How Flexible have Asian Exchange Rate Regimes become in the Post-crisis Era?

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Abstract

This paper presents an analysis of the degree of flexibility in the exchange rate regimes of seven emerging Asian economies, viz. India, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand, by comparing *de jure* and *de facto* regimes. We conclude that there are signs of a gradual movement towards somewhat greater *de jure* exchange rate flexibility in many Asian countries. However, the propensity for foreign exchange intervention and exchange rate management (as captured by *de facto* measures) among regional central banks remains fairly high in many instances.

1.   Introduction

A decade after the Asian financial crisis of 1997-98, Asia has once again been hurt by the global financial crisis that emanated in the financial sectors of the United States and Western Europe. The high degree of openness of Asia to trade, investment and capital flows inevitably meant that the regional economies would be impacted, although they had coped admirably until September 2008, even leading many analysts to talk about the possible "decoupling" of the region from the West. Such talk quickly vanished with the bankruptcy of Lehman Brothers, which led to the skyrocketing of emerging market spreads and extreme tightening of credit markets worldwide. The sharp curtailment in export demand, freezing of credit markets, including trade financing and wholesale funding, as well as the abrupt reversal in capital flows to emerging markets, worked in tandem to curtail near-term growth in Asia quite heavily (Rajan, 2009 and Figure 1). While the spillovers from the global financial crisis to Asia were sudden and rather dramatic, once credit markets started thawing by March 2009, Asia looked poised to emerge most rapidly from the global economic contraction compared to many other regions.[2]

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[2]   This is not to suggest that risks to the outlook of the region do not exist.

Without a doubt, the painful deleveraging and restructuring of the corporate and financial sectors that the region went through placed the regional economies in good stead. Many have also argued that more transparent monetary policy frameworks and the introduction of relatively greater degree of exchange rate flexibility also played an important role in helping the region manage, if not bounce back from, the sharp downturn experienced in late 2008-early 2009. This relative exchange rate flexibility is apparent from Figure 2 which reveals that, with the exception of the month of intense volatility and selling pressure in mid-September to mid-October 2008, many of the emerging Asian economies did not appear to intervene very much in the foreign exchange market, allowing most of the adjustments to take place via the exchange rate. Thus, the region largely rebuilt their reserves lost in late 2008 by early 2009.[3]

This paper concentrates on the specific issue of exchange rate flexibility in selected Asian economies between the two crises periods (that is, 2000 and 2008). The remainder of the paper is organised as follows. The next section compiles and discusses the *de jure* or official exchange rate regimes in seven emerging Asian economies, viz. India, Indonesia, Malaysia, Philippines, Thailand, Singapore and South Korea. Recognising that countries do not always follow their policy pronouncements, Section 3 presents some simple *de facto* exchange rate regime measures for selected Asian countries. Since different measures inevitably capture different characteristics of any regime, it is critical to use alternative methodologies to check the robustness of the results. Section 4 concludes the paper.

2.   Official Exchange Rate Regimes in Asia

Until 1998 it was fairly easy to obtain *de jure* exchange rate classifications as this data was compiled from national sources by the International Monetary Fund (IMF). Specifically, between 1975 and 1998 the IMF's *Annual Report on Exchange Arrangements and Exchange Restrictions* was based on the self-reporting of national policies by various governments with revisions in 1977 and 1982. Since 1998 – and in response to criticisms that there can be significant divergences between *de facto* and *de jure* policies – the IMF's exchange rate classification methodology has shifted to compiling unofficial policies of countries as determined by Fund staff.[4] While the change in IMF exchange rate coding is welcome for many reasons (including the fact that the new set of categories is more detailed than the older one), the IMF is no longer compiling the *de jure* regimes. The only way this can be done is to refer to the website of each central bank or other national sources individually and wading through relevant materials. The results of this 'detective work' are summarised in Table 1.[5]

From Table 1, it can be seen that three countries possess the stated aim of some degree of sustained exchange rate management. India's regime seems to be a managed float. Malaysia implements a basket peg, as does Singapore, where the basket peg is supported by an implicit band and prescribed rate of growth (crawl) – the so-called Band-Basket-Crawl. Each of the remaining countries; Indonesia, Korea, the Philippines and Thailand claim to have adopted an inflation targeting regime. From Table 1, we can see that most central banks have also declared an intention to intervene in the exchange rate markets in some way where the central banks deem appropriate in the interests of smoothing out periods of excessive volatility in

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[3]   We do not specifically discuss the issue of reserve build-up here but will return to this issue in the concluding section.

[4]   The data has since been applied retroactively to 1990.

[5]   The descriptions in Table 1 are mostly direct quotes from the official sources and not paraphrased by the authors and draws on Cavoli and Rajan (2009, Chapter 1) based on information as of mid 2008.

those markets. This is an important facet of the inflation targeting arrangement that is instituted in these countries. Typically, we would associate inflation targeting with floating exchange rates as the possession of fixed exchange rates may dilute monetary policy due to the existence of two targets and only one instrument – usually the short-term nominal interest rate. Too much emphasis on exchange rate stability for its own sake suggests a possible "fear of floating", something that is more readily detected in the *de facto* regimes as depicted in the sections that follow.

