

# Monetary Policy in Asia and the Pacific In the Post, Post-Crisis Era

Hiro Ito\*

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## Abstract

As the United States started considering normalizing its monetary policy and tapering unconventional monetary measures, some of the emerging market economies (EMEs), including those in Asia, that received massive capital inflows in the immediate aftermath of the global financial crisis of 2008 seem afraid of capital flight and possibly a financial crisis as it happened in the late 1990s. Several key economic indicators suggest that the current situation of Asian EMEs is more favorable compared to the pre-Asian crisis period. Most of the Asian EMEs are experiencing more favorable current account balances and hold much more international reserves. Asset markets do not show signs of overheating. In terms of open macro policies based on the trilemma hypothesis, Asian EMEs on average have higher levels of monetary autonomy and exchange rate flexibility than in the pre-Asian crisis years of the 1990s. However, it has been increasingly argued that financial globalization has been playing a bigger role in determining domestic asset prices and long-term interest rates. In fact, in recent years, the correlation of long-term interest rates between Asian EMEs and the United States has been rising while the correlation of short-term rates does not show such a trend. In other words, Rey's (2013) "irreconcilable duo" – the trilemma reduces to a dilemma between monetary autonomy and free capital mobility – may be applicable to long-term interest rates, though not to the short-term interest rates. This paper presents empirical results that net capital inflows can contribute to weakening the link between short-term and long-term interest rates. However, the effect of net capital inflows on the extent of interest rate pass-through is greater in the pre-Asian crisis period than in recent years including the Great Moderation period and the post-global financial crisis years. Economies open to cross-border capital flows or with more developed financial markets tend to have greater negative relationship between net capital inflows and the extent of interest rate pass-through.

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\* Ito: Department of Economics, Portland State University, 1721 SW Broadway, Portland, OR 97201, U.S.A;  
e-mail: [ito@pdx.edu](mailto:ito@pdx.edu)

## 1. Introduction

Countries around the globe have been nervously paying attention to the state of the advanced economies. Many of the advanced economies still have not been able to embark on a sustainable recovery path from the recessionary situation caused by the global financial crisis of 2008 followed by the Euro debt crisis. The United States, the Euro area, the United Kingdom, and Japan have essentially exhausted conventional monetary policy measures by guiding their policy interest rates to almost zero. These economies have had in place unconventional monetary policy measures including large-scale asset purchases and quantitative easing (QE).<sup>1</sup>

While the advanced economies have been struggling to jumpstart their economies, other economies, especially emerging market economies (EMEs) most of which were barely affected by the 2008 crisis, have become good investment destinations for international investors. Shunning extremely low rates of return and growth uncertainties in the advanced economies, a massive amount of capital inundated many EMEs (Figure 1).

Until recently, policy makers in the EMEs faced a dilemma. On the one hand, the influx of “hot money” made EMEs’ currencies face appreciation pressure, that could harm the trade competitiveness of these export-dependent economies. However, the appreciation pressure can be mitigated by foreign exchange interventions which EMEs did (figure 2). Despite sterilization efforts, interventions started creating inflationary pressures in some economies. Thus, many EMEs had to face the trade-off of stabilizing their currency values or retaining monetary autonomy and restrain inflation pressure.

More recently, the tide of the world economy seems to have changed. The U.S. and Japanese economies started showing some signs of recovery while the Euro debt situation seems to have been stabilized. This situation has created a different type of dilemma for many of EMEs. On the one hand, the recovery of advanced economies is beneficial to these economies because the advanced economies are important trading partners for EMEs after all. On the other hand, recovery in the advanced world, that may lead to lifting the extremely low interest rate policies or a tapering of unconventional monetary measures, could change the direction and volume of capital flows. In fact, in the summer of 2013, a mentioning of a possible tapering of the QE by U.S. Federal Reserve officials unnerved the international financial markets especially those in

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<sup>1</sup> Refer to Fawley and Neely (2013) for an extensive review on unconventional monetary policy measures taken by the United States, Japan, the United Kingdom, and the Euro area.

EMEs. As of the summer of 2013, those EMEs that are particularly dependent on external capital such as India, Brazil, Indonesia, Turkey, and South Africa have already experienced rapid depreciation of their currencies.

In the immediate aftermath of the crisis, despite the dilemma of currency appreciation pressures vs. inflationary expectations, it is also true that the influx of hot money contributed to lowering the cost of capital and helped the economies of capital recipient countries boom. Along with being scatheless from the global crisis, easy money created a sense of complacency among some EMEs.

Now that the United States, the epicenter of the global financial crisis, started considering normalizing their monetary policy and tapering unconventional measures, it seems that we are now about to enter the world of the “post-, post-crisis” period. Some of the EMEs that received massive capital inflows seem afraid of starting the post-, post-crisis era with capital flight and possibly a financial crisis.

This situation directly applies to the economies in Asia and the Pacific. Especially, Southeast Asian countries received massive capital inflows and faced high appreciation pressures in the immediate post-crisis period. Now, these EMEs are feeling nervous about the recovery of advanced economies and a possible tapering of their monetary measures.

In the Asia and Pacific region, economies are paying close attention to the three economic giants: the United States, Japan, and China. For the U.S. and Japan, smaller economies need to be concerned about the potential changes in monetary policies of the two economies, but especially the United States. As for China, while its monetary policy does not yet have the same effect on the EMEs to the same extent as the U.S. or Japan, the current slowdown of the economy and the possibility of a non-performing loans problem due to the implosion of the shadow banking system may have massive impacts on smaller neighboring economies.

