

# Romance of the Three Currencies

Andrew Sheng, Kwek Kian Teng and Cho Cho Wai

*The emergence of an integrated Asian bloc has often been seen as an enigmatic enclave due to its diverse institutional, economic and geo-political structures. In the aftermath of the Asian Financial crisis 1997/98, and the increasing trade integration in the region, Asian financial and capital market reforms have accelerated. Regional monetary cooperation has also advanced progressively. However, the formation of an economic or financial bloc for Asia cannot succeed without a stable exchange rate arrangement. This paper tries to show that the rise of an Asian bloc creates a natural currency en bloc, through global presence called the 'currency dominance' effect. This effect is computed based on a Nash and a cooperative equilibrium. The network effect of trade and financial links would generate cluster effects from external and internal pressures that work towards the formation of a regional currency, although the exact form of exchange rate regime would have to await political consensus. The formation of a third currency bloc will create counter-balance to the current dominance of the US dollar and the Euro. The paper explores how trade and financial clustering effects will generate a three-party game that have several possible directions. Like the epic story of Three Kingdoms who sought hegemony in Chinese history, the three currency bloc will contend with many possible outcomes.*

Keywords: *natural currency en bloc*, currency cooperation, currency dominance effect

## 1. Introduction

Many economists have differing views on the role of the world currency<sup>1</sup> (Greenspan (2001), Mundell (1998, 2005), Krugman (1980, 1984), McKinnon (1979, 2005), Swoboda (1968), Chrystal (1977)). Given the rise of East Asia as a high growth bloc, some view it not as a single currency, but as a currency configuration that is being comprised of three currency blocs, namely, US dollar,

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Andrew Sheng  
Adjunct Professor  
University of Malaya, Kuala Lumpur and Tsinghua University, Beijing  
Email: AS@andrewsheng.net

Kwek Kian Teng  
Faculty of Economics & Administration, University of Malaya, Kuala Lumpur  
Email: Ktkwek@um.edu.my

Cho Cho Wai  
Faculty of Economics & Administration, University of Malaya, Kuala Lumpur

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<sup>1</sup> World currency here denotes a single currency used as the numeraire for exchange medium to trade across multiple currencies. In President Roosevelt's message to Congress on "the Bretton Woods Money and Banking Proposals", he made explicit the fact that the Bretton Woods plan did not include a world currency.

Euro and the Yen. The recent depreciation of the US dollar and the corresponding strength of the Euro has suggested to some that the days of US dollar dominance may be over. However, researchers like Eichengreen and Flandreau (2008) maintains that the US dollar will continue its dominance as reserve currency of central banks, because the US houses the most developed and liquid capital markets in the world. McKinnon (2005) also used the international dollar standard trap argument, and suggested that the network effects support the common use of the US dollar as international money so that any change would be difficult and expensive. In contrast, Mundell (1998, 2005) supports a new world currency, as the advent of Euro since 1999 has changed the current currency power configurations. Chinn and Frankel (2008) also concluded that the Euro will surpass the US dollar as the leading international currency over the next 15 years. Currency configurations are never static but evolve along with the changing growth and power of nations.

In Asia, many studies suggest that the Yen is not a suitable anchor currency for Asia due to its large fluctuations (Mundell (2003), Park (2007), Sheng *et al* (2007)). Asia was naturally entrenched as a US dollar bloc before the 1997/98 financial crisis, as most of the East Asian currencies (except for Japan) were informally pegged to the US dollar. As argued by McKinnon (2004), the East Asian dollar pegs are entirely rational from the perspective of each country – both to facilitate hedging by merchants and banks against exchange rate risks, and to help central banks to anchor their domestic price levels<sup>2</sup>. Soft-pegging was necessary for the Asian Global Supply Chain which had the US as its main export customer and financial center for its savings, so that stability with a common currency facilitated trade and investments between both sides of the Pacific and within East Asia.

Soft-pegging against the US dollar enabled the East Asian countries to learn to trade and coordinate production and distribution chains (“fly-together” in unison) like the Flying Geese Model (Sheng *et al*, 2007)<sup>3</sup>. In the aftermath of the Asian Financial Crisis 1997/98, the IMF published a long study on “exit strategies” setting forth conditions for abandoning a pegged exchange rate system (stating a conclusion that most emerging countries would benefit from greater exchange rate flexibility), which determined the exchange rate arrangements for East Asia of today. But more flexible exchange rates still seemed to suggest that after the shock of 1997/98, East Asian currencies still broadly followed each other in a discernible pattern. Figure 1 shows the time series pattern of the bilateral exchange rate index (1990 = 100) against the US dollar for the nine East Asian currencies. Here onwards, “Asian currency” is treated as consisting of nine individual currencies. Before the crisis, all the nine currencies had similar trends, and they all experienced low fluctuations against the US dollar. After the crisis,

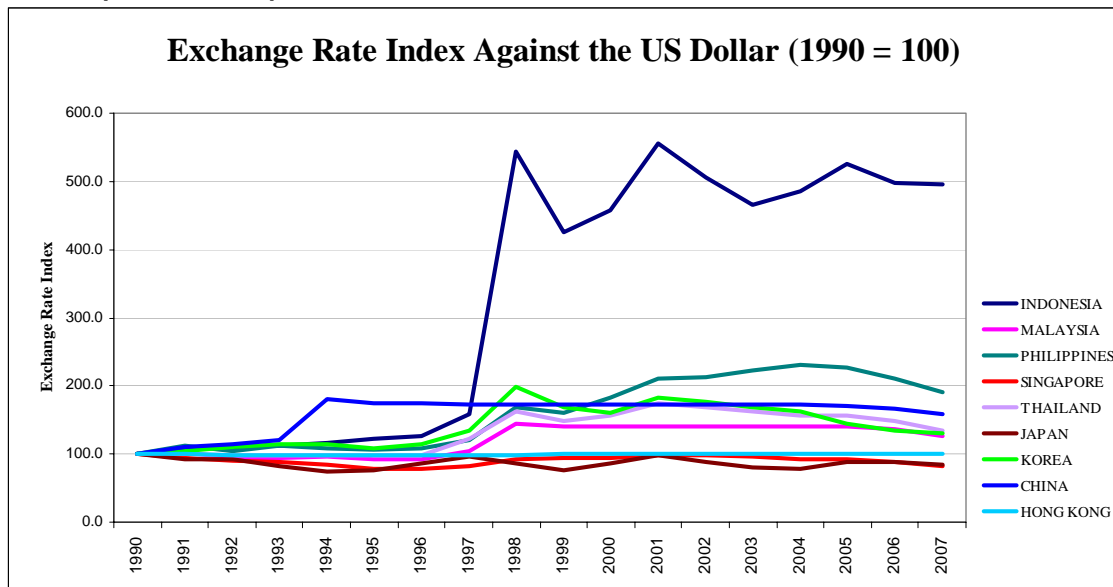
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<sup>2</sup> Lim (2006) examined the Bergsten-Mundell-Eichengreen views that stresses large economic size and diversification effects as supportive of a larger Euro role, while McKinnon-Kenen-Cooper view that stresses on network externalities, path dependence, strong dollar financial markets, and the nominal anchor role as supportive of continuing dollar dominance.

<sup>3</sup> Sheng *et al* (2007) discussed the “uplift” provided by the lead goose in giving the currency stability for the Asian region.

though the Asian currencies experienced larger fluctuations, they still maintained broadly similar trends in moving in the same direction.

**Figure 1: Regional Asian Bilateral Exchange Rate Index Against the USD (1990 = 100)**



Source: IFS Database.

In this paper, we do not examine which particular currency will emerge as the international currency or the trading currency. Asia essentially invests its official reserves largely in US dollar and Euro assets, much more than holding her own regional currencies. Given the close ties in terms of the Asian Global Supply Chain, we would like to ask “How can ‘Asian currencies’<sup>4</sup> form a bloc, assuming that the US dollar and the Euro relationship is status quo?” ‘Asian currencies’ can only assume greater usage and status, if there is a stable exchange rate arrangement amongst the region. Stable exchange rates provide a trading environment with low risks in holding these currencies. She could be used more efficiently and widely when network-effects set-in through linking of more channels of transactions among Asian markets (thus by-passing any one conversion rate to a single foreign currency). This would definitely reduce transaction costs, because the volume of transactions among users of Asian currencies would likely be larger.

Section 2 of this paper examines the rise of an Asian en bloc by comparing with the US and EU<sup>5</sup> markets. Section 3 looks at the network effect of trade and financial links that would generate clusters effect from internal and external pressures that work towards the formation of a regional currency. Section 4 simulates currency dominance by a three-party game based on the Nash and a

<sup>4</sup> ‘Asian Currencies’ is referred to as singular pronoun, though it consists of regional currencies which include nine other Asian currencies - Rupiah, Ringgit Malaysia, Peso, Singapore dollar, Baht, Yuan, HK dollar, Won, and Yen.

<sup>5</sup> Includes Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden, United Kingdom.

cooperative equilibrium. We computed the welfare gain for Asia if she were to switch from a loose-form of cooperative exchange rate arrangement (no cluster effect) to a strict-form cooperation (cluster effect) for its exchange rate arrangement. Section 5 gives some concluding thoughts.