3. *De Facto* Exchange Rate Regimes in Crisis-hit Asia

We attempt to capture *de facto* exchange rate regimes in this paper using exchange rate flexibility indices. There are a variety of indices based on the idea of exchange market pressure (EMP).[6] The theoretical foundation for EMP stems from a basic monetary model incorporating the demand for money, its supply and relative purchasing power parity (Tanner, 2001 and Pentecost et al., 2001).

3.1 Exchange Rate Flexibility Index

The first measure of exchange rate flexibility is the following:

$$Index\ 1 = \Delta e\ /(\Delta e + \Delta f) \tag{1}$$

where Δe is as calculated in the previous section and Δf is the change in net foreign assets (IFS line 11 – line 16c) scaled by a lagged money base (line 14).[7] The index is deliberately constructed in this manner so that it returns a value between zero and one.[8] This offers a scaling device for the relative exchange rate volatility; the closer the index is to one ($\Delta f \rightarrow 0$), the more flexible the exchange rate regime, and while the closer the index is to zero ($\Delta e \rightarrow 0$), the more fixed the regime. In contrast to other papers using this method where annualised mean absolute deviations or standard deviations are used to smooth Index 1, here we take the Hodrick-Prescott (HP) filtered trend of the index as it allows us to take a longer term view over the regime choices for our selection of countries. The HP trends are calculated using a sample of data between 1985 and 2008, but only the post-crisis time period is reported.

Figures 3 and 4 report the results of the exchange rate flexibility index for India, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand for the period 2000 to 2008 (monthly data). The index is computed for the nominal effective exchange rate (NEER) (Figure 3) and for the local currency per US$ (Figure 4). Generally, we can see that there are

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[6] For instance, see the seminal contribution from Girton and Roper (1977). Also see Li, Rajan and Willett (2006) and Guimãeres and Karagdag (2004).

[7] Reserve differences (from trend) are scaled by a lagged domestic monetary base in order to compare the magnitude of the reserve change in relation to the stock of money base in the system. The result is an index that is more easily interpretable than if absolute values are taken.

[8] Note that 1- $\Delta e\ /(\Delta e + \Delta f) = \Delta f\ /(\Delta e + \Delta f)$ which is defined as a measure of exchange rate intervention. An index such as Index 1 can also be constructed using standard deviations, for example, $\sigma_{\Delta e}\ /\ \sigma_{\Delta e} + \sigma_{\Delta f}$. Baig (2001) and Calvo and Reinhart (2002) use variances. The index values using standard deviations are broadly similar to those for index 1 and are not reported here but available on request. The nominal interest rate is often included in EMP measures but is excluded here due to the unavailability of market interest rates for all countries. It should be noted that part of the exchange rate change (and, indeed, interest rates) could be valuation effects rather than adjustment because of foreign exchange intervention.

some similarities between Figures 3 and 4.[9] This would indicate that the US$ likely occupies a significant weight in the basket that makes up the NEER in each country. What is noticeable is that Singapore seems to have the least flexible regime in terms of the NEER, consistent with the stated basket pegging. Not surprisingly, the Malaysian ringgit was the least flexible in terms of the US$ until 2005 when it forsook the US$ peg. The Indonesian rupiah appears to be the most variable vis-à-vis both the NEER and the US$ until the most recent part of the sample, where the Korean won and the Philippine peso became more flexible especially since 2005. While the Indian rupee has been relatively flexible compared to its East Asian counterparts, it appears to have been relatively more managed in the last two years (2006-08), as is true for the Thai baht.

3.2   Augmented Exchange Rate Flexibility Indices using the Frankel-Wei method

While the foregoing results are indicative, they do not offer any degree of precision. To this end this section presents a measure that has been recently used in Frankel and Wei (2007) as a way of incorporating exchange rate regime flexibility (or fixity) into the original Frankel-Wei (Frankel and Wei, 1994) method for inferring implicit basket weights for majors on our local currencies.

Consider the following:

$$Index\ 2 = \Delta e + \Delta f \qquad (2)$$

where, Δf is defined as in the previous section. In order to facilitate the estimation of exchange rate regimes using Frankel-Wei, Δe, is defined as the local currency per some independent numeraire – here we use the Special Drawing Rights (SDR).[10] To see how it relates to exchange rate regime choice, we need to use Index 2 to augment the Frankel-Wei method as follows:

$$\Delta e_t = \alpha_0 + \alpha_1 \Delta US_t + \alpha_2 \Delta JP_t + \alpha_3 \Delta UK_t + \alpha_4 \Delta DM_t + \alpha_5 \Delta EU_t + \gamma\ Index\ 2 + \mu_t \qquad (3)$$

The α coefficients in equation (3) are the usual Frankel and Wei (1994) implicit currency weights. The US$, yen, euro and pound (all per the SDR) are chosen as they would represent world currencies deemed to exert sufficient influence on the local currencies such that they are worthy of consideration in our estimates. While it is tempting to interpret these coefficients as potential basket weights, it is probably more prudent for them to be interpreted as degrees of influence. The reason for this is that it is very difficult to tell whether a high and significant coefficient value implies a basket currency, or merely market driven correlations.[11] Under equation (3), as $\gamma \rightarrow 1$, the exchange rate per local currency becomes more flexible as index 1 converges to the dependent variable, Δe. As $\gamma \rightarrow 0$, the exchange rate becomes more fixed as the situation where reserve movements overshadow exchange

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[9]   Correlations of Index 1 between the local currencies per US dollar and its respective NEER are for the most part, positive and high (0.8-0.9). Malaysia is the exception. Also, for Indonesia, the rupiah per the SDR is used instead of the NEER due to the unavailability of NEER data for Indonesia at this time.

