way in response to appropriate prompting. For instance, when domestic inflation is lower than the foreign level, the domestic currency will be undervalued if nominal exchange rate is kept constant. Thus, domestic authorities may revalue its nominal exchange rate to realign the nominal rate to the real rate.

However, Canzoneri, Valles, and Vinals, (1996) viewed it differently. According to them, a 'revealed performance' based on a variable measuring variation in the real exchange rate against a numéraire would be more appropriate to assess the need of floating rates in prompting the direction of real rates. This is so because real exchange rate variability is a good indicator of synchronicity of economic forces between

³⁶ In a 2008 correspondence with Mike Artis, he indicated that the absolute value may be a better option to avoid the problem of cancellation of values of the opposite sign.

countries. Real exchange rate changes are clearly measurable and automatically give the appropriate weights to the economic forces which they are the result (Vaubel, 1978). Tavlas (1993) referred to those economic forces as similarity of inflation rates, degree of factor mobility, openness and size of the economy, degree of commodity diversification, price and wage flexibility, degree of goods market integration, and fiscal integration. If there has been little variation in real exchange rates, then little costs from these economic forces will be revealed. As put it aptly by Artis and Zhang (1997a), lower real exchange rate volatility could indicate absence of asymmetric shocks and greater business cycle conformity.

Following the above and Artis and Zhang (2001), volatility in real exchange rate is viewed as a measurement of cost here. For an Asian country, the lower the variability of its real dollar rate, the higher its readiness to adopt a rigid dollar peg. The same applies to other monetary anchors. In empirical texts, real exchange rate volatility has been used as an OCA criterion by Artis and Zhang (1996, 1997b, 2001, 2002), Boreiko (2003), Font-Vilalta and Costa-Font (2006), Nguyen (2007), Tsangarides and Qureshi (2008), and Ibrahim (2008).

In respect of measurement, authors have quantified volatility in real exchange rate using the standard deviation of the log-difference of monthly real bilateral exchange rates where deflation is accomplished using relative wholesale (producer) or consumer prices. Due to data availability, monthly CPI is used here.

4.2.5 Synchronization in Real Interest Rate Cycle

Though not explicitly stated as one of the dimensions in traditional OCA theory, akin to volatility in real exchange rates, synchronicity in real interest rate cycles is indicated by revealed preference argument (Tavlas, 1993; Artis & Zhang, 2001, 2002). If the monetary policy of a candidate country historically has differed little from that in the reference country, the cost of relinquishing monetary independence would be

accordingly low. In this respect, symmetry in real interest rate cycle may be interpreted as an indicator of coordination in monetary policy.

From another perspective, real interest rate cycle synchronicity with a credible country could imply willingness to commit to policies of high counter-inflationary credibility (Tavlas, 1993). In contrast, the presence of a negative synchronization in terms of interest rates may reveal the presence of asymmetric shocks which arguably could be expected to influence the stability of a monetary union in the long run (Font-Vilalta & Costa-Font, 2006).

For the economies under review, the higher the degree of synchronicity in real interest rate cycle with a reference country, the smaller will be the cost of eschewing national monetary policy. According to Artis and Zhang (2001), this is also a measurement of cost. In empirical studies, this criterion has been implemented as an OCA dimension by Artis and Zhang (2001, 2002), and Font-Vilalta and Costa-Font (2006).

With regard to quantification, Artis and Zhang (1997a, 2001, 2002) measured real interest rate cycle synchronization by reference to the cross-correlation of the cyclical components of the real interest rate cycle of a country with that of reference country. To extract the cyclical components, detrending is accomplished by applying H-P filter to monthly series of real interest rates, which is defined as the difference between a short-term nominal rate (assumed to be set by the central bank) and the rate of consumer price inflation. Similar approach is employed here.³⁷

³⁷ To ensure the greatest degree of data consistency over time and countries, including countries with heavily regulated capital markets (such as China and countries in Indochina), discount rates are used though some authors may prefer to use money market rates to approximate monetary policy especially for advanced countries. But then again, numerous studies have demonstrated significant influence of discount rates on money market rates (see e.g. Thornton, 1998; Rai, Seth, & Mohanty, 2007).