## 2. The Rise of an Asian En Bloc

### 2.1 From Crisis to Recovery in the Real Economy

The emergence of an integrated Asian bloc has often been seen as an enigmatic enclave due to its diverse institutional, economic and geo-political structures. In the aftermath of the Asian Financial Crisis 1997/98, Asian increasing trade integration in the region (Table 2.1) has spurred the economic growth for the region. In 2006, Asian's share of world trade (23.46%) is already double the size of US (12.4%), but is still relatively smaller than the EU (39.9%), due to the huge intra-EU trade. The high degree of trade openness in Asia has also allowed increased volume of trade (Figure 2.1, Panel 2), thus overtaking the US market.

**Table 2.1 Regions' Trade as a Percentage (%) of World Trade**

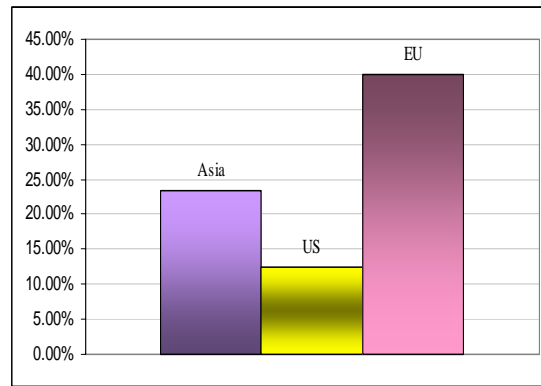
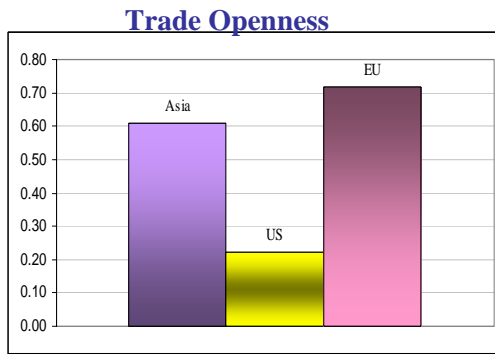
	1985	1990	1995	2000	2005	2006
Indonesia	0.71%	0.68%	0.85%	0.75%	0.69%	0.68%
Malaysia	0.69%	0.84%	1.49%	1.41%	0.00%	1.22%
Philippines	0.25%	0.00%	0.45%	0.56%	0.43%	0.42%
Singapore	1.21%	1.63%	2.39%	2.13%	2.07%	2.14%
Thailand	0.40%	0.81%	1.25%	1.02%	0.00%	1.08%
Japan	7.48%	7.49%	7.67%	6.73%	5.36%	5.13%
China ML	1.61%	0.00%	2.77%	3.72%	6.86%	7.37%
China HK	1.47%	0.00%	3.64%	3.26%	2.86%	2.76%
Korea	1.51%	1.94%	2.56%	2.61%	2.63%	2.66%
Asia	15.34%	13.38%	23.08%	22.19%	20.90%	23.46%
US	14.05%	13.06%	13.34%	15.97%	12.72%	12.37%
EU	48.27%	45.53%	40.55%	35.22%	39.84%	39.91%

Source: COMTRADE Database.

**Figure 2.1 Trade Openness and Regional Trade as a Percentage (%) of World**

**Trade for Asia, US and EU, 2006**

**Regional Trade (%) of World Trade**



In particular, after the Asian Crisis 1997/98, East Asia needed to reconstruct herself as she came under tremendous internal and external pressure. Asia had also understood the dangers of balance sheet weaknesses, particularly the “double mismatch” problem that plagued the Asian crisis economies. She had to restore confidence in the banking system by dealing firmly with non-performing bank loans and strong measures to restructure banking institutions through recapitalization, privatization and mergers. Regulatory and supervisory policies and practices have been addressed to meet international norms and for improvements in transparency and governance. Conditions for regional integration has improved since the Asian economies have emerged beyond "original sin" (Eichengreen and Hausman, 1999), *i.e.* that most countries cannot borrow internationally in their own currencies. Asian has learnt to open-up her financial system more, and also built up considerable foreign exchange reserves. Overall, regional monetary cooperation has also advanced progressively. Today these East Asian economies are enjoying robust real growth, large current account surpluses and rapid accumulation of external reserves. These impressive macroeconomic fundamentals include real Gross Domestic Product (GDP) growth rates in ASEAN-5 countries exceeding those of the US, Europe, Japan and world average growth in recent years. On average, the real GDP growth rates of ASEAN-5 is at 5.5%, faster than those of the US, Europe and the world in 2007 (Table 2.2).

**Table 2.2 Real GDP Growth Rates (Annual Change in %)**

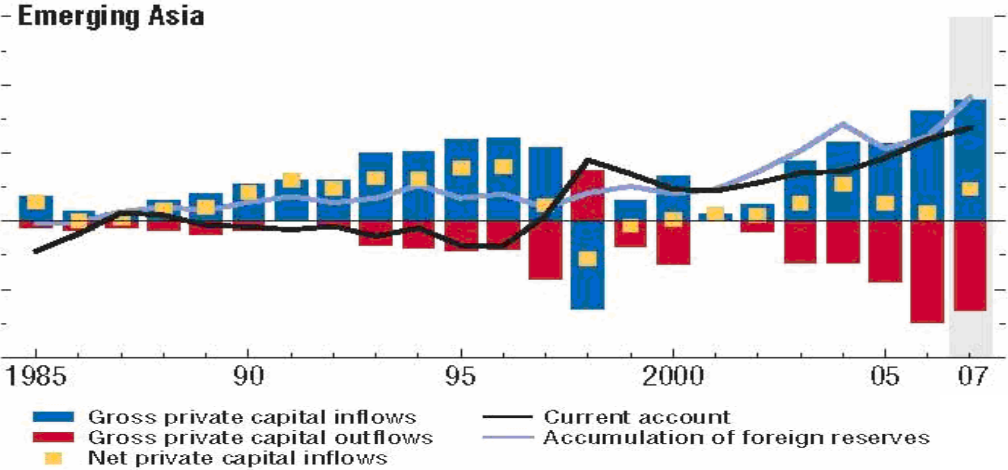
	2005	2006	Estimate 2007	Projected 2008
<b>World Output</b>	<b>4.8</b>	<b>5.4</b>	<b>5.2</b>	<b>4.8</b>
United States	3.1	2.9	1.9	1.9
Euro Area	1.5	2.8	2.5	2.1
Japan	1.9	2.2	2.0	1.7
China	10.4	11.1	11.5	10.0
South Korea	4.2	5.0	4.8	4.6
India	9.0	9.7	8.9	8.4
Africa	5.6	5.6	5.7	6.5
<b>ASEAN-5</b>				
Indonesia	5.7	5.5	6.2	6.1
Malaysia	5.2	5.9	5.8	5.6
Philippines	4.9	5.4	4.0	4.5
Singapore	6.6	7.9	7.5	5.8

Thailand	4.5	5.0	4.0	4.5
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Source: IMF, World Economic Outlook.

In emerging Asia (which includes China, Hong Kong, India, Indonesia, Korea, Malaysia, Pakistan, the Philippines, Singapore, Thailand and Vietnam), net private inflows have rebounded from their sharp reversals during the crisis (Figure 2.1). Large and growing current account surpluses and capital account developments have led to massive accumulation of foreign reserves.

**Figure 2.1 Current Account Balances, Private Capital Inflows, and Reserves Accumulation (% of regional GDP)**



Source: IMF, World Economic Outlook, October 2007.

Behind these robust growth numbers, is the fearfully-watched and awesome rise of the Chinese and Indian financial markets - that would have powerful resounding impact on the Asian markets. Chinese equity market rose to fifth largest in world by end of 2007, US\$4.5 trillion in market capitalization, with 138.9 million accounts (market capitalization of only US\$396 billion in end of 2005). Moreover, the Chinese banking assets of US\$7.2 trillion at end of 2007 (231% of GDP), and GDP (US\$3.1 trillion) overtook Germany in size (third largest in world). As for the Indian equity market, it is 10th largest in world in market capitalization, totalling US\$1.8 trillion at end of 2007 or 180% of GDP. The Indian bank assets of US\$1 trillion consist of 100% of GDP in March 2007. The China's foreign exchange reserves also topped US\$1.68 trillion at end of March 2008, while India's foreign exchange reserves were US\$303 billion. Combined, both stock markets are becoming highly liquid, with US\$6.4 trillion turnover in Chinese markets, and US\$1.14 trillion in Indian markets in 2007.