Against this background, this paper examines monetary policy management in the Asia and Pacific region with focus on the EMEs and their linkages with the economic giants. More particularly, this paper will explore the following questions. Are the small, open economies in the region facing a similar situation to the one immediately before the breakout of the Asian crisis? What kind of challenges are these economies facing in terms of managing monetary policy in a globalized world? To what extent and how can these economies be affected by the monetary policy decisions of major advanced economies? What are the issues central bankers

and other policy makers should be aware of in managing their economies through the potential spell-over effects?

## **2. Are We Seeing the Déjà-vu? – Comparison Between the Pre-Asian Crisis and the Current Economic Situations for Asia**

### **2.1. Economic Indicators**

The first question to explore is whether the economies in the Asian region are facing a similar situation to the time immediately before the Asian financial crisis of 1997-98. Table 1 reports the key economic indicators, especially those considered as good predictors of financial crises.<sup>2</sup>

Overall, the economic conditions of the Asian economies as of 2010-12 do not appear as overheating as in the pre-Asian crisis years. In those years, the economies that ended up experiencing financial crises (i.e., Indonesia, Korea, Malaysia, and Thailand) experienced persistent, sizeable current account deficit. Now, all these economies as well as others have had better current account balances. Especially, the improvement of current account balances of the four crisis economies is quite notable. India and Indonesia are the only two economies that have had cumulative current account deficit in the 2010-12 period. Indonesian current account deficit situation is still better than in the pre-Asian crisis years whereas India's current account balances are worse. As of this writing, both economies are experiencing relatively large currency depreciation pressure.

Better current account balances are also reflected as higher levels of international reserves (IR) holding. The former crisis economies, except for Indonesia, have increased the amount of IR holding significantly, reflecting their precautionary motives to hold a large amount of IR (Aizenman and Lee, 2007). As for Indonesia, given the size of its economy, the amount of IR holding does not appear large in terms of both as a ratio to GDP and to total external debt, which may explain the rapid depreciation of the currency in recent years.

The growth of both private credit creation and stock market capitalization, which can be good predictors of asset markets overheating, is mostly contained compared to the pre-Asian crisis period, though several economies such as Korea and Thailand are experiencing rapid

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<sup>2</sup> “Cumulative CA” is the sum of current account balances over the period and expressed as the ratio to the GDP as of the last year of the period (i.e., 1996 or 2011). “Credit growth” and “Stock market growth” are the annual changes in the ratios of private credit creation and stock market capitalization as ratios to GDP, respectively.

growth in stock market capitalization and several others such as China, Hong Kong, Malaysia, Singapore, and Vietnam are experiencing a market slump. Similarly, inflation situations significantly improved, except for Vietnam.

Like other financial crises in EMEs, the Asian crisis economies experienced an influx of capital inflows (or “surges” as in Ghosh, et al., 2012 and others). Figure 3 illustrates the averages of net private capital flows for different country groups including the group of Emerging Asia excluding China.<sup>3</sup> From the figure, it is clear that, as of the last few years, the emerging market economies in Asia and the Pacific are not experiencing the surges of capital inflows to the same extent as in the years leading up to the Asian crisis in the late 1990s. In fact, these economies are on average experiencing moderate outflows of capital since the beginning of the 2000s.

Asset markets in the Asian economies are not overheated as was the case in the years before the Asian crisis. Table 2 is an excerpt from the IMF’s *Regional Economic Outlook* (2011) and reports several asset market indicators often used to examine whether the markets are experiencing an overheat or bubble. The table shows to what extent such indicators as price/earning ratios, residential price/rent ratios, growth of credit-to-GDP ratios, and debt/equity ratios deviates from their long-term averages when the economy of concern is experiencing a “surge” of capital inflows.<sup>4</sup> Figures in the table are the number of standard deviations for the deviation from the long-term averages. Colors are based on the number of standard deviations. Green means the variable of concern is not too much above its long-term average (less than 1.5 standard deviations), orange moderately above (between 1.5 and 2 standard deviations), and red greatly above the long-term average (greater than 2 standard deviations) which suggests an overheating based on that particular indicator.

Not surprisingly, during the time of surges in the 1990s, many cells are colored red or orange, indicating that many economies were experiencing an overheat in their asset markets in the years leading up to the Asian crisis. Clearly, massive increases in capital inflows were accompanied with much higher asset valuations in those years. More recently (i.e., as of REO

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<sup>3</sup> See Appendix for the grouping of countries.

<sup>4</sup> For the definitions of the ratios, refer to IMF (2010) or Pradhan, et al. (2011). “Surges” refer to the episodes of temporarily high capital inflows or to a significant increase in net capital flows. While different researchers have different definitions of “surges,” it is common to set a threshold for the level of capital inflows and define a surge if the level of net capital flows surpasses the threshold. See Cardarelli et al. (2009), Forbes and Warnock (2012), Ghosh, et al. (2012), and Reinhart and Reinhart (2008).

2011), most of the economies are experiencing the “green” state, except for China and Hong Kong both experiencing rapid growth in credit creation.<sup>5</sup>

Lastly, real effective exchange rates appear to be relatively stable for emerging market economies in Asia, except for China (Figure 4).<sup>6</sup> In the post-global financial crisis years, real effective exchange rates for emerging Asian economies are on an appreciation trend, but the average level is only less than 5% higher than the level as of June 2008, immediately before the collapse of Lehman Brothers.<sup>7</sup> Compared to the years before the Asian crisis, the extent of real appreciation is much lower. Along with the high levels of IR holding, the pressure on the foreign exchange markets is not high.