[10]   The idea behind using the SDR revolves around finding a currency that is not excessively related to any of the currencies used in this study. A common choice in this literature has often been the Swiss franc, but there are concerns that its strong correlation with the euro may bias parameter estimates.

[11]   It is also for this reason that we did not impose the restriction that all the currency weights should add up to one.

rate movements is reflective of sustained exchange rate intervention. The extent of fixity to various currencies is captured by the coefficients.

Table 2 presents the regression results for equation (3). Some interesting results stand out. With the exception of Indonesia, the US$ remains the currency that has the greatest degree of influence on the local currency, particularly in the case of Malaysia (not surprisingly given that it only depegged in mid 2005), the Philippines, and India (which is somewhat unexpected). The other currencies possess a generally low degree of influence and are, for the most part, statistically insignificant except the yen in Singapore's case.[12] Clearly the weight of the US$ may be capturing other currencies such as the Chinese renminbi which itself is pegged heavily to the US$. With the exceptions of Korea and Malaysia, the EMP index is highly significant. The values are all under 0.1 in the cases of the Philippines, Singapore and Thailand, suggesting there exists a great deal of fixity in the local currencies. The EMP has a slightly stronger economic weight in Indonesia and India, implying that these two economies allowed relatively greater exchange rate flexibility than the others. As mentioned above, to what extent are these weights market-driven versus policy targets?

We can attempt to answer this by summarising the interaction between the currency weights and the EMPs. The currency weights for Indonesia suggest it is market-driven. The US$ is significant, but none of the other currencies are. The EMP for Indonesia represents some degree of flexibility. The Indian rupee and the Korean won are somewhat influenced by the US$. The EMP is relatively high and significant for the Indian rupee, indicating a level of flexibility in the exchange rate with a possible loose US$ peg. The EMP for the Korean won is statistically and economically insignificant. There is insufficient evidence from the EMP coefficient to suggest the existence of any systematic exchange rate fixity of the won over the sample period under examination. The high degree of influence of the US$, the non-existent influence of the other currencies, and the low EMP for Malaysia all suggest a US$ peg which we know to have been the case in actuality. The Philippines and Thailand present a similar scenario – albeit with a lower US$ weight (particularly for Thailand) and a higher EMP – suggesting a degree of flexibility. The special case is Singapore where the US$ and the yen are significant weights (the euro is very nearly significant) and the EMP level is quite low. There is evidence here of an attempt to control a basket of currencies, which is consistent with official proclamations by the central bank.

Figure 5 presents the recursive least squares estimates for the US$ coefficient, α_1.[13] This is instructive as a mechanism which allows a comparison between these results and the EMPs per US$ in the previous section. With the exception of Indonesia – where the results are inconclusive – there appears to be a general trend downwards in the recursive series. This is suggestive of a lowering of the degree of influence of the US$ on each local currency and is consistent with the findings in the previous section of somewhat greater flexibility of the local currencies per US$.

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[12]   The other exceptions are the pound and euro in the case of the Korean won, but this result should be viewed cautiously given that the coefficients almost offset each other (that is, a possible high correlation between the pound and euro).

[13]   The recursive estimates are generated by running the regression for equation (3) iteratively – beginning with a few observations, and recording the coefficient values until we reach the full sample. Due to insufficient degrees of freedom, we discard the first 18 coefficient values. Recursive least squares is a special case of the Kalman Filter modeling strategy with time-varying coefficients. These results are typically consistent with the rolling fixed window regressions where one would drop the oldest observation before incorporating the most recent.

4.   Conclusion

This paper has examined the *de jure* and *de facto* exchange rate regimes in Asia. The evidence points to a somewhat greater degree of exchange rate flexibility in the regional economies. This flexibility likely helped to somewhat cushion the domestic economies from the sharp global financial crisis of 2008-09. What we have not specifically tested for but appears to be the case is the existence of a degree of asymmetry. Asian countries seem somewhat more willing to allow for exchange rate depreciations in times of stress than they are to allow exchange rate appreciations during periods of capital surges. This possible "fear of appreciation" as opposed to a broader "fear of floating" is formally explored in Pontines and Rajan (2008) and may explain how Asia has been able to continuously accumulate reserves while still moving to somewhat greater currency flexibility.

At a broader level, it is always useful to keep in mind that the choice of exchange rate regime cannot be done in isolation. It must be seen as part of a coherent macroeconomic and development strategy. No exchange rate regime will deliver stability if governance is poor, institutions are weak, and domestic macroeconomic policy is unsound. Paraphrasing Max Corden (2003), one should not be "too sensational" about the choice of exchange rate regime.