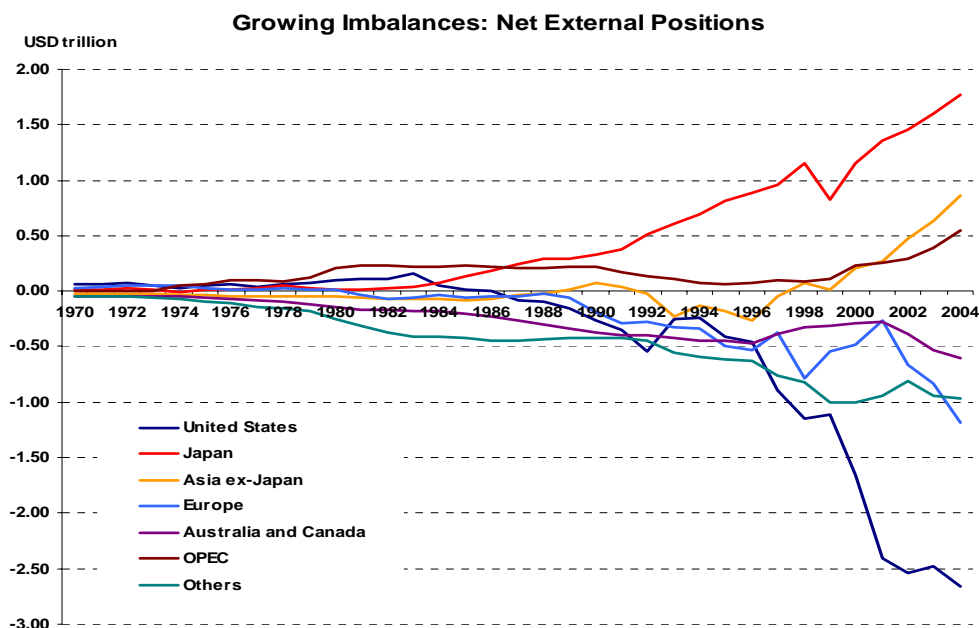
The Asia financial and capital markets have also created two distinct phenomena:

- (i) High foreign exchange reserves, which Lane and Milesi-Ferritti (2006, 2007) has pointed out that "Asia has become a net exporter of capital" creating the other side of the global imbalance; and

- (ii) Savings have flowed back into Asia, through what Dooley, Folkerts-Landau and Garber (2003) calls the “Total Equity Return Swap” effect.

Through their balance sheet analysis, Lane and Milesi-Ferritti (2006) has pointed out that East Asia is concurrently both an exporter of manufactures and capital (Figure 2.2). At the end of 2004, Asia had a net foreign asset position of 30% of GDP (US\$2.7 trillion), whereas Europe had a net liability of 9.3% of GDP (US\$1.2 trillion), and NAFTA had a much larger net liability of 22.9% of GDP (US\$3.1 trillion). The global imbalance position appears to be widening rather than narrowing.

**Figure 2.2**



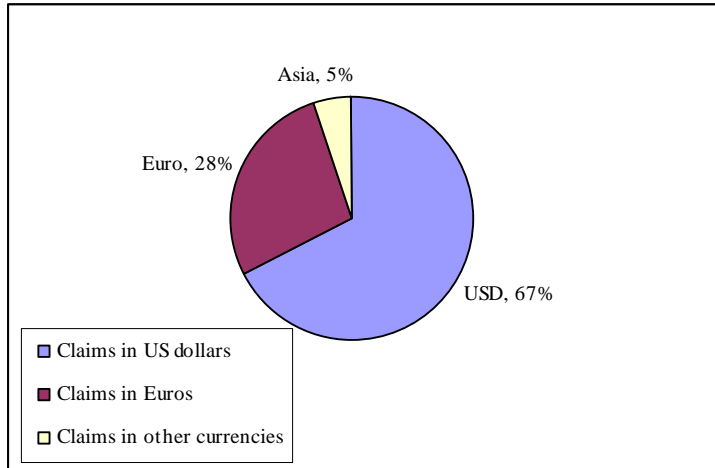
**Source:** World Bank Financial Structure Dataset, February 2006

## 2.2 Low Network Externalities Among Asian Currencies

Despite these significant robust growth in the real and financial sectors, most observers would agree that Asia is not as attractive as the US and Europe in terms of a catchment area for captive savings. Sadly, the Asian capital markets are relatively shallow and contain significant barriers due to a host of reasons, many of which are entrenched. Moreover, there is no effective currency/monetary coordination or even cooperation among them. This has indirectly caused low network externalities among the Asian regional currencies. ‘Network externalities’ is a phenomenon closely associated with international currencies, whereby a currency becomes more valuable as more users and providers of capital use and hold it. Figure 2.3 shows the low network externalities amongst the Asian currencies based on the Currency Composition of Official Foreign Exchange Reserves (COFER) data of IMF. In 2007, an approximation of the Asian’s share as a percentage of currency composition of

the official foreign exchange reserves constitutes the smallest share of the COFER is 5% (includes Japan), as compared to the US dollar's largest share of 67%, followed by Euro of 28%.

**Figure 2.3 Currency Composition of Official Foreign Exchange Reserves (COFER), 2007**



Source: COFER data are currently reported on a voluntary basis by 115 member countries of the IMF, comprising all 24 industrial countries and 91 out of the 160 developing countries.

### 2.3 Looking Ten Years Beyond

This section looks at Asia beyond 2006 by projecting, allocating and simulating the size of Asia's GDP, and total financial assets. While the banking systems of Asia are stronger than they were a decade ago, the continuing dependence on banks to finance investment and growth will limit the extent to which the emerging Asian economies can fund domestic investment. Hence there is urgency for these Asian economies as a region to begin to think and act cooperatively and regionally in order to compete in the global capital markets, whereby then Asia will become at least on par or a dominant savings region. The projections in the following are computed based on Table 2.3 obtained from the 2008 Global Financial Stability Report of IMF.

**Table 2.3 Selected Indicators on the Size of the Capital Markets, 2006  
(in billions of US dollars)**

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	GDP	Total Reserve Minus Gold	Stock Market Capitalization	Debt Securities			Bank Assets	Bonds, Equities and Bank Assets	Bonds, Equities, and Bank Assets
				Public	Private	Total			
World	48434.4	5091.5	50826.6	25780.7	43420.2	69200.9	74435.2	194462.7	401.5
EU	13658.0	525.7	13068.8	7693.4	15498.9	23192.3	37736.3	73983.7	<b>541.7</b>
Euro	10586.1	157.5	8419.1	6580.6	12180.4	18761.1	26719.2	54129.5	511.3
North America	14470.0	89.8	21269.7	6941.3	21449.6	28390.8	12236.0	61896.6	427.8
Canada	1275.3	35.0	1700.7	706.9	633.8	1340.7	2033.1	5074.6	397.9
United States	13194.7	54.9	19569.0	6234.4	20815.7	27050.1	10202.9	56822.0	<b>430.6</b>
Japan	4377.1	879.7	4795.8	6750.6	1973.1	8723.7	6590.0	20109.5	459.4
Austria	323.8	7.0	192.8	189.4	335.0	524.4	455.6	1172.8	362.2
Belgium	398.1	8.8	335.1	421.1	406.4	827.4	1878.0	3040.6	763.8
Denmark	276.3	29.7	239.5	95.9	484.4	580.3	804.9	1624.6	588.0
Finland	209.8	6.5	309.5	122.1	102.5	224.5	243.8	777.7	370.7
France	2252.1	42.7	2312.8	1241.1	2254.9	3496.0	8035.0	13843.9	614.7
Germany	2915.9	41.7	1637.6	1479.1	3357.5	4836.6	4643.8	11118.1	381.3
Greece	268.7	0.6	208.3	364.3	97.5	461.8	359.8	1029.8	383.3
Ireland	219.4	0.7	163.3	41.8	368.2	410.0	1357.2	1930.5	879.9
Italy	1858.3	25.7	1026.5	1759.0	1732.0	3491.0	3443.8	7961.3	428.4
Luxembourg	42.5	0.2	79.5	0.0	96.5	96.5	857.6	1033.6	2431.5
Netherlands	670.9	10.8	725.1	286.1	1421.5	1707.6	3128.0	5560.7	828.8
Portugal	194.8	2.1	105.8	155.9	201.1	357.1	216.8	679.6	348.9
Spain	1231.7	10.8	1322.9	520.8	1793.8	2314.6	2345.5	5981.0	485.6
Sweden	393.6	24.8	615.9	175.5	381.2	556.7	559.4	1731.9	440.0
United Kingdom	2402.0	40.7	3794.3	841.5	2452.8	3294.3	9409.2	16497.8	686.8
Emerging market c	14262.9	3657.5	11692.4	3874.4	2198.3	6072.7	13219.4	30984.4	217.2
Asia	6271.4	2271.6	6857.0	2013.5	1494.6	3508.0	8844.9	19210.0	<b>306.3</b>
Latin America	2953.2	310.7	1454.2	1100.2	474.8	1575.0	1550.7	4579.9	155.1
Middle East	1327.8	247.1	657.4	37.9	61.0	98.9	998.4	1754.8	132.2
Africa	950.6	221.9	850.9	83.3	57.4	140.7	611.6	1603.2	168.7
Europe	2759.0	606.2	1872.8	639.5	110.5	750.0	1213.7	3836.6	139.1

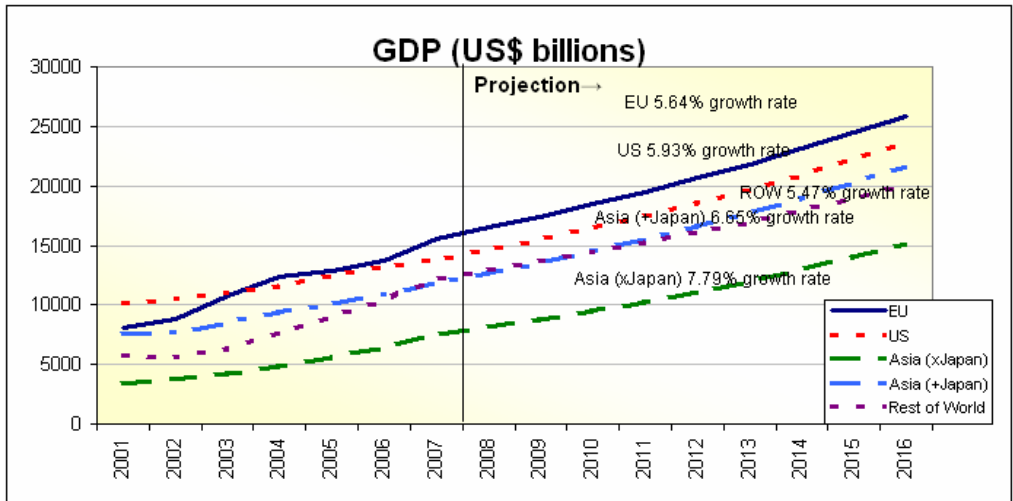
Source: IMF, Global Financial Stability Report, Table 3.