Discount rates may also be better in reflecting the broad stance of monetary authorities because the rates are directly set by central banks whilst money market rates are influenced by both monetary authorities and the markets with varying degrees across countries. As pointed out by Milton Friedman (1968), monetary policy has little potency in fine-tuning the interest rates (and price levels) in midst of the dynamism in the private markets. This aspect is important for Asian economies as no one really knows how effective the authorities are in adjusting the market rates. In addition, countries differ in their

4.2.6 Export Diversification

In response to Mundell's mobility of labor which hardly prevails perfectly in the real world, Kenen (1969) argued that diversity in national product mix is as good a precondition to demarcate OCAs. If outputs were diversified, Kenen asserted that a country would be a better candidate to fix its exchange rate because shocks focused on this or that industry would offset each other in the aggregate, that is, when the law of large number sets into play. On the contrary, a one-product economy which is isolated from international financial markets may be more suitable to float its exchange rate because exchange rate changes could effectively correct external imbalances resulted from shifts in export demand (see McKinnon, 2000; Mundell, 1961). Viewed in this light, export diversification can be deemed as a measurement of cost for monetary integration.

Hence, the higher the variety of exports, the lower the vulnerability to export demand shocks, the lesser the need for exchange rate policy discretionary, the greater the suitability for fixed exchange rates.

In spite of this, the diversification thesis by Kenen can be actually turned around (Mundell, 1969). It can be argued that those economies that are highly diversified can best afford to have flexible exchange rates whereas undiversified economies are less able to deal with exchange-rate fluctuations. Nevertheless, since the present purpose is to identify homogenous clusters of economies, the 'direction' at which the diversification proposition works should not pose a problem. In either case, countries within a cluster would be symmetrical in this dimension and hence would be equally prepared against adverse demand shocks in their exports so that asymmetries in the

monetary targets; other than interest rates, some countries target exchange rates, inflation rates, price levels, or other monetary measures. In a sense, discount rates may be better a proxy to reflect monetary policies in general for the countries under review.

Moreover, as the analysis looks at correlation of movement rather than a definitive measure of monetary policy stance, the choice between discount rates and money market rates should not matter very much.

ways they respond to shocks can be reduced.

Viewed in another light, countries in the same clusters to be detected in the analysis would have relatively parallel levels of export diversification which could reflect similarity of economic structures between economies, another facet for monetary union raised by Kenen (1969).

Whilst diversity in product-mix as a prerequisite for common monetary standard has been investigated in empirical texts, specific measurements for export diversification in OCA context are comparatively rare. In respect of measurement, Bénassy-Quéré and Coupet (2005) for instance, measured export diversification by the share of the dominant exported good in total exports. The higher the ratio, the less diversified the economy, and vice versa.

This paper employs a computationally more rigorous approach exhibited by Nguyen (2007). The degree of export diversification is measured by the inverse of the period average of the annual Herfindahl indices. The index is a popular indicator of the degree of specialization. Herfindahl index is computed as $H = \sum_{i=1}^n s_i^2$ where s_i is share of the export of product i , n is the number of products exported. Since export of individual product data are unavailable, annual export data according to the first-digit subindustries of the United Nation's Standard International Trade Classification (SITC) Revision 2 are used, as shown in Table 4.4. Since there are 10 categories, Herfindahl index would extend from 0.1 (most diversified) to 1 (least diversified). Correspondingly, the diversification index would extend from 1 (least diversified) to 10 (most diversified).

Table 4.4 United Nation's Standard International Trade Classification (SITC) Revision 2

Code	Product type
0	Food and live animals.
1	Beverages and tobacco.
2	Crude minerals, inedible, except fuels.
3	Mineral fuels, lubricants, and related materials.
4	Animal and vegetable oils, fats, and waxes.
5	Chemicals and related products.
6	Manufactured goods classified chiefly by material.
7	Machinery and transport equipment.
8	Miscellaneous manufactured articles.
9	Commodities and transactions not classified elsewhere.

Source: Nguyen (2007).