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Table 1: *De Jure* Exchange Rate Classifications

Country	Official Policy Pronouncements (direct quotes)
India	The exchange rate policy in recent years has been guided by the broad principles of careful monitoring and management of exchange rates with flexibility, without a fixed target or a pre-announced target or a band, coupled with the ability to intervene if and when necessary.
Indonesia	In July 2005, Bank Indonesia launched a new monetary policy framework known as the Inflation Targeting Framework, which has four basic elements as follows: (1) use of the BI rate as a reference rate in monetary control in replacement of the base money operational target, (2) forward looking monetary policymaking process, (3) more transparent communications strategy, and (4) strengthening of policy coordination with the Government. The rupiah exchange rate is determined wholly by market supply and demand. However, Bank Indonesia is able to take some actions to keep the rupiah from undergoing excessive fluctuation.
Korea	Inflation targeting is an operating framework of monetary policy in which the central bank announces an explicit inflation target and achieves its target directly. This is based on the recognition that to achieve sustainable economic growth, it is important, above all else, that inflation expectations which have a great effect on wage and price decisions should be stabilised. In this regard, inflation targeting places great emphasis on inducing inflation expectations to converge on the central bank's inflation target level by the prior public announcement and successful attainment of that target level. The exchange rate is, in principle, decided by the interplay of supply and demand in the foreign exchange markets. However, the Bank of Korea implements smoothing operations to deal with abrupt swings in the exchange rate caused by temporary imbalances between supply and demand, or radical changes in market sentiment.
Malaysia	On 21 July 2005, Malaysia shifted from a fixed exchange rate regime of US$1 = RM3.80 to a managed float against a basket of currencies. Under the managed float system, the ringgit exchange rate is largely determined by ringgit demand and supply in the foreign exchange market. The Central Bank does not actively manage or maintain the exchange rate at any particular level – economic fundamentals and market conditions are the primary determinants of the level of the ringgit exchange rate. In this regard, the Central Bank intervenes only to minimise volatility, and to ensure that the exchange rate does not become fundamentally misaligned.
Philippines	The primary objective of the 'Bangko Sentral ng Pilipinas' monetary policy is to promote a low and stable inflation conducive to a balanced and sustainable economic growth. The adoption of inflation targeting framework for monetary policy in January 2002 is aimed at achieving this objective. The Monetary Board determines the exchange rate policy of the country, determines the rates at which the Bangko Sentral buys and sells spot exchange, and establishes deviation limits from the effective exchange rate or rates as it deems proper.

Country	Official Policy Pronouncements (direct quotes)
Singapore	Since 1981, monetary policy in Singapore has been centered on the management of the exchange rate. (1) The Singapore dollar is managed against a basket of currencies of its major trading partners and competitors. (2) The Monetary Authority of Singapore operates a managed float regime for the Singapore dollar. The trade-weighted exchange rate is allowed to fluctuate within an undisclosed policy band, rather than kept to a fixed value. (3) The exchange rate policy band is periodically reviewed to ensure that it remains consistent with the underlying fundamentals of the economy. (4) The choice of the exchange rate as the intermediate target of monetary policy implies that MAS gives up control over domestic interest rates (and money supply).
Thailand	Since 2 July 1997, Thailand has adopted the managed-float exchange rate regime, in which the value of the baht is determined by market forces, namely, demand and supply in both on-shore and off-shore foreign exchange markets, to let the currency move in line with economic fundamentals. The Bank of Thailand will intervene in the market only when necessary, in order to prevent excessive volatilities and achieve economic policy targets. Under the inflation targeting framework, the Bank of Thailand implements its monetary policy by influencing short-term money market rates via the selected key policy rate, currently set at the 14-day repurchase rate.

Source: Cavoli and Rajan (2009).

Table 2: Frankel-Wei-EMP Estimates. Dependent Variable: Local currency per SDR

	Indonesia	India	Korea	Malaysia	Philippines	Singapore	Thailand
Constant	**-0.52**	**-0.27**	**-0.22**	**-0.14**	-0.14	**-0.24**	**-0.32**
	(0.01)	**(0.02)**	**(0.09)**	**(0.04)**	(0.39)	**(0.00)**	**(0.00)**
Dollar	**0.12**	**0.69**	**0.44**	**0.87**	**0.76**	**0.41**	**0.29**
	(0.50)	**(0.00)**	**(0.01)**	**(0.00)**	**(0.00)**	**(0.00)**	**(0.02)**
Yen	-0.04	0.09	0.25	-0.03	0.04	**0.11**	0.13
	(0.77)	(0.28)	(0.12)	(0.56)	(0.87)	**(0.05)**	(0.24)
Euro	-0.12	0.09	**-0.29**	0.04	0.03	0.12	0.07
	(0.49)	(0.28)	**(0.07)**	(0.35)	(0.75)	(0.11)	(0.49)
Pound	-0.08	0.13	**0.23**	-0.05	-0.01	-0.02	0.02
	(0.70)	(0.14)	**(0.05)**	(0.58)	(0.91)	(0.74)	(0.89)
EMP	**0.35**	**0.17**	0.02	-0.00	**0.07**	**0.03**	**0.07**
	(0.00)	**(0.00)**	(0.13)	(0.90)	**(0.00)**	**(0.00)**	**(0.01)**
Adj R^2	0.73	0.68	0.28	0.77	0.40	0.35	0.31
DW	2.18	1.62	1.77	1.39	1.90	2.06	1.79
Observations	112	95	110	111	111	111	111

Note: Includes lagged dependent variable.
Figures in parentheses are p-values and those parameters significant at 10 percent or better are in bold.
Sample 1999m1 to 2008m6.