## 2.2. The Policy Mix

The economic situations we have observed are partially the outcomes of policy decisions. Now, let us see how the situations of Asian economies’ open macroeconomic management at present look compared to the pre-Asian crisis period.

An effective way to observe open macroeconomic management is to apply the concept of the “impossible trinity” or the “trilemma.”

In the hypothesis of the trilemma, countries are supposed to adopt a combination of three policy goals: monetary independence, exchange rate stability, and financial openness, with different degrees of attainment in each. In their policy decisions, we assume that policy makers tend to focus only on the positive aspects of the three open macro policies, and therefore to prefer pursuing higher levels in all three policies believing that higher levels of these policies would help them stabilize their economies.<sup>8</sup> However, while it is possible to achieve the full

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<sup>5</sup> As of this writing, China started experiencing a slow down in credit creation after the summer of 2013.

<sup>6</sup> The real effective exchange rate is extracted from the BIS effective exchange rate database. It is reindexed to have the level of the exchange rate as of June 2008 as 100.

<sup>7</sup> One exception among Asian emerging market economies is China. Its currency appreciated in real terms by 25% since the summer of 2008 (20% in nominal terms). Another exception in the region is Japan. Since the summer of 2008, the effective exchange rate for the Japanese yen appreciated by 40% in nominal terms and 20% in real terms by mid-2012. However, once Prime Minister Shinzo Abe implemented *Abenomics* at the end of 2012, the currency depreciated significantly. As of the fall of 2013, the effective exchange rate for the Japanese yen is about 10% above the pre-global financial crisis level in nominal terms and 5% below in real terms.

<sup>8</sup> Greater exchange rate stability or simply adopting a fixed exchange rate regime would help bring out price stability and foster investment and international trade by lowering risk premium and mitigating uncertainty. Retaining monetary autonomy or independence could help stabilize the economy. Greater financial openness may allow countries to share risks, that would also help stabilize output movement. However, each of the policies has its own downsides. Greater exchange rate stability can lead to the loss of stabilization through exchange rate fluctuations. High levels of monetary autonomy could harm fiscal discipline through monetization of the debt. Highly open

extent of two policy goals, it is impossible to achieve simultaneously the fullest degrees in all the three policy goals. In other words, policy makers are constrained by the linear relationship of the three policies.<sup>9</sup> As long as the linear constraint is not violated, an economy may adopt a combination of intermediate degrees of all of the three policy goals. Thus, an infinite number of policy combinations can exist.

To see the state of policy mix for the economies of our concern, we use a set of the “trilemma indexes” developed by Aizenman, Chinn, and Ito (2008). These indexes measure the degree of three policy choices monetary authorities make in the context of the trilemma. In their metrics, the monetary policy independence index is based on the correlation of a country’s interest rates with the base country’s interest rate. The index for exchange rate stability is an inversion of the annual standard deviations of the monthly rate of exchange rate depreciation where the exchange rate is defined between the home and the base country.<sup>10</sup> The degree of financial market openness is measured by the capital account openness index developed by Chinn and Ito (2006, 2008).<sup>11</sup>

In addition to the three trilemma policies, it would be more useful if we incorporate the level of IR holding in this context. IR holding has been increasing its importance in the globalized world and is closely related to changing patterns of the trilemma especially for developing countries and emerging market economies, because these economies are increasingly exposed to volatile short-term inflows of capital (or “hot money”), subject to frequent sudden stops and reversals (see Calvo, 1998). The empirical evidence suggests that international reserves can reduce both the probability of a sudden stop and the depth of the resulting output collapse when the sudden stop occurs.<sup>12</sup> Aizenman and Lee (2007) link the large increase in reserves holding to the deepening financial integration of developing countries and find evidence that

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financial markets would make the economy vulnerable to external financial shocks and therefore susceptible to boom and bust cycles.

<sup>9</sup> That implies that if the extent of achievement in the three policy goals is measured by some normalized indexes, the sum of the three indexes must be a constant. Aizenman, et al. (2013) and Ito and Kawai (2012) empirically proved the linearity of the three policy variables.

<sup>10</sup> The base country for both exchange rate stability and monetary independence indexes is defined as the country that a home country’s monetary policy is most closely linked with as in Shambaugh (2004). The base countries are Australia, Belgium, France, Germany, India, Malaysia, South Africa, the U.K., and the U.S.

<sup>11</sup> More details on the construction of the indexes can be found in Aizenman, et al. (2008). The three indexes are updated to 2012 for monetary independence and exchange rate stability, and 2011 for financial openness.

<sup>12</sup> See Ben-Bassat and Gottlieb (1992), Rodrik and Velasco (1999), and Aizenman and Marion (2004) for papers viewing international reserves as output and consumption stabilizers.

international reserves hoarding serves as a means of self-insurance against exposure to sudden stops.