4.2.7 External Indebtedness

The conventional OCA literature has been criticized for not paying enough attention to the increased role of international financial markets and capital mobility (see e.g. Calvo, 2002; Boreiko, 2003). Recently though, Bénassy-Quéré and Coupet (2005) have used an indebtedness measure—the liability to service external debt as an additional dimension to complement the conventional OCA criteria in the context of West Africa. According to the Bénassy-Quéré and Coupet, the higher the degree of external debt service, the lower the incentive to devalue to increase competitiveness because debt service is denominated in hard currencies (e.g. the US dollar). The argument implies that countries with higher levels of foreign borrowings are more willing to fix their exchange rates, reflecting the ‘fear of floating’ syndrome (see Calvo & Reinhart, 2002) which has been pervasive in middle-income economies with access to international capital markets.

This debt liability argument might also apply to East Asia. Since the late 1980s, liberalizations undertaken by emerging economies, including those in East Asia have actually raised their dependence on external debt (Reinhart, Rogoff, & Savastano, 2003).³⁸ As described in Chapter 3, these economies are affected by the so-called ‘original sin’ syndrome. Hence, to take advantage of the lower financing costs in

³⁸ These liberalizations have led to decline in tax revenues particularly trade taxes but increased expenditures due to lifting of interest rate ceilings. As shown by Reinhart, Rogoff, and Savastano (2003), emerging markets that have defaulted before are Argentina, Brazil, Chile, Colombia, Egypt, Mexico, Turkey, Venezuela, and the Philippines whilst Thailand, India, Korea, and Malaysia have not defaulted before.

international capital markets, these countries must borrow in dollars or other hard currencies.

Though there have been hints on the debt thresholds above which interest rates would start to rise and lending be restrained, in times of panic countries with soft currencies are highly vulnerable to being suddenly shut out of international capital markets and to suffer a debt crisis (Reinhart, Rogoff, & Savastano, 2003). This was evident during the series of financial crisis in Latin America and East Asia.³⁹

To avoid debt crises, according to Rogoff (2005) the single best precaution any emerging country can take is to keep down its external debt. The other solution would be either insulation from international capital flows or accession into a monetary union anchored on a hard currency (McKinnon & Schnabl, 2004a) due to the fact that for developing countries, floating exchange rates, independent monetary policy, and freedom of capital movements are incompatible (Cooper, 2000). Unlike advanced economies, developing countries have small and poorly developed domestic capital markets, making them vulnerable to hot moneys and currency speculation.

Despite significant increase in foreign reserves, the return to soft dollar pegging after the Asian crisis (see McKinnon & Schnabl, 2004b) still make Asian economies vulnerable to currency attacks. As pointed out by Edwards (2000), victims of contagion have seemingly included economies with sound fundamentals—the currencies of which might not have been attacked had the countries adopted one of the corner solutions, namely hardly fixed rates or pure floating rates. Along this argument, Asian economies are still vulnerable to contagion crisis such as those that distressed even the chronic

³⁹ In East Asia, the crisis began in Thailand when its financial institutions which borrowed in dollars at lower interest rates and lent in Thai baht at higher rates to local property developers were on the verge of default—triggering vicious cycles of runs on the baht. Consequently, the baht was forced to devalue precipitously. The rest of the region, in particular Korea and Indonesia, which had excess investment and high borrowings in dollars faced similar predicament. As the crisis spread, most of Southeast Asia and Japan saw slumping currencies, devalued stock markets, and other asset prices, and a precipitous rise in private debt. China, India, Taiwan, Singapore, Brunei and Vietnam were less affected, although all suffered from a loss of demand and confidence. Singapore and Taiwan even devalued their currencies in a preemptive move to ward off potential attacks. Meantime, with its robust currency board system, Hong Kong was able to defend its peg to the dollar.

creditors of Singapore and Taiwan, and the reserves-rich Hong Kong during the Asian crisis if they persist with soft dollar pegs.

Moreover, even after the crisis, Asia Pacific countries still have high levels of dollar-denominated debts or debts indexed to the dollar (Rogoff, 2005). In 2006, only about 40 percent of external debt outstanding in developing countries was denominated in currencies other than the US dollar, mainly in euros (23 percent) and Japanese yen (10 percent) (WB, 2008). The rest of the debt was in dollars. Table 4.5 shows the currency composition of long-term debt for East Asia and Pacific from 1970 to 2001. The figures clearly exhibit the rising roles of dollar and yen in long-term financing in the region. Though the maturities of the debts are long-term, the servicing costs are nevertheless short-term or periodic.