**Figure 1: Impact of the Global Financial Crisis on Emerging Asia**
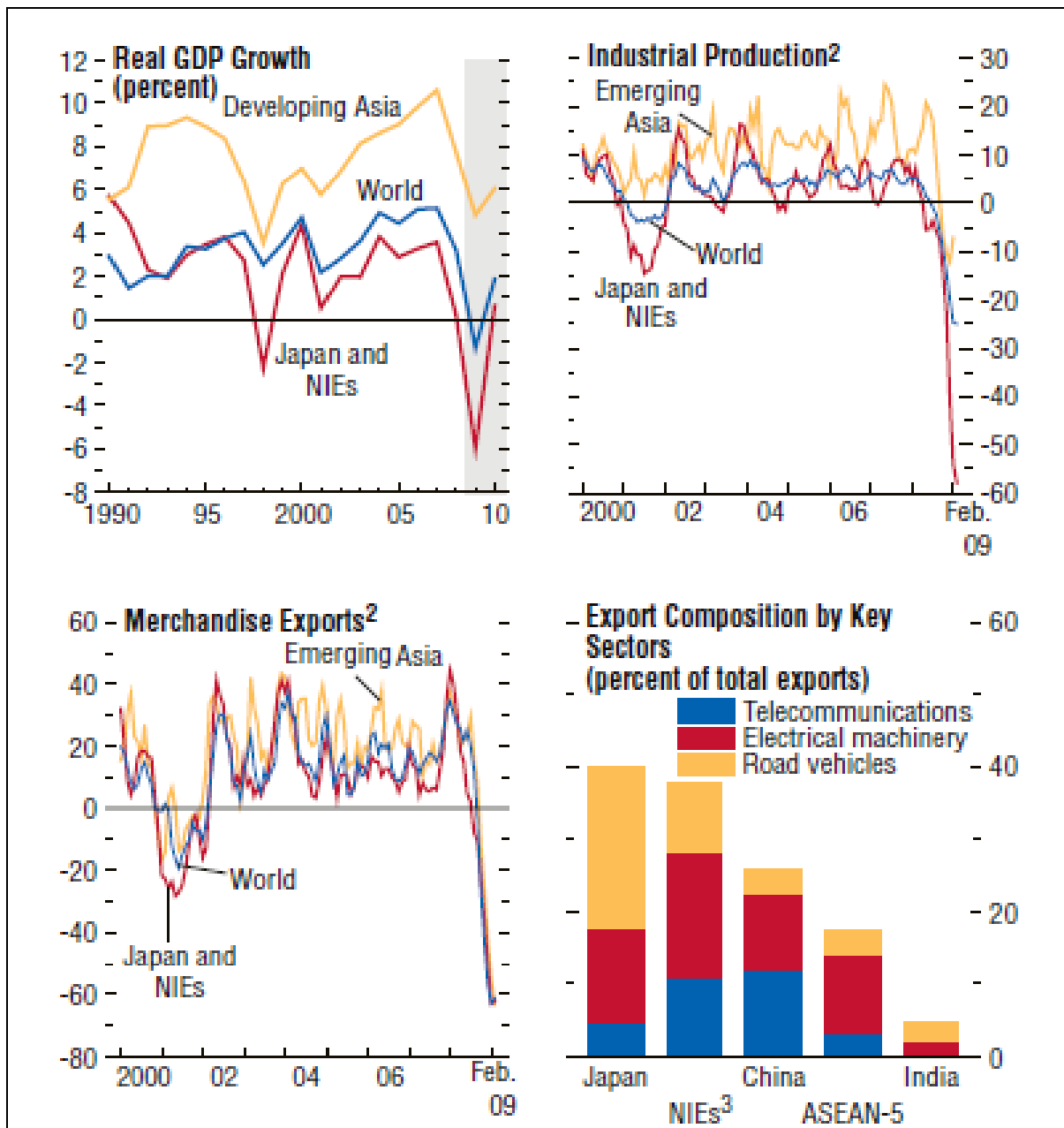
Notes: 1) Newly industrialised Asian economies (NIEs) comprise Hong Kong SAR, Korea, Singapore, and Taiwan Province of China. ASEAN-4 countries comprise Indonesia, Malaysia, Philippines, and Thailand. ASEAN-5 countries