The “diamond charts” in Figure 5 are an easy and intuitive way to summarize the trend of open macro policy combinations. The configuration of the four policy variables of a country or a country group at a given instant is represented by a “generalized diamond,” whose four vertices measure monetary independence, exchange rate stability, IR holding (as a ratio to GDP), and financial integration. The origin has been normalized so as to represent zero monetary independence, pure float, zero international reserves, and financial autarky. Figure 5 display the diamond charts for Emerging Asian economies excluding China, the four economies that experienced the Asian crisis of 1997-98, non-Asian emerging economies, and China for three different time periods: the pre-Asian crisis period (1990-96), the pre-global financial crisis period (2000-07), and the post-global financial crisis period (2010-12).<sup>13</sup>

In the figure, we can make several interesting observations about the development of Asian economies’ open macro policies in recent years compared to the past periods. First, Asian emerging market economies have reduced the extent of exchange rate stability over time after the Asian crisis. This also applies to China to a lesser extent, reflecting its decision to allow more exchange rate fluctuations in 2010 after repegging to the dollar in 2008. Second, while the extent of financial openness declined slightly for the group of Emerging Asian economies, some of the extent of exchange rate stability is replaced with a pursuit for greater monetary independence.<sup>14</sup> Much of the increase in monetary independence levels can be explained by the zero interest rate policy implemented by the U.S. In essence, Emerging Asian countries’ monetary policies have become decoupled from that of the U.S. or other advanced economies, which was also necessary to shun the influence of the crisis situations in the advanced economies. Third, as has been widely reported, Asian EMEs have increased the level of IR holding. Not only the Asian crisis economies, but also the economies that did not experience the Asian crisis have also increased the level of IR holdings. Dominguez et al. (2011) show that countries with high levels of IR holding performed better in terms of GDP growth in the post-global financial crisis period. Obstfeld et al (2009) show that countries with larger international reserve holdings experienced

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<sup>13</sup> For financial openness, the period average is calculate for 2010-11 since the index is available only up to 2011.

<sup>14</sup> The level of financial openness dropped significantly for the four crisis economies because all the economies, except for Korea, lowered the level of financial openness in 2010-11. For the Emerging Asian group excluding the four crisis economies, it is found that the degree of financial openness have been increasing over time since the 1990s.



smaller sizes of currency depreciations during 2008. Considering these points, it is understandable for these economies to increase IR holdings. Also, the extent of fall in the level of exchange rate stability could have been larger if these economies had not had massive IR holdings. Fourth, China continues to increase its IR holding in the 2010-12 period, making its GDP ratio up to 43%.<sup>15</sup> Chinese monetary authorities have been trying to abate the appreciation pressure by intervening the foreign exchange market. Furthermore, the global financial crisis may have convinced Chinese monetary authorities about the importance of international reserves as buffers to financial globalization, though the depreciation trend of the U.S. dollar has been a headache for their reserve portfolio management.

Panel (d) of Figure 5 shows that none of the recent characteristics of Asian EMEs applies to other EMEs. Non-Asian EMEs maintain the same levels of monetary independence and exchange rate stability for the last two decades, while slightly increasing the level of financial openness over the years. They have also increased the level of IR holdings, but not to the same extent as Asian EMEs.

Over all, despite the expectation that advanced economies, mainly the U.S., may normalize their monetary policy, and that that may lead to capital reversals from emerging market economies, economic indicators and the current situation of open macro policy management give us a benign picture of the state of the economy unlike the time immediately before the Asian crisis.

However, alarmists claim that because of the ostensibly irreversible waves of financial globalization, the fate of economies outside the advanced world, especially open small ones, is so intertwined with the policy changes in the economic center country, i.e., the United States. Now, we need to investigate the issue of financial interlinkages.

### **3. Interest Rates Linkages and Their Implications on Monetary Policy Management**

#### **3.1. Linkages between Domestic Interest Rates and Financial Globalization**

Recently, a number of researchers have argued that financial globalization has made domestic asset prices and interest rates more vulnerable to developments in capital markets abroad. They also argue that if domestic financial markets are more susceptible to international

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<sup>15</sup> The volume of China's reserves is \$3.7 trillion as of the end of September 2013. The volume of U.S. treasuries is \$1.3, accounting for about one third of the total.

factors, that would help decouple short-term and long-term interest rates. That is, while short-term interest rates are under more direct controls of monetary policy makers, long-term yields can be more affected by global factors if the domestic market is more open to international investors, thereby making it harder for policy makers to control longer-term interest rates through manipulating the shorter end of the yield curve. Because long-term interest rates affect both financial and real activities more directly, decoupling of short-term and long-term interest rates could also mean policy makers would have a harder time in managing both macroeconomic and financial stability.

In the mid-2000s, when the U.S. Federal Reserve was raising the federal funds rate to rein in the economy, the longer-end of the yield curve turned out to be less responsive. The former Federal Reserve Chairman Mr. Alan Greenspan referred to the lack of responsiveness in the long-term interest rates as “conundrum.” A widely received argument to explain the conundrum was the “global saving glut” view (Bernanke, 2005; Clarida, 2005; Greenspan, 2005a,b). According to this view, the lack of sophisticated financial assets or other investment opportunities in countries with excess saving, namely, China, Japan, other East Asian economies, and oil exporters, had led to massive capital flows to the United States where financial markets are well-developed and sophisticated, and legal systems and institutions support smooth financial transactions (Caballero, et al., 2008). Warnock and Warnock (2009) estimate that if there were no foreign purchase of U.S. Treasury and agency bonds, U.S. long-term interest rates would have been 80 basis points higher. In a cross-sectional context, Byrne, et al. (2010) provided empirical evidence that the disconnect of short- and long-term interest rates is not just happening to the U.S. but also to other industrialized countries.