Figures 2.4 – 2.8 give the simulation projection for the rise of an Asian en bloc in 5 steps.

### Step 1: Projection of GDP from 2006 - 2016

Figure 2.4 gives a ten year Asian GDP projection from 2006 - 2016, based on the actual 1980-2006 real growth rates (obtained from the IFS database) for US, EU, Asia excluding Japan, Asia including Japan, and rest of the world (ROW). The projection shows that Asia's (excluding Japan) GDP would grow at the fastest at 7.79% per annum.

**Figure 2.4 Scenario GDP Projection to 2016**

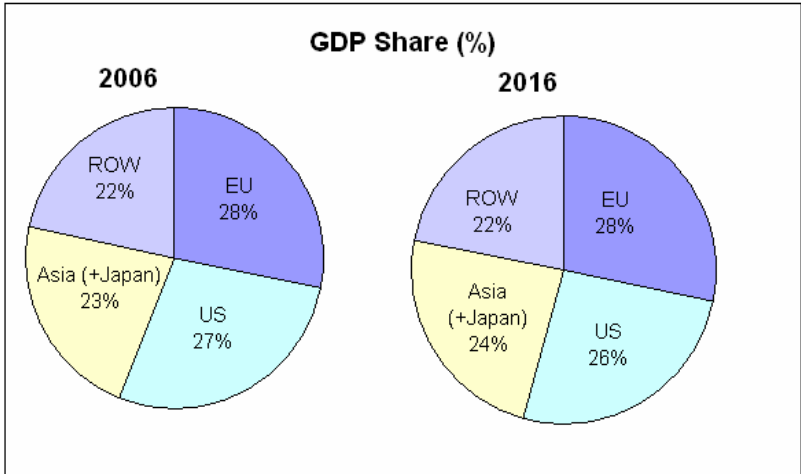


Source: IFS, using 1980-2006 growth rates.  
 Note: ROW is rest of the world.

**Step 2: Computation for Share of Actual (2006) and Projected (2016) GDP**

Figure 2.5 gives the pie charts of the actual 2006 and projected share 2016 of the GDP for Asia, US and EU. The projection shows that by 2016, EU would have the largest share of the world's GDP (28%), followed by US (26%), and Asia (24%).

**Figure 2.5 Projected Share of GDP (%)**  
**By 2016, EU > US > Asia (+Japan) > ROW**

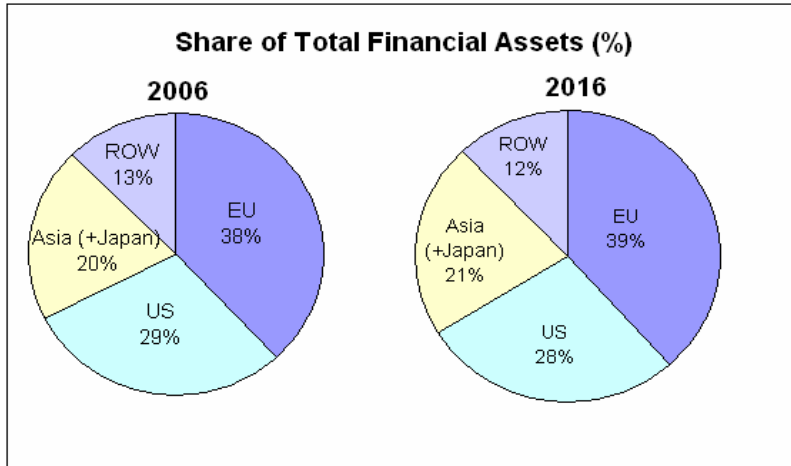


Source: Global Financial Stability Report, 2008.

**Step 3: Computation of Actual (2006) and Projected (2016) Share of Total Financial Assets**

Figure 2.6 gives the pie charts for the actual and projected share of total financial assets (assuming that the Asian's assets/GDP ratio grew at the existing 306.3% of GDP – see Table 2.3). The projection in 2016 still shows that EU would have the largest share of world's total financial assets (39%).

**Figure 2.6 By 2016, EU > US > Asia (+Japan) > ROW  
(Ratio of Asian's Asset/GDP is 306.3%)**



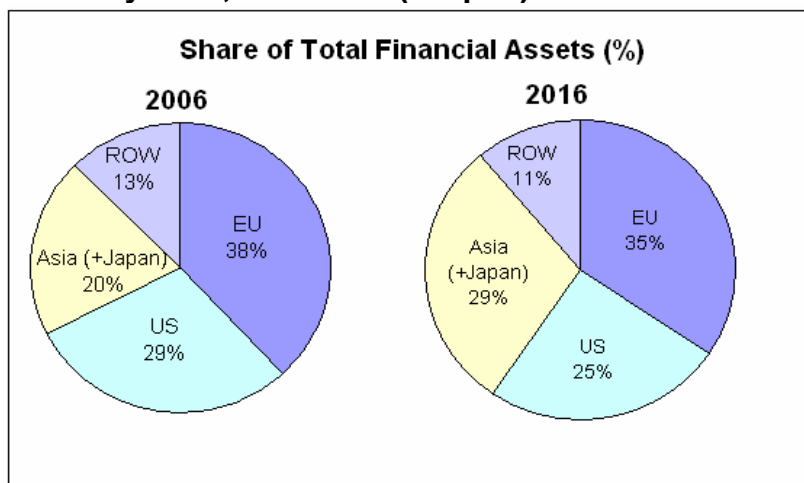
Source: Global Financial Stability Report, 2008.

**Step 4: Computation of Actual (2006) and Projected (2016) Share of Total Financial Assets (assuming enlarged assets base in Asia)**

In Figure 2.7, we simulated a financial deepening effect by assuming that the share of Asia's total financial assets would grow from 306.3% to 550% of GDP. The projected asset share in 2016 still shows that Asia lags behind EU's share. However, Asia has overtaken US.

**Figure 2.7 Even with Financial Deepening Effect (Ratio of Asian's Asset/GDP is 550%)**

**By 2016, EU > Asia (+Japan) > US > ROW**

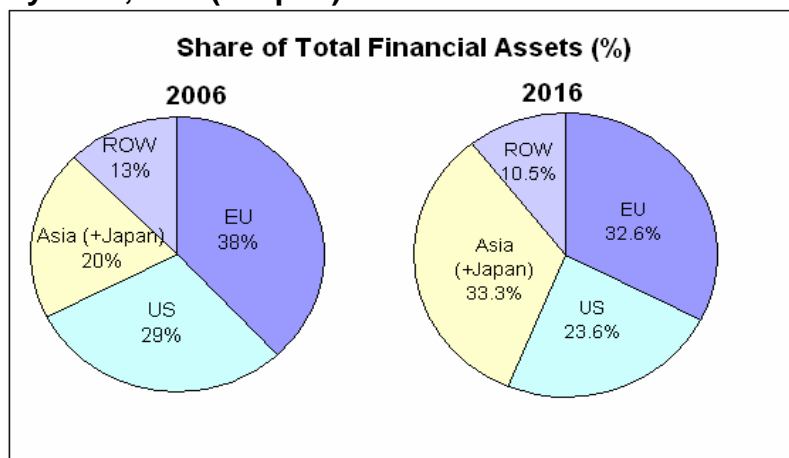


Source: Global Financial Stability Report, 2008.

## Step 5: Computation of Actual (2006) and Projected (2016) Share of Total Financial Assets (assuming exchange rates appreciation of 20% in Asia)

Lastly, in Figure 2.8, when we projected the Asia's assets size by adding an exchange rate effect on top of the financial deepening effect (increasing the share of total financial assets of Asia from 550% to 600% of GDP, by assuming that the Asian currencies would appreciate by 20%), the results finally suggest that Asia would have overtaken EU and US assets size by 2016.

**Figure 2.8 With Combined Financial Deepening and Exchange Rate Effect  
(Ratio of Asian's Asset/GDP is 600%)  
By 2016, Asia(+Japan) > EU > US > ROW**



Source: Global Financial Stability Report, 2008.

The conclusions for these simulations and projections are clear. Asia will be big if there is both a financial deepening and exchange rate effects on the share of the asset size as her GDP grows on an average rate of 7%. This would also imply that if GDP of Asia is growing faster, then both financial deepening and exchange rate effects will come into play to augment the robust growths in the real and financial markets. This would further imply that if Asia numerically has the largest financial system by 2016, then she must play her role as a sound and efficient intermediary of global and regional savings and investments. To do so would require both financial innovations and sound banks and risk management systems, as well as high financial supervision and coordinated monetary and fiscal policies. All these processes need to be built in modularly. This is because markets evolve over time and they become adaptive systems when they learn from past history in order to become resilient, rather than fragile system that would break at the first shock or stress.