In terms of public and publicly guaranteed debt in East Asia and Pacific, the portion of debt in dollars has actually risen from 23.6 percent in 1990 to 58.4 percent in 2008 whilst the part in yen reduced from 29.1 percent (1990) to 27.3 percent (2008); and the part in euro reduced from 8.7 percent (2004) to 7.4 (2008) (WB, 2010). Also, although other debt ratios had been improving in the last decade, the ratio of short-term to external debt stocks has actually increased from 12.4 percent in 2000 to 35.6 percent in 2008, indicating increased dependence on short-term external financing.

Table 4.5 Currency composition of long-term debt for East Asia and Pacific (%)

	1970	1980	1990	1996	1997	1998	1999	2000	2001
Euro	-	-	-	-	-	-	-	4.6	-
Deutsche mark	7.8	5.5	3.6	2.4	2	2.4	2	1.9	-
French franc	3.9	3.6	1.7	1.3	1.1	2	1.5	1.4	-
Japanese yen	6.5	18.6	28.5	24.1	21.5	24.5	27.9	27.6	24.3
Pound sterling	5.3	1	0.9	0.5	0.6	0.6	0.5	0.4	0.4
Swiss franc	0.8	0.7	0.9	0.4	0.2	0.2	0.2	0.2	0.2
U.S. dollar	43.2	35.8	23	41.3	50.6	52.5	50	54.5	58.8
Multiple currency	8.7	18.1	22.4	17	14.2	8.1	8.7	7.4	6.7
Special drawing rights	0	0	0.1	0.2	0.2	0.2	0.2	0.2	0.2
All other currencies	23.7	8.3	16.7	10.4	7.3	6.9	6.6	3.8	4.8

Source: WB (2004).

Based on the points above, countries with higher external indebtedness should be more willing to fix their exchange rates. In addition, debt-prone countries might also be

better off from lower borrowing costs when exchange risk is eliminated. Along these lines, this facet might well represent a measurement of benefit and especially when the monetary anchor is the dollar which denominates most the debt liabilities. Nevertheless, for comparative purposes, this dimension is used for all other monetary anchors investigated in this paper.

In another aspect, it may also be crucial to have members of a monetary union to be sufficiently symmetrical in external indebtedness as it reflects, amongst others, the degree of financial strength, dependence on foreign capital, and savings propensity of a country. This is so because in times of distress, funds might flow out from low-credit-rating to high-credit-rating countries under a monetary union arrangement. The recent debt crisis in EMU shows that this can be a threat to stability. Accordingly, results from cluster analysis would identify countries which are comparatively similar in this dimension.

For measurement, Bénassy-Quéré and Coupet (2005), and Tsangarides and Qureshi (2008) have represented external indebtedness as the ratio of debt-servicing requirements to total exports of goods and services. Constrained by data availability over countries, for the present work the ratio of total external debt stocks to total exports of goods and services⁴⁰ is used to measure this criterion. This measure has been used to measure debt intolerance in applied literature by, for instance, Reinhart, Rogoff, and Savastano (2003).

Also due to data constraints, the debt variable is not computed for the advanced countries with hard currencies and developed capital markets of Japan, Australia, New Zealand, and Canada, four of the economies included for the analysis.⁴¹ For these cases,

⁴⁰ According to IMF, this ratio can be used as a measure of sustainability because an increasing debt-to-exports ratio over time, for a given interest rate, implies that total debt is growing faster than the economy's basic source of external income, indicating that the country may have problems meeting its debt obligations in the future.

⁴¹ While consistent gross external debt data (aggregate of public and private debts) for developing or emerging economies are compiled by IMF/World Bank and hence can be retrieved easily, the data for

their values are replaced with mean over countries.

This should be compatible with current arrangement because advanced countries generally borrow in their own currencies and hence changes in the exchange rates might not to big a concern. Even if the Greek government was on the verge of debt defaults recently, Greece has been borrowing in its own currency so it is not exposed to currency risks unless it leaves the euro. Certainly, holders of claims in their currencies would attempt to prevent their assets to devalue from changes in exchange rates. The reluctance of China in the recent decade to revalue its yuan against the dollar is largely due to its huge net claims in dollars (see McKinnon & Schnabl, 2008).