While the “Greenspan conundrum” received much attention in the debate for the cause of the U.S. housing bubble or the global imbalances, it has also been pointed that emerging market economies have also been experiencing their own conundrum. As the financial markets of the EMEs become more open toward foreign investors, foreign capital flow may have started affecting the pricing of assets and interest rates in these economies. Both Pradhan, et al. (2010) and Peiris (2010) found that among major EMEs, a one percentage point increase in nonresident purchases of local bonds would lead to a 5-6 basis points reduction in long-term yields.

Figure 6 illustrates the development of the degree of financial openness using the Chinn-Ito de jure measure of financial openness (panel (a)) and the de facto measure based on the Lane

and Milesi-Ferretti (2006, 2007, and updates) dataset of external assets and liabilities (panel(b)).<sup>16</sup> Both panels of figures show that emerging market economies have been increasing the extent of financial openness especially since the mid-1990s, though Emerging Asian economies, excluding China, Hong Kong, and Singapore, seem to be somewhat lagging behind other EMEs. Figure 7, however, illustrates that Asian economies have been experiencing a rapid growth in terms of the share of foreign holdings of government bonds.

In a financially globalized world, global shocks or monetary shocks of the center country, i.e., the U.S., can influence the ebb and flow of cross-border capital movements, especially for small open economies. There has been vast literature on identifying “push” (= supply-driven or global common shocks) and “pull” (= demand-driven or country-specific) factors in determining the direction and volumes of cross-border capital flows, especially since EMEs with newly liberalized financial markets experienced financial crises.<sup>17</sup>

Focusing on the global factors, Forbes and Warnock (2010) categorize episodes of extreme capital movements into four different types (surges, stops, flights and retrenchments), and find that global factors such as interest rates in advanced economies, global risk, and contagion effects affect the retrenchment of residents’ assets abroad. Ghosh, et al. (2012) find that global factors such as U.S. interest rates and risk aversion (measured by the VIX index) affect the likelihood of an occurrence of a “surge,” or a rapid increase in capital inflows, while country-specific factors or structural factors determine the magnitude of capital inflows for the economies that are experiencing an surge. Ahmed and Zlate (2013) find that global risk appetite as well as growth and interest rate differentials are important determinants of net private capital flows to EMEs.<sup>18</sup>

Figure 8 displays the development of the VIX index, that measures the implied volatility of S&P 500 index options, as well as the development of net capital flows to EMEs. The VIX

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<sup>16</sup> The de facto measure is shown as the sum of external assets and liabilities as a ratio to GDP. However, it must be noted that normalizing the sum of total assets and liabilities as a ratio of GDP would make the resultant index unnecessarily small for large economies like the U.S. or extremely large for international financial centers such as Ireland, Luxemburg, Singapore, and Hong Kong. Also, the de facto measure can be subject to cyclical factors as it appears the index series is dented at the time of the global financial crisis in the figure. For the sample averages of both measures, the “ex-China Emerging Asia” group excludes Hong Kong and Singapore, both small city states with the roles as regional financial centers.

<sup>17</sup> For the analyses on the “push” and “pull” factors, see Chuhan, et al. (1993), Taylor and Sarno (1997), Griffin, et al. (2004), and Fratzscher (2011) among many others.

<sup>18</sup> The also investigated the impact of U.S. unconventional monetary expansion on net capital flows to EMEs, but did not find statistically significant effects.

index is a measure of uncertainty or risk aversion of the markets, so its scale (on the right-hand side) is reversed so that it can be seen as a measure of investor risk appetite. From the figure, we can see that the volumes of capital flows to EMEs tend to rise when risk appetite is higher. Figure 9 shows the development of VIX and the country group averages of correlations between long-term yields in the sample countries and the United States.<sup>19</sup> Here, when investors have higher risk appetite, the correlations of long-term yields tend to be higher especially EMEs, particularly Asian EMEs. In sum, financial globalization may have made asset prices and interest rates in EMEs more subject to global movements of capital, that is usually heavily influenced by the monetary policy of the center country, the United States.

More recently, Rey (2013) argues that financial globalization has made countries' macroeconomic conditions more sensitive to the "global financial cycle" in capital flows, asset prices, and credit growth. The monetary policy of the center country in the international financial system is one of the important determinants of the global financial cycle. In the markets where capital is freely mobile, she continues to argue, the center country's monetary policy influences other countries' national monetary policies through capital flows, credit growth, and bank leverages. This linkage between the center and other countries' monetary and financial conditions is irrespective of the types of exchange rate regime of the non-central countries. In such a global financial system, the aforementioned monetary trilemma reduces to a mere dilemma or an "irreconcilable duo" of monetary independence and capital mobility. In other words, restricting capital mobility is the only way for non-central countries to retain monetary autonomy.<sup>20</sup>

While Rey (2013) does not provide any empirical evidence that the trilemma reduces to a dilemma, or more particularly that the types of exchange rate regimes do not matter for the pass-through of interest rates from the center country to others, there are several empirical studies related to this issue. Aizenman, et al. (2013) used the trilemma indexes for 1970 through 2010 and empirically showed that the variables for the three trilemma are linearly related.<sup>21</sup> With the linearity, a rise in one trilemma variable should be traded-off with a drop of the weighted sum of

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<sup>19</sup> Long-term bond yields are used whenever available. When they are not available for EMEs, lending rates are used.

<sup>20</sup> In order for her argument to hold, the world has to have achieved the state of fully free capital mobility. However, as the previous figures showed, that is true only for traditional advanced economies, not other developing or emerging market economies.