comprise ASEAN-4 countries and Vietnam. Emerging Asia comprises China, India, Indonesia, Malaysia, Philippines, and Thailand.
2) Annualised percent change of three-month moving average over previous three-month average.
3) Excluding Taiwan Province of China.
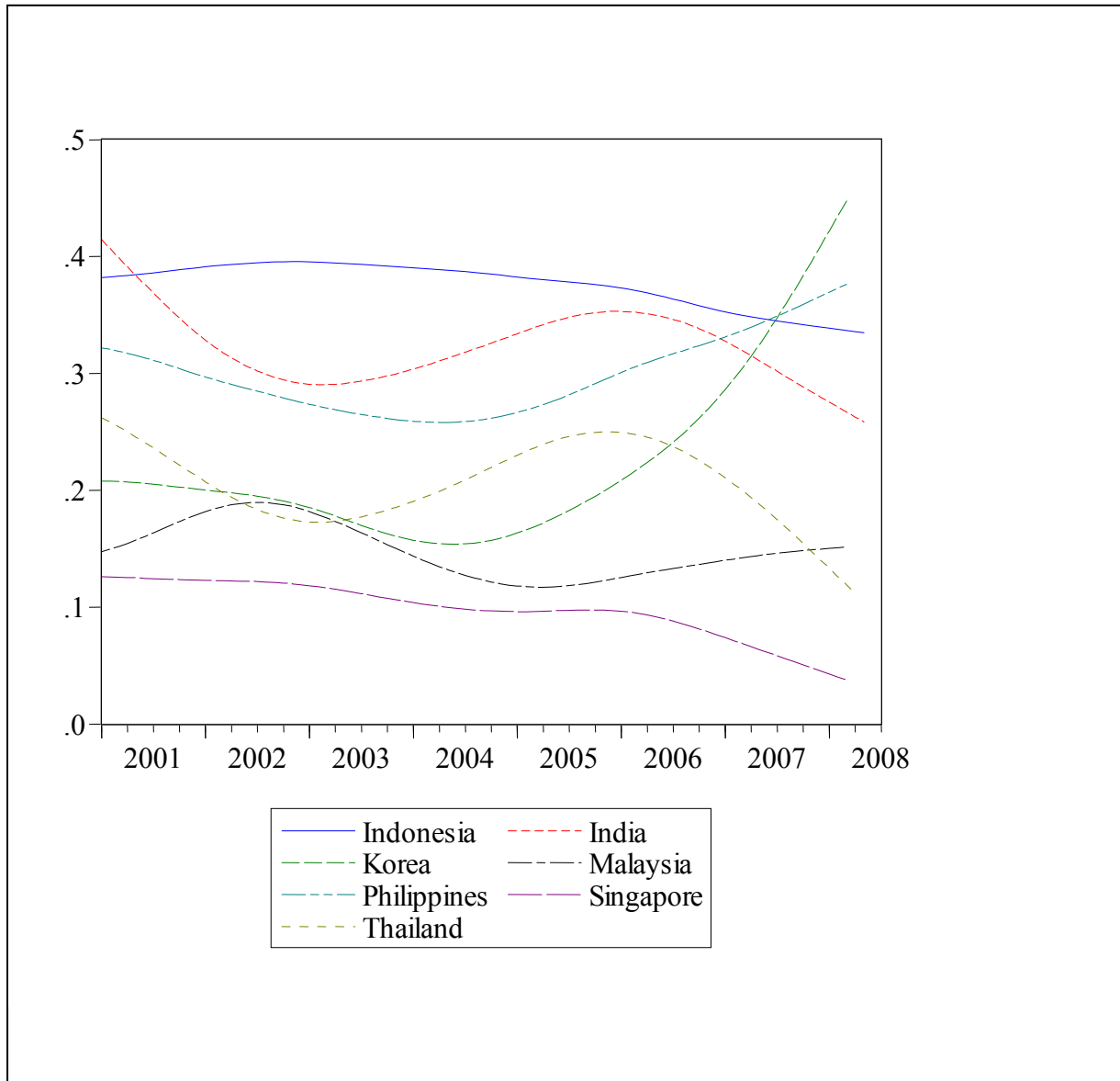
Source: IMF (2009a).