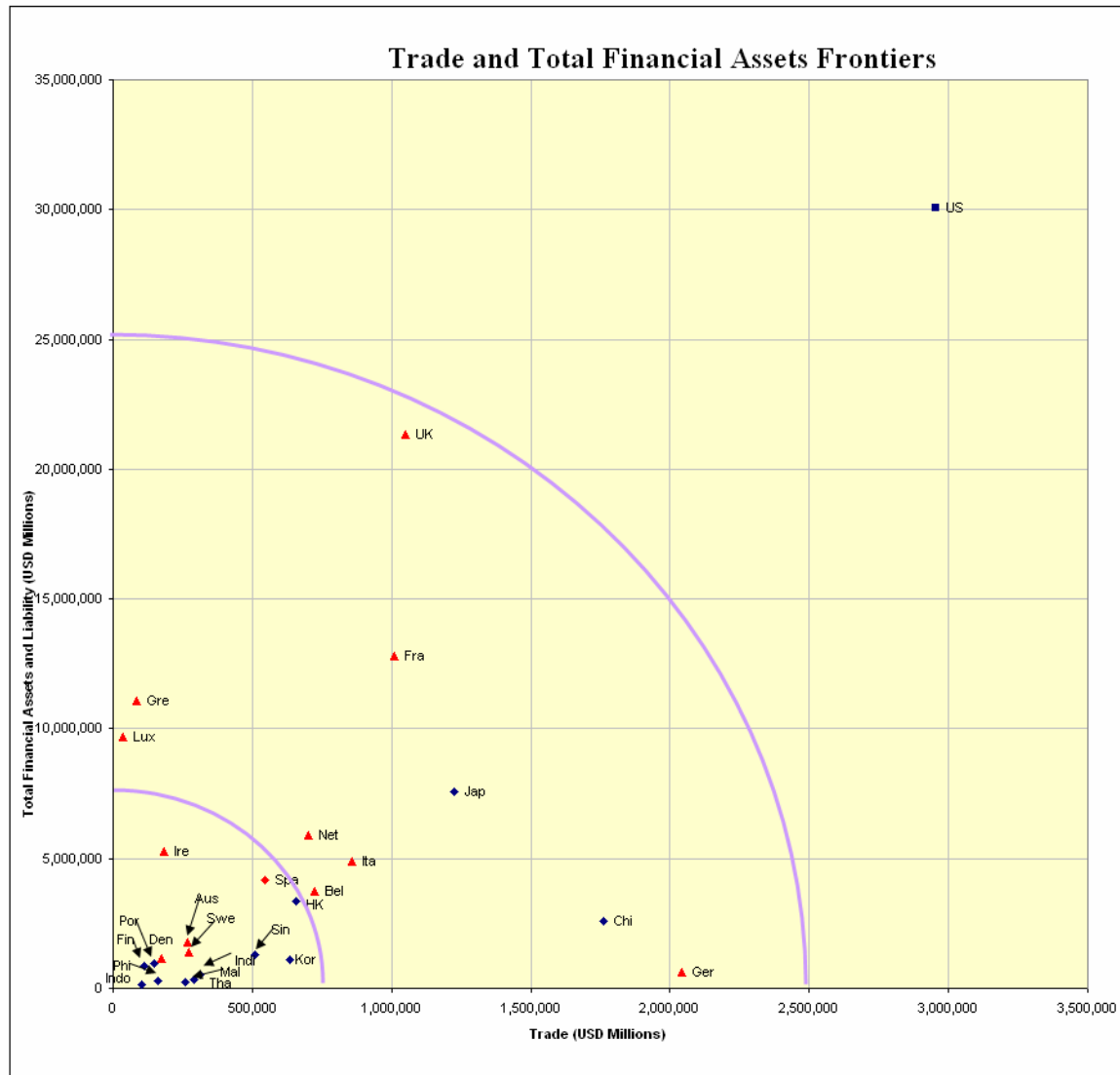
### 3. Drivers of Regional Currency Formation: The Cluster Effect

Markets are a network of nodes. In this section, we try to explore some theories to cluster effect in order to understand how and why trade and financial markets are networks of nodes. The sum effect, a network of nodes can then generate cluster effect. The cluster effect is the natural process when investors or traders simply drift to markets that offer more efficiency, transparency, and property

rights. This is because these markets that create value, have low costs and high access, and are transparent and fair. In reality, the global markets have become two-tiered in this age of third wave (information era) – with highly technical professional market and very naive retail market. In the Asian markets, we are already witnessing this cluster effect. The sophisticated financial markets in Japan, Korea, Singapore, Hong Kong, Taiwan vs the EMCs such as Cambodia, Laos, Myanmar and Vietnam (CLMV). The latter have high transactions costs across many markets, as brokerage and stamp duties still hinder liquidity, there are barriers to foreign entry and regulatory conservatism towards financial innovation, and conflict between national interests (protectionism) vs. integration (openness).

We now apply Network Theory and Nobel Laureate Douglass North's Institutional Framework to think about how the process of network effect on trade and financial links can generate cluster effect. Possibly, this cluster effect could become important sequential driver (when political will fails) for forging ahead the formation of a regional currency in Asia. Figure 3.1 maps the relationship between total trade and total financial assets of nine Asian, US and EU markets in a scatter plot, we call the Network Frontier. We arbitrarily divide (purple curve) the network frontier by lowest-tier, middle-tier, and top-tier.

**Figure 3.1 Network Frontier for Trade and Financial Markets, 2006**



Sources: Trade data are from COMTRADE, and total financial assets (total assets and liabilities) are from IFS.

Note: The purple curves are arbitrary lines to segregate the network frontier into three tiers, that is lowest, middle and top.

The majority of these Asian markets in the Asian bloc are clustered around the lowest-tier of the network frontier, except for China, and Japan, located nearer to the second tier of the network frontier. The majority of the markets in the EU bloc are located in the middle-tier of the frontier. US market is located at the top tier of the frontier, reflecting its superiority in trade and finance. Interesting to note is the UK market. The locations of the US and UK markets do reflect the “currency power” of these two countries in the pre-Bretton Woods and post-Bretton Woods era. The US dollar was the hegemonic currency after World War II, after replacing the Sterling as the international currency (Eichengreen (2005)).

Markets are indeed networks, and across which market players trade property rights, such as equity, currency and the like. If this is true, then networks conform to Metcalf’s Law, which states that the “value” or “power” of a network

increases in proportion to the square of the number of nodes on the network. This phenomenon explains why economies or corporations try to expand as fast as possible, in order to maximize the value of their network and gain economies of scale. Growth can be achieved through acquisition or mergers, so that integration is only part of growth strategy. (Douglass North conceptualizes markets as **network institutions** that are path dependent, driven by ever changing and interactive behaviour between market participants acting as hubs or nodes. This switching of allegiance to different networks clearly means that markets as networks are dynamic and always in transition or motion).

Networks are linkages of nodes. Physicists, such as Barabasi, were first to point out that nodes do not link at random – there is a “preferential attachment coefficient”. In other words, there are reasons why nodes link with other nodes to form hubs, because of the efficiency of certain hubs. Faster connection through a hub means that transaction costs are reduced to the benefit of all users. Because networks grow through linkages, the architecture of network has what Barabasi call a “scale-free, self-organizing behaviour”. It is also path driven and path dependent; because the way a network evolves through alliances, acquisitions or failure reflect its history and experience. Finally, networks also exhibit “winner-take-all” power laws where highly linked hubs dominate in number of links, whereas small nodes have few links. Also the scale-free growth or decline of networks through expansion, coalition or collapse is a more dynamic depiction of competition and cooperation behaviour in these trade and financial markets.

Thus, for the Asian markets to be fundamentally shaped by the competition between hubs for links with nodes, reflecting Metcalf’s Law, in order to “scale” to the upper network frontier, every hub (market) needs to cooperate with a dominant hub. So for a regional currency to be formed, there need to be “network altruism” at work. As Barabasi pointed out, nodes do not join hubs at random (that is currency cooperation is not easy) – they do so because the hub provides superior benefits relative to costs (relative to other hubs). The fundamental truism of markets is huge information asymmetry, not only in terms of flow costs of search, but also the stock of knowledge, which covers individual experience and institutional experience, the latter being the collective wisdom gained through history and bitter experience of wars, disasters and crises. From the demand side, nodes do not link at random, because they search to link with the hub, which offers the best benefits with the lowest risks.

On the other side of transactional exchange, the supply side of hubs implies that they must be able to provide “network altruism” due to the cluster effect. They offer benefits to the user nodes through economies of scale, superior technology, standardization and lower transaction costs. The more a hub can offer superior benefits in order to induce “preferential attachment”, the more links and the more value generation through Metcalf’s Law. (For example, this phenomenon has become commonly understood because websites such as Hotmail, Yahoo and Google each compete intensely through giving superior or free service in order to attract users). Of course, this is not so easy in terms of currency arrangements.

To sum up this overview of Network Theory, we conclude that before regional currency can be formed, there must be a process to find out what benefits, costs, and areas of commonality can be shared, including products, platforms, rules, who to enforce and what checks and benefits are there for everyone. With the network effect of trade and financial links, these effects could further generate cluster effect from external and internal pressures that work towards the formation of a regional currency (although the exact form of exchange rate regime would have to await political consensus). The formation of a third currency bloc will create counter-balance to the current dominance of the US dollar and the Euro. The following section explores how trade and financial networks can generate a three-party game that could lead to several possible directions for the currency arrangements in Asia.