<sup>21</sup> Using a different set of indexes, Ito and Kawai (2012) also evidenced the linearity among the three trilemma variables.

the other two, suggesting that for a given level of financial openness, the type of exchange rate regime should matter for the extent of monetary independence, which implicitly denies Rey's contention of the "irreconcilable duo." Obstfeld, et al. (2005) examined the extent of the linkage of the interest rates between the sample countries and their base countries among different financial openness regimes. They found that in the regime absent of capital controls, countries with exchange rate pegs lose monetary independence considerably. Klein and Shambaugh (2013) examined to what extent intermediate levels of exchange rate stability or capital account openness would allow a country to retain monetary autonomy. They showed that while a full or even moderate degree of exchange rate flexibility allows a country to retain monetary autonomy, only extensive, not partial, capital controls would enable a country to have monetary autonomy. In contrast, Saxena (2008) found the extent of pass-through from foreign interest rates to domestic interest rates is higher under *floating* exchange rate regimes than pegging regimes.<sup>22</sup> Christiansen and Pigott (1997) also suggest that even under floating exchange rate regimes, foreign factors play an important role in affecting long-term interest rates.

After all, as previously discussed, like in the case with the U.S. conundrum, external or global factors have been important determinants of domestic interest rates as Moreno (2008), Pradhan, et al. (2011), and Ciarlone, et al. (2009) have shown. One way to reconcile Rey's view of the "irreconcilable duo" and the trilemma is to allow different degrees of connectivity between the center and non-central countries depending on what part of the yield curve one is referring to. In other words, while the concept of monetary autonomy in the trilemma hypothesis is about to what extent policy makers can have controls over domestic short-term policy interest rates without being subject to foreign monetary policies, Rey's "irreconcilable duo" view is more about interest rates for the longer-end of the yield curve.

Unlike short-term interest rates that are directly under the control of monetary authorities, long-term interest rates can be influenced by not only short-term policy rates, but also other factors including future direction of policy, inflation expectations, risk premia, and foreign interest rates. Hence, as financial globalization proceeds and foreign investors start affecting the pricing of financial assets, it can become harder for policy makers to have a better grip on the

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<sup>22</sup> To explain the counterintuitive results, Saxena argues that the classification of exchange rate regimes may allow some of the countries that conduct active but incomplete foreign exchange interventions to be classified as "floating" regimes so that the results for the floating regimes may include those of de facto pegging regimes. Also, she argues countries with floating exchange rates tend to have more developed financial markets which tend to follow the trend of the center country's financial markets.

longer-end of the yield curve. The possibility of capital reversals or flight, or that of a large amount of issuances of foreign currency-denominated debt could add to higher risks of longer-term bonds, and thereby make it harder for policy makers to control the longer-end of the yield curve. Before examining the possibility, let us see how the correlation between domestic and foreign interest rates look for Asian and other EMEs.

### **3.2. Observations of the Interest Rate Pass-through from the Center Country**

Panel (a) of Figure 10 illustrates the 36-month rolling correlations of domestic money market rates with the U.S. money market rate for different country groups, including Asian EMEs, and China. The figure shows that from 2003 through 2011, the correlation between domestic and the U.S. interest rates appear relatively high except for 2005 and the time of the global financial crisis. The two dips in the correlations correspond to the time when the U.S. Federal Reserve changed its policy rate rapidly.<sup>23</sup> For the Asian EMEs, the level of correlations was high in the early-1990s, reflecting the de facto dollar-pegs many of the economies adopted during the period. In the last few years, the correlations are negative for all the country groups, especially Emerging Asia, and China. The figure presents a consistent picture to the previous diamond charts. As far as the short-term interest rates for Emerging Asia are concerned, the economies appear to have retained moderately high levels of monetary independence in recent years.

Panel (b) of Figure 10 displays the correlations between the short-term interest rates of Emerging Asian economies and those of the U.S., China, and Japan. Since the short-term rates of China and Japan must be correlated with the U.S. rates, the short-term rates of the two countries are orthogonalized with respect to the U.S. rates by regressing the Chinese or Japanese rates on the U.S. rate, respectively, and using the residuals to calculate the correlations with the U.S. rate.<sup>24</sup>

Panel (b) makes it clear that it is predominantly the U.S. short-term interest rate that the short-term rates of Emerging Asian economies are highly correlated with. Chinese and Japanese short-terms are correlated with those of Emerging Asian economies only briefly, around early

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<sup>23</sup> The Federal Reserve started raising the federal fund rate target from 1.00% in June 2004 to 5.25% in June 2006. It started lowering the target from 5.25% in September 2007 all the way essentially to the 0.00-0.25 by December 2008.

<sup>24</sup> The blue line for the correlations between Emerging Asian economies' and U.S. short-term rates is the same as the blue line in Panel (a). It is included for comparison purposes.

2011 for China and around 2000 for Japan. For Emerging Asian economies, clearly, the U.S. is the center country.

Figure 11 is recreated for long-term interest rates. In Panel (a), the long-term interest rates of Emerging Asia are highly correlated with that of the U.S. rates in much of the last decade. Since 2005, the correlation has been on a rising trend despite the global financial crisis and the rapid decline in the correlations of the short-term interest rates we saw in Figure 10. Since the late 2000s, it does seem that short- and long-term interest rates have been decoupled, which may suggest that policy makers may have to find it difficult to control macroeconomic and financial conditions through maneuvering short-term interest rates.