Indeed, as Reinhart and Rogoff (2009) explained, advanced countries can usually tighten fiscal policy with sufficient speed and credibility that the pain comes mainly in slower growth (such as the case of Ireland) but unfortunately for emerging markets adjustment is often impossible without help from the outside. This is consistent with Tambakis (2007) who concluded that the net welfare impact of fear of floating is more appropriate for financially fragile developing countries with imperfectly credible monetary policy than for advanced economies.

4.2.8 Labor Market Flexibility

Flexibility in the labor market was first introduced as an OCA criterion by Mundell (1963). According to Mundell, a currency area works well when labor markets in the area's economic regions are flexible in geographical and industrial dimensions.

Flexibility can also manifest in other form. In the face of shocks that cannot be easily buffered, labor market flexibility, namely relatively fast adjustment of employment and wages is desirable in reducing persistence in unemployment that will otherwise be induced (see Ingram, 1962). In fact, this type of argument has dominated

Australia, New Zealand, Japan, and Canada from other sources are either inadequate or not the same with those of the rest of the countries reviewed.

much of the discussion of the policy adjustment appropriate for high unemployment in Europe in the 1980s and 1990s (Artis & Zhang, 2002).⁴²

Hence, the following is proposed: the higher the flexibility of labor, the greater the ability to recover from unemployment shocks, the higher the feasibility to join a fixed exchange regime. Hence, labor market flexibility can be looked upon as a measurement of cost for monetary unification.

In another aspect, Dellas and Tavlas (2003) discovered that authorities of an economy with flexible labor market are more likely to form a currency union with an equally flexible labor market rather than one with a rigid market because in times of shocks, the burden of adjustment would be asymmetrically borne by the economy with greater flexibility. Economies with relatively flexible wages would lose in terms of macroeconomic volatility and welfare when they join a monetary union with economies with relatively rigid wages. On the contrary, economies with substantial wage rigidities benefit from monetary union in which these benefits increase with the elasticity of substitution between domestic and foreign goods and with the degree of openness.

In view of this, the approach of identifying symmetrical clusters of countries for monetary union in this study is consistent with the finding of Dellas and Tavlas (2003).

Empirically, labor market flexibility has been used as an alternative for labor mobility by Artis and Zhang (2001, 2002). Artis and Zhang employed a ranking measure of the severity of employment protection legislation (EPL) from OECD (1994) as a measure of flexibility of labor markets. In the same vein, for this study an equivalent measure, a variable derived from the indexes by the World Bank's Doing Business Project⁴³ is used to measure labor market flexibility. The methodology used to construct these indexes is documented in Botero, Djankov, La Porta, Lopez-de-Silanes,

⁴² Artis and Zhang suggested reading Buti, Pench, and Sestito (1998) on a discussion of the possible significance of the variable in labor market adjustment.

⁴³ The Doing Business project by World Bank site can be accessed at <http://www.doingbusiness.org>. It is a project to rank the easiness of doing business across the countries in the world.

and Schleifer (2003). The original indexes indicating labor market rigidity are given in Table 4.6. These indexes extend from 0 to 100 where larger values indicate greater rigidity. To obtain the index for flexibility, the period average of the indexes is deducted from 100. Thus, the higher the flexibility index, the more flexible the labor market. Due to data constraints, the variable is only investigated for the post-crisis period.

Table 4.6 Indexes indicating labor market rigidity

	Index	Definition
1	Difficulty of hiring	Difficulty of hiring a new worker.
2	Rigidity of hours	Restrictions on expanding or contracting the number of working hours.
3	Difficulty of firing	Difficulty and expense of dismissing a redundant worker.
4	Nonwage labor cost	Nonwage worker remuneration in percent of salary.
5	Firing cost	Cost of a redundant worker, expressed in weeks of wages.

Source: Botero, Djankov, La Porta, Lopez-de-Silanes, and Schleifer (2003).

4.3 The Maastricht Treaty Criteria

In addition to the real convergence criteria suggested by OCA theory, the present study also performs the analysis using nominal convergence criteria specified by the Maastricht Treaty, a treaty which has laid down a set of conditions to be fulfilled by countries aspiring to participate in EMU. In Asian context, Maastricht criteria have been used by Ibrahim (2008) in his clustering exercise.