#### **4. Currency Dominance: A Three-Party Game**

The formation of an economic or financial bloc for Asia cannot succeed without a stable exchange rate arrangement. This section tries to show that the rise of an Asian bloc creates a *natural currency en bloc*, through cluster effect called the 'currency dominance' effect. This cluster effect is computed based on a Nash and a cooperative equilibrium.

##### **4.1 Exchange Rate Clustering to Create Asian En Bloc**

Let us start off a party game within the Asian bloc. That is, suppose that Asian central bankers have politically decided to 'cluster' and to cooperate together (through binding commitments) to create a stable exchange rate arrangement, not necessary through one common currency, but through coordination of the exchange rate movements such that they move relatively in unison. Suppose a cluster of Asian currencies should appreciate by 20% in order to overtake the EU and the US markets, and to create a new currency dominance. The question is then "Who will gain more?" The US dollar or the Euro, as Asian gains more in the game. Game theory is applied here to show how an Asian central bank's decision can affect its neighbours'. In a party game, the best strategy is the dominant strategy, where every player agrees in unison, that is, to appreciate one's currency together. So, in the Nash equilibrium, both countries that appreciate their exchange rates together would gain most (20%), even though both countries would also gain (10%) if neither appreciates its rates.

##### **Prisoners' Dilemma Example**

Assume: Appreciation of country's currency is the dominant strategy for both players.

Nash Equilibrium: Both countries appreciate together.

**Figure 4.1 A Payoff Matrix**

		Country B's Decision	
		→ Appreciate	→ Don't Appreciate
Country A's Decision	→ Appreciate	Country A gains 20% Country B gains 20%	Country A gains 1% Country B gains 25%
	→ Don't Appreciate	Country A gains 25% Country B gains 1%	Country A gains 21% Country B gains 21%

- Outcome: (i) Country A and B both appreciate, each will gain by 20%.  
(ii) Both would have been gained 10% if both do not appreciate.  
(iii) If Country A does not appreciate, but Country B appreciates, A would gain 5%, and B would gain less at 1%.  
(iv) If Country A appreciates, but Country B does not appreciate, A would gain 1%, and B would gain even more at 5%.

Thus, this game has a unique pure-strategy of Nash equilibrium when both countries chose to appreciate together. Any other choice of cooperative strategies can be improved if one of the countries lowers her gain compared to the other country.

Let us assume that there are two central banks in Asia ( $i = A, A^*$ , where  $A$  is "an Asian central bank" and  $A^*$  is "other Asian central banks") who will minimize a quadratic loss function by reducing variability in the loss function:

$$\min_{e_{i/USD}} L_i = \frac{1}{2}(g_i^2 + \beta f_i^2), \quad i = A, A^*$$

This function is derived from the total trade (which is a function of  $g$  - goods) and the total financial assets (which is a function of  $f$ ) (Bénassy-Quéré, 1999).  $g_i$  is the deviation of total trade from the target level (which we assume is the underlying trend in total trade), and  $f_i$  is the deviation of total financial assets from the underlying trend in total financial assets.  $\beta$  is the assigned value given to the relative sensitivity of the total trade and total financial assets to the effective exchange rate variations. If  $\beta = 0.5$ , this implies that this function can be interpreted as the central bank discounting the future variability in the trade and financial asset gaps by a factor 0.5. The parameter  $\beta$  relates the central bank's preference for financial assets stability to its preference for trade stability. This proportion also suggests a bias on cluster effect between the trade and financial

weights. Each central bank is assumed to control its bilateral exchange rate against the USD,  $e_{j/USD}$ .

Both  $g_j$  and  $f_j$  are real effective exchange rates based on trade weights and total financial assets weights.  $a_j$  represents the trade weight of country  $j$  as a trading partner ( $j = \text{USD, Euro, } A^*$ ), and  $b_j$  is the financial weight of currency  $j$  for total financial assets.

The real effective exchange rates (reer)  $g_A$  and  $f_A$  can be written in logarithms as:

$$\begin{aligned} g_A &= a_{USD} e_{A/USD} + a_{Euro} e_{A/Euro} + (1 - a_{USD} - a_{Euro}) e_{A/A^*} \\ f_A &= b_{USD} e_{A/USD} + b_{Euro} e_{A/Euro} + (1 - b_{USD} - b_{Euro}) e_{A/A^*} \end{aligned} \quad (4.1)$$

Equation (4.1) can be rearranged as:

$$\begin{aligned} g_A &= e_{A/USD} - a_{Euro} e_{Euro/USD} - (1 - a_{USD} - a_{Euro}) e_{A^*/USD} \\ f_A &= e_{A/USD} - b_{Euro} e_{Euro/USD} - (1 - b_{USD} - b_{Euro}) e_{A^*/USD} \end{aligned} \quad (4.2)$$

Similar relations prevail for other eight Asian currencies. If each central bank minimizes its loss function without taking the reaction of its counterparts into account (this is because in Nash equilibrium each player knows the equilibrium strategies of the other player, and no player has anything to gain by changing her own strategy), the following Nash equilibrium can be derived:

$$e_{A/USD} = e_{A^*/USD} = \frac{(a_{Euro} + b_{Euro})}{(a_{USD} + a_{Euro}) + \beta(b_{USD} + b_{Euro})} e_{Euro/USD}. \quad (4.3)$$

For the cooperative equilibrium, assuming that all the nine central banks agree on the minimization of  $L = L_A + L_{A^*}$ , then the cooperative exchange rate equilibrium is:

$$e_{A/USD} = e_{A^*/USD} = \frac{(a_{USD} + a_{Euro})a_{Euro} + \beta(b_{USD} + b_{Euro})b_{Euro}}{(a_{USD} + a_{Euro})^2 + \beta(b_{USD} + b_{Euro})^2} e_{Euro/USD}. \quad (4.4)$$

In our simulation study, the trade weights  $g_A$  are computed from the COMTRADE database (<http://comtrade.un.org/db/>), and the financial weights  $f_A$  are computed as total financial assets and liabilities<sup>6</sup> taken from the International Financial Statistics (IFS database) and apportioned according to the Currency Composition of Official Foreign Exchange Reserves (COFER) (<http://www.imf.org/external/np/sta/cofer/eng/index.htm>). Table 4.1 gives the welfare gain computed from the Nash and Cooperative equilibriums.

<sup>6</sup> Code for total assets (FIN ACCT TOTAL ASSETS) is 79AADZF and total liabilities (FIN ACCT TOTAL LIAB) is 79LADZF.

**Table 4.1 Actual Welfare Gain for Asia from Computed Nash and Cooperative**

**Equilibriums**

Country	$a_{USD}$	$a_{Euro}$	$b_{USD}$	$b_{Euro}$	$\beta = 0.5$		Welfare Loss (%)		Welfare Gain (%)
					Nash	Cooperative	Nash	Cooperative	
					Indonesia	0.3613	0.4119	0.6511	
Malaysia	0.4731	0.3455	0.6511	0.2978	0.3824	0.3786	0.158%	0.158%	0.505%
Philippines	0.4754	0.3560	0.6511	0.2978	0.3867	0.3831	0.179%	0.178%	0.403%
Singapore	0.3990	0.3769	0.7422	0.2086	0.3845	0.3715	0.925%	0.916%	0.968%
Thailand	0.4038	0.3964	0.6511	0.2978	0.4278	0.4205	0.438%	0.435%	0.675%
Japan	0.5226	0.3517	0.7422	0.2086	0.3379	0.3343	0.476%	0.475%	0.160%
Korea	0.4413	0.4005	0.6511	0.2978	0.4174	0.4129	0.362%	0.361%	0.330%
China	0.4430	0.4318	0.6511	0.2978	0.4304	0.4271	0.459%	0.458%	0.150%
HK	0.3924	0.4174	0.7422	0.2086	0.4060	0.3947	1.180%	1.173%	0.599%
Average			0.6815	0.2681	0.4025	0.3957	4.798%	4.769%	4.773%

Notes: “a” is trade weight and “b” is financial weight calculated from COMTRADE and IFS database respectively. “ $\beta$ ” is the assigned value given to the relative sensitivity of the total trade and total financial assets to the effective exchange rate variations.

**Nash Equilibrium**

With  $\beta = 0.5$ , for Nash equilibrium, we have  $e_{A/USD} = e_{A^*/USD} = 0.04025 e_{Euro/USD}$ . This is interpreted as “when the Euro appreciates by 1% against the USD, each Asian currency will appreciate its appreciated against the USD by 0.4025%”. Its effective exchange rate appreciates by 0.057% in terms of trade weight, but it appreciates by 0.1141% in terms of financial weights. The welfare loss amounts to  $L_A = L_{A^*} = 0.04798 e_{Euro/USD}^2$ .

**Cooperative Equilibrium**

For the cooperative equilibrium, we obtained  $e_{A/USD} = e_{A^*/USD} = 0.03957 e_{Euro/USD}$ , that is when the Euro appreciates by 1% against the USD, each Asian currency will appreciate its currency against the USD by 0.3957%, instead of 0.4025% in the Nash equilibrium. Its effective exchange rate appreciates by 0.065% (instead of 0.057%) in terms of trade weights, but it depreciates by only 0.1076% in terms of financial weights (instead of 0.1141%). The loss of each country shrinks to  $L_A = L_{A^*} = 0.04769 e_{Euro/USD}^2$ .