Furthermore, according to Panel (b) of Figure 11, the U.S. functions as the center country for Emerging Asian economies in terms of long-term interest rates as well. Figure 12 illustrates the correlations of stock market price indexes with the U.S. index for different country groups and China. Since the mid-2000s till recently, all the country groups had maintained high levels of correlations of stock market price indexes with the U.S. stock market. Since the global financial crisis, the correlation has been declining for all the groups, but to only a lesser extent for Emerging Asian economies. In sum, the correlations of both the long-term interest rates and the stock market price indexes are not well-connected with that of short-term interest rates.

These figures help connect Rey's view and the trilemma; even if policy makers appear to have monetary autonomy in the context of the trilemma, it does not necessarily guarantee that they can well-manage macroeconomic and financial conditions. In other words, the extent of interlinkages between short-term and long-term interest rates, or the effectiveness of monetary policy, may be affected by the degree of exposure to cross-border capital flows, which will be examined in the next subsection. Before conducting a more formal analysis, however, let us see how the nature of correlations of financial variables between the non-central countries and the U.S. can depend upon the type of monetary regimes.

Figure 13 displays the 36-month rolling correlations of money market rates with the U.S. again, but the correlations are averaged for three types of exchange rate regimes: Fixed, intermediate, and floating.<sup>25</sup> In the figure, the difference among the three exchange rate regimes is not evident. However, the extent of interest rate linkages, or the lack of monetary autonomy, is

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<sup>25</sup> When the exchange rate stability index is greater than 0.70, it is considered to be "fixed." The country-years whose exchange rate stability index is less than 0.30 are considered to be "floating." The range in-between is considered to be "intermediate."

a function of *both* the type of the exchange rate regime and the extent of financial openness. Hence, without conditioning on the level of financial openness, the extent of interest rate linkages does not have to differ.

Figure 14 shows the correlations for three types of financial openness regimes: open, intermediate, and closed.<sup>26</sup> The difference in terms of the level of correlations is more distinct among the three financial openness regimes than among the three exchange rate regimes, though, again, financial openness alone does not have to make the extent of monetary interdependence differ. In any case, the correlations of money market rates with that of the U.S. are stronger for more open regimes.

Given that the strength of interest rate interlinkages has to be conditional upon the extents of *both* exchange rate stability and financial openness means, among the financially open regimes, fixed exchange rate regimes should have the strongest interest rate interlinkages while floating exchange rate regimes should have the weakest.<sup>27</sup> Figure 15 again presents the correlations of the short-term rates for the three types of exchange rate regimes, but only for the most open regimes for capital account transactions.

As the trilemma hypothesis predicts, among the economies most open for cross-border capital flows, fixed exchange rate regimes appear to have the strongest interest rate interlinkages. As Aizenman, et al. (2013), Obstfeld, et al. (2005), and Ito and Kawai (2012) have shown, the hypothesis of the trilemma does hold. Hence, in contrast to Rey's (2013) contention, even among financially open regimes, the type of exchange rate regimes does matter as far as short-term interest rates are concerned.

What about the linkages of long-term interest rates between economies and the center country, i.e., the U.S.? Figure 16 shows the correlations of the long-term interest rates for the open, intermediate, and closed financial openness regimes. From the early 1990s through the mid-2000s, the gap between open and closed regimes is large, though the gap has dwindled in the last decade. Besides the last decade, Rey's claim seems applicable for the long-term interest rates.

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<sup>26</sup> The cutoffs for the three regimes financial openness are comparable to the case of the exchange rate stability index.

<sup>27</sup> Similarly, for the fixed exchange rate regimes, the most open regime for capital account transactions should have the strongest interest rate interlinkages while the most closed ones should have the weakest.



As was previously discussed, there is a possibility that policy makers of an economy highly open to international financial markets may find it difficult to control the longer end of the yield curve even when they have monetary autonomy in the context of the trilemma. Hence, it is reasonable to investigate how greater exposure to international financial markets could affect the extent of linkages between short-term and long-term interest rates, which the next subsection will investigate.

### 3.3. Estimation on the Determinants of the Yield Curve

We first examine to what extent long-term interest rates respond to short-term interest rates by running the following estimation. The estimated coefficient  $\hat{\beta}_i$  in the model can be considered as a measure of the responsiveness or pass-through, of the long-term interest rates ( $i_{LTI,t}$ ) to the short-term interest rates ( $i_{STI,t}$ ).

$$\Delta i_{LTI,t} = \alpha + \beta_i \Delta i_{STI,t} + \varepsilon_{i,t} \quad (1)$$

I estimate the  $\beta$  coefficient with a 36-month rolling window for each of the sample countries, which means that a time-varying measure of the extent of responsiveness can be obtained for each country. Because it is the long-term interest rates that can affect both real and financial activities while policy makers try to control short-term interest rates to affect them,  $\hat{\beta}_{i,t}$  can be regarded as the measure of monetary policy effectiveness.