As described by Artis and Zhang (2002), Maastricht criteria can be regarded as concentrating on the single issue of ‘stability orientation’—recognized in inflation achievement, fiscal policy stance, and exchange rate behavior. Not surprisingly, the criteria have been criticized for ignoring the ‘real’ side of the economy and for concentrating attention on the value of the criteria proposed in a short assessment period. According to Artis and Zhang, the lack of attention to real side factors would be made good by OCA criteria.

The Maastricht criteria for nominal convergence specify that an aspiring country must have an inflation rate not more than 1.5 percentage points of the average inflation rate of the three members with the lowest inflation and nominal long-term interest rate

not more than 2 percentage points above the average rate of the same three member states. Furthermore, the Treaty requires that the exchange rate must have been stable within the ± 15 percent ERM bounds for at least two years. As regards fiscal policy, the budget deficit should be no higher than 3 percent of the GDP and public debt less than 60 percent of the GDP.

These preconditions serve several purposes (Bayoumi & Mauro, 2001). The requirement that inflation rates and interest rates converge in the run up to EMU was primarily aimed at avoiding large real exchange rate changes once nominal rates were locked irreversibly. The fiscal and debt criteria were designed to avoid negative spillovers from the fiscal imbalances of individual members to other members through pressures for an undue relaxation of monetary policy or even a bailout of a government.

Instead of assessing the qualification of potential countries based on the prescriptions above, Artis and Zhang (2002) and Boreiko (2003) have simply used the absolute values of those variables. The variables used by them are: (1) budget deficit as percent of GDP, (2) public debt (domestic and foreign) as percent of GDP, (3) CPI inflation rate, (4) volatility of nominal exchange rate (standard deviation of log difference of bilateral monthly nominal exchange rate), and (5) long-term interest rate.

A similar approach is adopted here with some modifications. Different from Artis and Zhang, and Boreiko, the reference countries used here are not cluster-analyzed together with the prospective member countries, similar to that for the OCA analysis. This is done so that findings from Maastricht criteria can be directly compared to those from OCA criteria. Similar approach was demonstrated by Ibrahim (2008).

Hence, inflation differential is used for the inflation criterion, measured by the absolute difference between the inflation rate in a candidate country and the inflation rate in the reference country, as in the OCA analysis. This will measure the degree of inflation convergence with the reference country. The same is done for the interest rate

criterion. The measurements for exchange rate volatility and budget deficit are exactly the same with those of Artis and Zhang, and Boreiko. For inflation, interest rate, and public deficit variables, period averages are used.

Due to data constraints over countries, lending rates for short- and medium-term financing extracted from IMF is used for the interest rate criterion instead of the long-term interest rate specified by Maastricht Treaty (similar adjustment was done by Ibrahim, 2008) and the public debt criterion whose data for Asian countries are extremely sporadic is omitted. After all, the public debt criterion was not strictly implemented as Italy, Belgium, and Spain which had public debt levels above the Treaty's requirement were allowed to enter the union. As pointed out by Artis and Zhang (2002), the criterion pertaining to the debt/GDP ratio was effectively set aside when the EU-11 countries and subsequently, Greece were nominated.

But then again, recently fear of public defaults has stricken Greece and other weaker euro members amidst the global financial crisis. For this and other reasons discussed in the previous section, the external indebtedness criterion consisting of both public and private debts as opposed to the Maastricht public debt criterion is included in the OCA analysis. Indeed, another reason for not including indebtedness as a Maastricht dimension is that consistent data over East Asian countries and eurozone founders, the benchmarks used in the preparedness assessment using Maastricht criteria (to be detailed later) are inadequate.

For main analysis, the exercises using Maastricht criteria are similar to those using OCA criteria. Details are discussed in Chapter 5 Methodology. Precise data definitions and sources of variables are provided in Appendix A.

4.4 Chapter Conclusion

This chapter has presented the potential monetary anchors and two sets of convergence criteria. In particular, the chapter has looked at the possibility of the US dollar, a currency basket (of dollar, yen, and euro), the Japanese yen, the euro, and the Chinese yuan as the anchor. It has also described the OCA and Maastricht dimensions used. The chapter has actually provided the basis for the first and the second research objective.

The next chapter, Chapter 5 Methodology details the methodology employed, including the technical aspects of the statistical tools used.