**Figure 2: Emerging Asia: Changes in Foreign Exchange Reserves
(In US$ billion)**
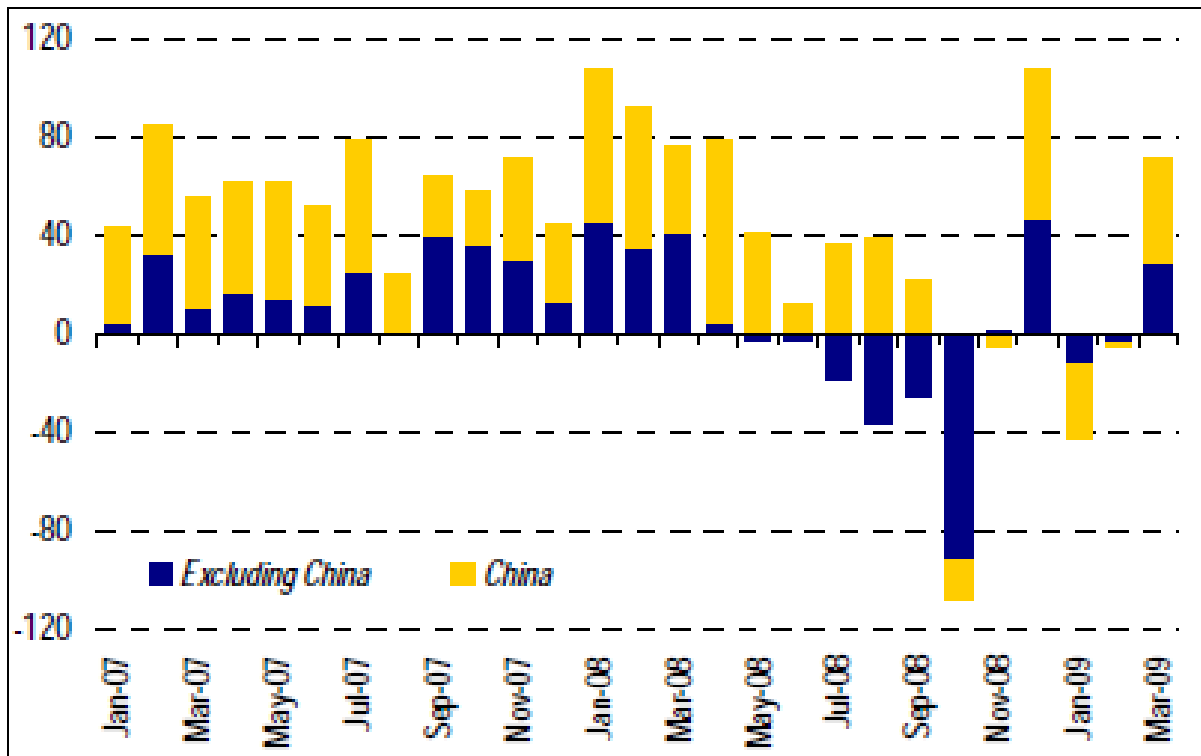
Notes: Emerging Asia defined as China, India, Hong Kong SAR, Korea, Singapore, Taiwan Province of China, Indonesia, Malaysia, the Philippines, Thailand and Vietnam.
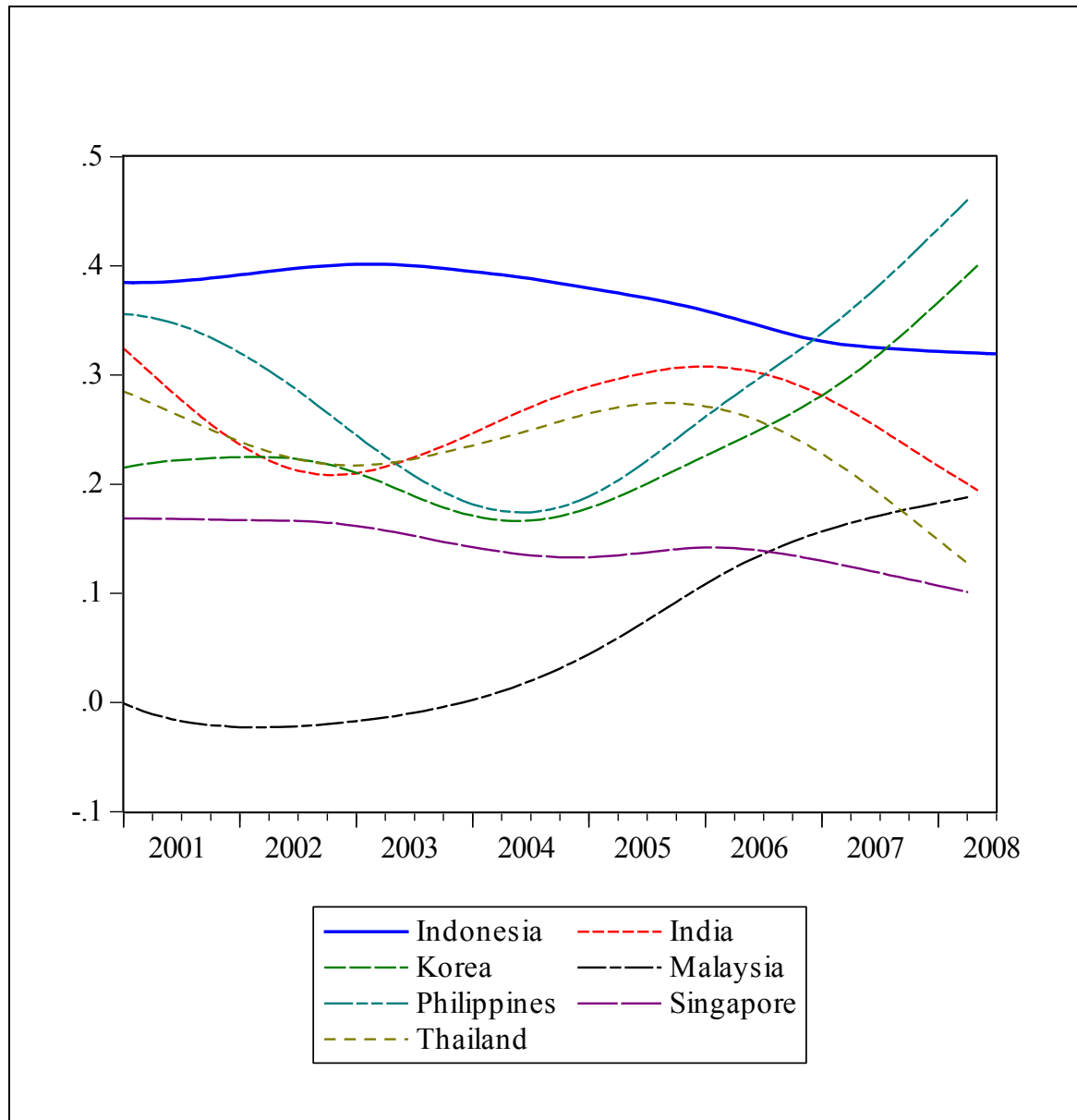Source: IMF (2009b).