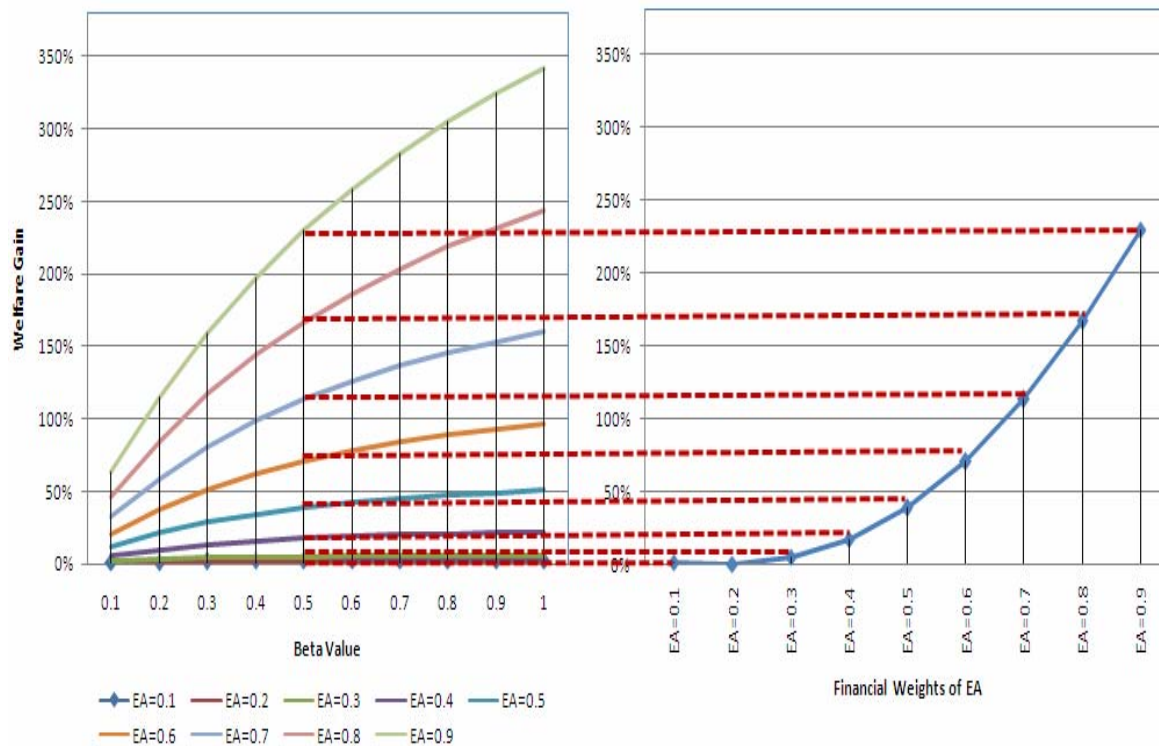
Given that welfare gain can be computed as:

$$Welfare\ Gain = 1 - \frac{Loss_{Cooperative\ Equilibrium}}{Loss_{Nash\ Equilibrium}}$$

Thus, welfare improvement is 4.773%, that is to say that in this three party game, Asian central banks would receive positive benefits when the nine Asian currencies begin to cooperate together in unison.

Figure 4.2 compares a simulation exercise in a few scenarios when the financial weight for Asia changes between 0 – 1. Panel 1 (left-hand-side) gives the plot of ten welfare gain curves for Asia at different levels of  $\beta$ s, the relative sensitivity of the total trade and total financial assets to the effective exchange rate variations, and nine different values of  $bs$ , financial weights or ratios of the official currency holdings in COFER. Panel 2 (right-hand-side) plots the welfare gain for Asia for one value of  $\beta = 0.5$ , and changing level  $bs$  (when different financial ratios ( $bs$ ) are allocated to Asia). The right-hand panel of Figure 4.2 clearly shows that Asian welfare gain would start to increase at a faster rate when allocation of the financial weights to Asia is greater than 30% (ratio = 0.3). This plot also shows that should the currency composition for the Asian financial size be larger than 50% (ratio = 0.5), then the welfare gain would be increased at an even faster rate of more than 50%.

**Figure 4.2 Simulation of Welfare Gain in Asia**



Notes: EA is East Asia.

$\beta$  is assigned value given to the relative sensitivity of the total trade and total financial assets to the effective exchange rate variations.  $b$  is the financial weight.

In conclusion, the three-party game shows that there is positive welfare gain when all the Asian currencies come-together, or to cluster and to actively cooperate and move-in-tandem. In the process of cooperating, the current allocation of Asian currencies in the financial asset holdings would naturally be increased beyond its current level of 5% (based on the COFER estimation), as welfare gain is increasing. The game of this simulation also suggests that for Asia to rise as a *natural currency en bloc*, the financial weights ( $bs$ ), that is ratio between US:Euro:Asia has to be increased beyond the ratio of 0.3: 0.3: 0.3

respectively. Once Asia achieves a sizable 30% in  $b_{EA}$  in global financial asset holdings, the welfare gain for Asia would be much increased at a faster rate. The values in Figure 4.2 is given in Table 4.2. The table tabulates all the values of the simulated welfare gain for the different values of " $\beta$ " (assigned value given to the relative sensitivity of the total trade and total financial assets to the effective exchange rate variations) and changing values of the financial weight " $b$ ".

**Table 4.2 Simulation of Welfare Gain for Asia when  $\beta$  and  $b$  Changes**

<b><math>\beta = 0.1</math></b>								
<b><math>b_{EA}=0.1</math></b>	<b><math>b_{EA}=0.2</math></b>	<b><math>b_{EA}=0.3</math></b>	<b><math>b_{EA}=0.4</math></b>	<b><math>b_{EA}=0.5</math></b>	<b><math>b_{EA}=0.6</math></b>	<b><math>b_{EA}=0.7</math></b>	<b><math>b_{EA}=0.8</math></b>	<b><math>b_{EA}=0.9</math></b>
0.84%	0.18%	1.76%	5.71%	12.12%	21.05%	32.54%	46.56%	63.03%
<b><math>\beta = 0.2</math></b>								
1.38%	0.31%	3.03%	9.97%	21.46%	37.73%	58.89%	84.85%	115.38%
<b><math>\beta = 0.3</math></b>								
1.73%	0.40%	3.95%	13.18%	28.73%	51.09%	80.49%	116.81%	159.52%
<b><math>\beta = 0.4</math></b>								
1.96%	0.46%	4.63%	15.61%	34.43%	61.90%	98.40%	143.78%	197.20%
<b><math>\beta = 0.5</math></b>								
2.11%	0.50%	5.12%	17.45%	38.93%	70.69%	113.38%	166.78%	229.73%
<b><math>\beta = 0.6</math></b>								
2.20%	0.53%	5.48%	18.86%	42.48%	77.89%	125.98%	186.56%	258.06%
<b><math>\beta = 0.7</math></b>								
2.25%	0.55%	5.73%	19.91%	45.28%	83.80%	136.65%	203.68%	282.94%
<b><math>\beta = 0.8</math></b>								
2.28%	0.57%	5.91%	20.70%	47.50%	88.66%	145.73%	218.61%	304.94%
<b><math>\beta = 0.9</math></b>								
2.28%	0.57%	6.03%	21.28%	49.23%	92.66%	153.48%	231.68%	324.52%
<b><math>\beta = 1.0</math></b>								
2.27%	0.58%	6.11%	21.69%	50.57%	95.95%	160.11%	243.19%	342.05%

Note: " $\beta$ " is assigned value given to the relative sensitivity of the total trade and total financial assets to the effective exchange rate variations. " $b$ " is the financial weight.

## 5. Conclusion

The study simulates a plausible 'New Asian Financial Landscape'. Currently, Asia uses US and EU financial markets for its higher value financial services. This is due to the inefficiency and lack of depth of the Asian financial markets. However, as Asia demographics and emergence into middle class changes its savings pattern, the need for greater financial-institutional depth like in the pension and fund management would arise. G10 experience suggests that if Asia does not handle the transition well, she may age without a proper social security and pension funding. Hence, matching global competitiveness, building strong and robust financial systems will be the next hurdle for Asia's development.

First, financial innovation in Asia must continue if Asia is to compete in global financial services. For example, mortgage securitization is inevitable in Asia if only to reduce maturity mismatch of banks holding more and more long-term mortgages. Asian fast growth in GDP and wealth means that Asian currencies will appreciate in long run, and Asians will have to improve their risk

management. Therefore, asset securitization and development of CDS market to manage credit risks are important steps for Asian banks. However, many pre-conditions, infrastructure and legal changes will have to be made.

Second, Asian needs to be cautiously optimistic. Asia is likely to continue its path towards catching up with Europe and North America, although bumps will be in the way. Much will depend on the ability of Asians to cooperate to establish stronger regional financial markets to better manage our risks. The benefits of the “Flying Geese in Unison” (Sheng *et al*, 2007) are considerable - greater market liquidity, global voice, better intermediation, lower risks etc. Of late, it is also interesting to note the unfolding of many quarters to call Asia to work out a coordinated realignment of their currencies against the depreciating US dollar. Bergsten (2008) proposed a call for an “Asian Plaza” as a collective action to allow major East Asian currencies to move together, and not undercutting its neighbours’ position by too much appreciation or depreciation. In the simulation exercise, we see that Asia will be a big player if there is both a financial deepening and exchange rate effect occurring in its financial and capital markets. This combined effect is supported by the Three-Party Game, that is Asian receives significant welfare gain when the Asian central banks agree to appreciate together.

Third, do not under-estimate US impact on Asia and do not think that China alone can carry the growth momentum. Japan is still the largest economy in Asia by a significant factor. Despite the fast growth of China, Japan’s GDP is roughly equal to the rest of East Asia put together, and its financial assets are roughly double the rest of Asia put together. Hence, Japan will play a crucial role in whatever shape Asian integration takes, but the historical legacies of conflicts with the rest of the Region play an important obstacle to common understanding. No currency cooperation effort in Asia can succeed without some kind of detente in understanding between Japan and her neighbours, similar to that between Germany and the rest of Europe. In conclusion, for Asia to play her role as a sound and efficient intermediary of global and regional savings and investments, they need currency cooperation of some kind for exchange rate stability. To do so requires both political and economic will power, in order to create financial innovation with sound banking and risks management/supervision systems. The Three-Party Game and the Asset/GDP projections clearly have generated several possible directions for Asia to take. Like the epic story of Three Kingdoms who sought hegemony in Chinese history, the three currency bloc will contend with many possible outcomes.

## References

Barabasi, Albert-Laszlo, 2003. *Linked: How Everything is Connected to Everything Else and What It Means for Business, Science, and Everyday Life*, Plume Books, May 2003.

Bergsten, Fred, 2008. “A Call for an ‘Asian Plaza’”, *The International Economy*, The Magazine of International Economic Policy, Spring 2008.

Bénassy-Quéré, Agnès, 1999. 'Optimal Pegs for East Asian Currencies', *Journal of the Japanese and International Economics*, 13: 44-60.

Chrystal, K. Alec, 1977. 'Demand for International Media of Exchange', *American Economic Review*, 67(December): 840-850.

Castells, Manuel, 1996. *The Information Age: Economy, Society and Culture Volume I: The Rise of the Network Society*, Blackwell, 1996.

Chinn, Menzie, and Jeffrey Frankel, 2008. "The Euro May Over the Next 15 Years Surpass the Dollar as Lending International Currency", Paper submitted to *International Finance*.

Dooley, Michael P., David Folkerts-Landau, and Peter Garber, 2003. "An Essay on the Revived Bretton Wood System", NBER Working Paper, No. 9971, Cambridge, MA: National Bureau of Economic Research.

Dooley, Michael P., David Folkerts-Landau, and Peter Garber, 2005. "International Financial Stability: Asia, Interest Rate and the Dollar", *Global Markets Research*, Deutsch Bank.

Eichengreen, Barry, 1997. "Hegemonic Stability Theories of the International Monetary System", NBER Working Paper No 2193

Eichengreen, Barry, 2005. "Sterling's Past, Dollar's Future: Historical Perspectives on Reserve Currency Competition", NBER Working Paper 11336.

Eichengreen, Barry, and Marc Flandreau, 2008. "Why the Euro is Unlikely to Eclipse the Dollar", *Financial Times*, 2 April 2008.

Eichengreen, Barry, and Marc Flandreau, 2008. "The Rise and Fall of the Dollar, or When did the Dollar Replace Sterling as the Lending Reserve Currency?" Paper prepared for the Past, Present and Policy Panel, Genoa, Italy, 28-29 March 2008.

Eichengreen, B. and R. Hausmann. 1999. "Exchange Rates and Financial Fragility", NBER Working Paper 7418.

Eiji Ogawa and Takatoshi Ito, 2000. "On the Desirability of a Regional Basket Currency Arrangement," *Journal of the Japanese and International Economics*, vol. 16(3): 317-334.

Frankel, Jeffrey A., and S.J. Wei, 1993. "Trading Blocs and Currency Blocs", NBER Working Paper No 4335, April.

Greenspan, Alan, 2001. "The Euro as an International Currency", Paper presented at the Euro 50 Group Roundtable, Washington DC, November 30.

Jeanneau, Serge, and Marian Micu. 2002. "Determinants of International Bank Lending to Emerging Market Countries." *BIS Working Paper 112* (June), Bank for International Settlements, Basel, Switzerland. <http://www.bis.org/publ/work112.htm>.

Kenen, Peter, 1983. "The Role of the Dollar as an International Currency", Occasional Papers No 13, Group of Thirty, New York.

Krugman, Paul R., 1980. "Vehicle Currencies and the Structure of International Exchange", *Journal of Money, Credit and Banking*, 12(3): 513-526.

Krugman, Paul R., 1984. "The International Role of the Dollar: Theory and Prospect", in *Exchange Rate Theory and Practice*, edited by John Bilson and Richard Marston, Chicago: University of Chicago Press, pp261-278.

Lane, Philip R., and Gian Maria Milesi-Ferritti, 2006. "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities," 1970-2004, IMF Working Paper, WP/06/69.

Lane, Philip R., and Gian Maria Milesi-Ferritti, 2007. "The External Wealth of Nations Mark II: Revised and Extended Estimates of Foreign Assets and Liabilities," 1970-2004, *Journal of International Economics*, 73: 223-250.

Lee, Jong-Wha, Yung Chul Park and Kwanho Shin, 2003. "Currency Union in East Asia", ISER Discussion Paper No. 571.

Lieberthal, Kenneth and Michel Oksenberg, 1998. *Policy Making in China*, Princeton University Press.

Lim, Ewe Ghee, 2006. "The Euro's Challenge to the Dollar: Different Views from Economists and Evidence from COFER (Currency Composition of Foreign Exchange Reserves) and Other Data", IMF Working Paper, WP/06/153.

McKinnon, Ronald, 1979. *Money in International Exchange*, New York: Oxford University Press.

McKinnon, Ronald I., and G. Schnabl, 2004. "The East Asian Dollar Standard, Fear of Floating, and Original Sin", *Review of Development Economics*, 8: 331-360.

McKinnon, Ronald I., 1996. *The Rules of the Game: International Money and Exchange Rates*, MIT Press.

Mundell, Robert A., 1998. "What the Euro Means for the Dollar and the International Monetary System", *Atlantic Economic Journal*, 26(3): 227-237.

Mundell, Robert A., 2003. "The International Monetary System and the Case for a World Currency", Distinguished Lectures Series No 12, Warsaw, 23 October 2003. (available on website: <http://www.tiger.edu.pl>)

Mundell, Robert A., 2003. "Prospects for an Asian Currency Area", *Journal of Asian Economics*, 14: 1-10.

Mundell, Robert A., 2005. "The Case for a World Currency", *Journal of Policy Modeling*, 27: 465-475.

North, Douglass, 1990. *Institutions, Institutional Change and Economic Performance*, Cambridge University Press.

North, Douglass, 2005. *Understanding the Process of Economic Change*, Princeton University Press.

Olson, Mancur, 2000. *Power and Prosperity: Outgrowing Communist and Capitalist Dictatorships*, New York: Basic Books.

Park, Yung Chul, and Kee Hong Bae, 2002. "Financial Liberalization and Economic Integration in East Asia, Unpublished Manuscript, Korea University.

Sheng, Andrew, 2006. "Financial and Monetary Integration in East Asia", mimeo, University of Malaya, January 2006.

Sheng, Andrew, 2006. "Building National and Regional Financial Markets: The East Asian Experience", Emerging Markets Forum, Jakarta, September 2006.

Sheng, Andrew, 2006. "Asian Integration: Process vs Projects" EABER Op-Ed, November 2006, <http://www.eaber.org>.

Sheng, Andrew, 2007. "The Asian Network Economy in the 21<sup>st</sup> Century", World Bank Asian Vision, February 2007.

Sheng, Andrew, Kian Teng Kwek, and Cho Cho Wai, 2006. "Asian City Hubs: Trading Network Patterns", FEA Working Paper No2006-14, University of Malaya.

Sheng, Andrew, and Kian Teng Kwek, 2007. "East Asian Capital Markets Integration: Steps Beyond ABMI", EABER Working Paper Series, Paper No 11, East Asia Bureau of Economic Research.

Sheng, Andrew, Wai Kuen Tan, and Kian Teng Kwek, 2007, "A Framework for Developing Capital Markets: Process, Sequencing and Options", Third APEC Policy Dialogue Workshop on Financial Sector Reform, Theme: Deepening and Integrating Private Capital Markets, hosted by the Australian Treasury, May 2007, Melbourne, Australia.

Sheng, Andrew, Kian Teng Kwek, and Wai Kuen Tan, 2007, "Impact of Exchange Rate and Exchange Controls on Market Integration", Second Asian Development Bank Conference on Towards a Strategic Framework for Strengthening National Capital Markets and Enhancing Cooperation Among Southeast Asian Equity Markets, July 2007.

Shirk, Susan, 1993. *The Political Logic of Economic Performance in China*, University of California Press, 1993.

Swoboda, Alexander K., 1968. "Eurodollars, a Suggested Interpretation", in *Essays in International Finance*, No 64 (Princeton University).

Werin, Lars, 2003. *Economic Behaviour and Legal Institutions: An Introductory Survey*, London: World Scientific.