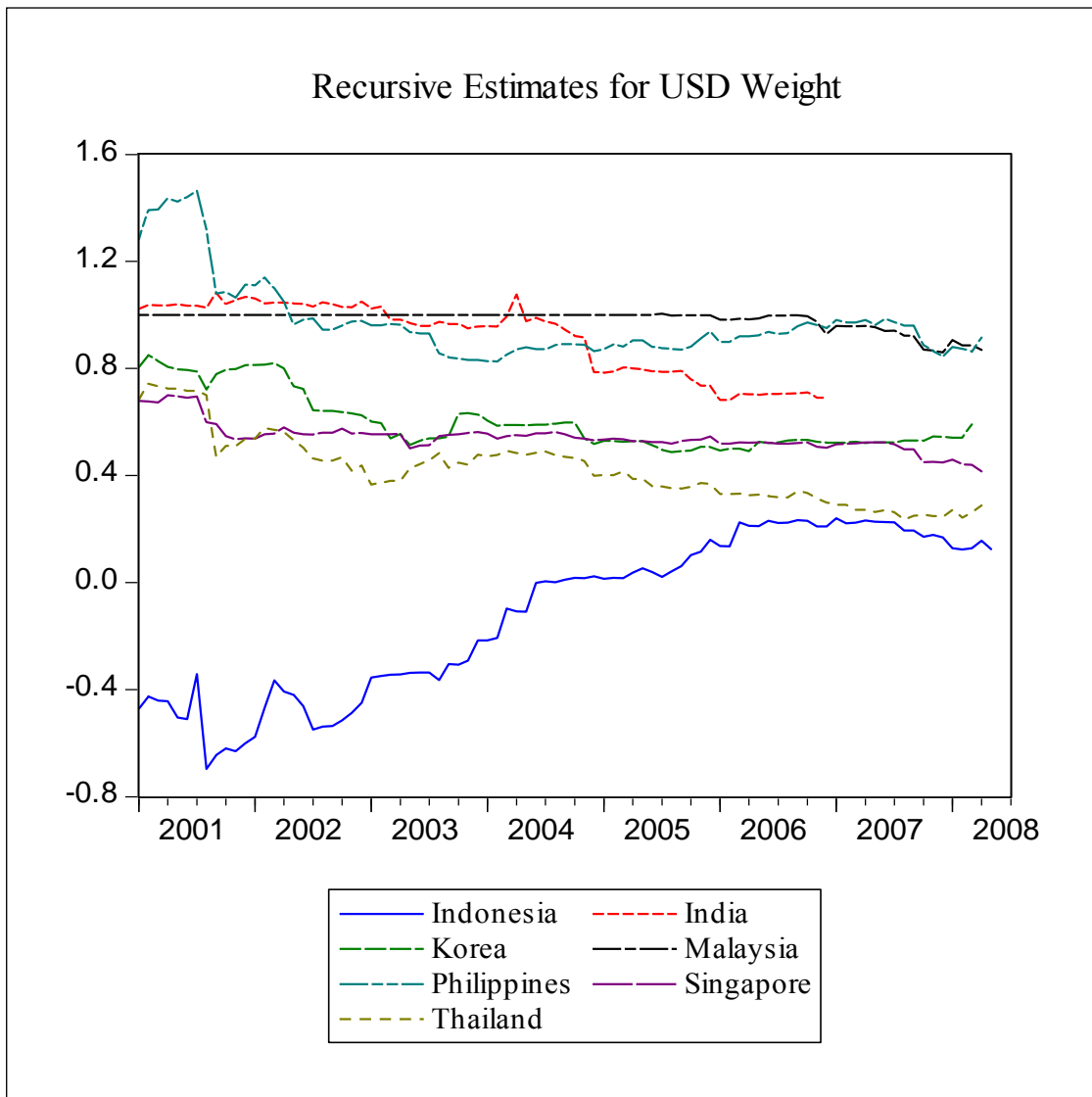**Figure 3: Exchange Rate Regime Index using NEERs**

Source: Cavoli and Rajan (2009).

Figure 4: Exchange Rate Regime Index (ccy per US$)

Source: Cavoli and Rajan (2009)

Figure 5: Recrusive Estimates for US$ Weight

Source: Cavoli and Rajan (2009)