Using the estimated  $\hat{\beta}_{i,t}$ , I will investigate the determinants of the extent of interest rate pass-through using the following estimation model.

$$\hat{\beta}_{i,t} = \phi_0 + \phi_1 KFlow_{i,t} + X' \Phi + u_{i,t} \quad (2)$$

*KFlow* is net capital flows as a share of GDP, and *X* is a vector of other determinants including the variables for inflation volatility, output volatility, and output gap as well as the dummies for currency crisis and high inflation episodes. Inflation volatility and output volatility are measured as the 5-year standard deviations of CPI-inflation and real output growth rates,

respectively. Both inflation and output volatilities would contribute to higher degrees of uncertainties, either monetary or real, for monetary policy makers.<sup>28</sup>

Output gap is measured as the difference between real output growth rates and five-year rolling average growth rates of real output. The extent of interest rate pass-through may differ depending on whether the policy rate rises or falls because the term premium often makes the yield curve upward sloping. Output gap may capture whether the economy is on the state of a rising or falling policy rate. If the coefficient on the output gap variable is found to be positive, that suggests a fall in the policy rate leads to a smaller response in the longer-term interest rate compared to when the policy rate is rising. The currency crisis dummy is based on often-used exchange market pressure (EMP) index (Eichengreen, Rose, and Wyplosz, 1995).  $X$  also includes the dummy for a country-year with the annual inflation of 50% or higher. While both dummies are supposed to capture noise in the dependent variable, it is likely that the policy rate disproportionately rises with respect to long-term interest rates in the case of currency crisis and that the long-term rate disproportionately rises with respect to short-term interest rates in the case of high inflation.

We apply this estimation model to a panel of 71 countries from the 1970-2011 period, including 47 developing countries, out of which 31 countries are emerging market economies.<sup>29</sup> Table 3 reports the results of the estimations conducted with the Ordinary Least Squares (OLS) method.<sup>30</sup>

Among the full sample and the industrial (IDC) and developing countries (LDC) subsamples, net capital flows are found to contribute negatively to the beta coefficient, suggesting that a country that receives more net capital inflows tends to have a weaker linkages

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<sup>28</sup> As for inflation volatility, on the one hand, it is highly correlated with the level of inflation so that the longer-end may tend to be stuck at higher levels. On the other hand, based on the “Greenspan conundrum” argument, a fall in the level of inflation volatility during the Great Moderation era may have contributed to underpricing of risk, which may have helped the longer-end of the yield curve stuck at low levels despite a series of increases in the short-term interest rates in 2004-05. To a lesser extent, the same explanation may apply to output volatility, though it seems more reasonable to assume that greater output stability might lead to greater effectiveness of monetary policy due to increased predictability of both economic conditions and economic policy management.

<sup>29</sup> See Appendix for country groups. Not all the countries used for previous summary statistics are included in the estimations due to data limitations.

<sup>30</sup> The estimates for the constant term and the dummies for currency crisis and high inflation are omitted from the table.

between short-term and long-term interest rates.<sup>31</sup> For the EMEs, the coefficient on the net capital flow is found to be negative, but not statistically significant.

Columns (5) through (8) report the estimation results for the same country groups, but for the subsample period of 1990-1996, the years leading up to the Asian crisis and other EME crises when many EMEs, especially those in Asia, experienced an influx of capital flows. For this subsample period, the coefficient on net capital flows is significantly negative for the full sample, and both LDC and EME subsamples. Furthermore, compared to the estimation for the full sample period, the magnitude of the significant estimates is considerably larger for this subsample period.

In the “Great Moderation” period of 2000-2007, the significantly negative coefficient on net capital flows remain for the full sample and the LDC subsample, but not for the EME group. For the post-global financial crisis, possibly due to small sample sizes, the estimation results do not appear to be robust for any of the sample groups.

The net capital inflows variable can be endogenous in the last OLS estimation. Although the correlations between net capital inflows and other right-hand side variables do not suggest the possibility of multicollinearity, conceptually, other right-hand side variables can affect net capital inflows, or vice versa.

As the literature on the “push” and “pull” factors of cross capital flows has shown, a number of factors affect the direction and the volume of cross-border capital flows. These factors include global factors such as the monetary policy of the center country and the level of risk appetite of international investors as well as some domestic factors of capital recipient countries such as the level of institutional or legal development, growth prospects, the state of its own monetary policy, and the capital controls policy. These factors could first affect the volumes and the directions of capital flows, then the latter may affect the interest rate pass-through.

To incorporate the literature on the determinants of capital inflows and the endogeneity issue, the two stage least square (2SLS) estimation method is applied. First, we regard the volume of net capital inflows as a function of policy interest rate differentials with the United States; real output growth differentials with the U.S.; relative real income to the U.S. level; the domestic country’s level of de jure financial openness (the Chinn-Ito index); and the volatility of

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<sup>31</sup> The estimation also includes the dummies for Japan in 2005 and 2006, Iceland in 2006-2011, and Bulgaria in 1997-2001 to control for the outliers of the estimated beta. Hence, part of the high adjusted R-squares, especially for the full and IDC samples, reflect the contributions of the dummies for the outliers.

S&P stock market price index (measured by the annual standard deviations of monthly percentage changes of S&P price index).<sup>32</sup> These variables should cover both “pull” and “push” factors. Also, since currency crisis should affect capital inflows more directly than the measure for the extent of interest rate pass-through, it is included in the first estimation. The output gap variable is removed from the estimation since it is redundant with the variable for output growth differentials with the U.S.

Table 4 reports the results from the 2SLS estimation. Both the magnitude and the statistical significance of the estimate for net capital inflows increase, especially for the subsamples of developing countries or emerging market economies. Again, the magnitude of the estimate for net capital inflows is larger during the pre-Asian crisis years than in the “Great Moderation” period. Interestingly, the estimate for net capital flows now becomes significantly negative during the post-global financial crisis period for the group of EMEs. The magnitude of the estimate is relatively large as well.

In Table 5, the subsample of either LDC or EME is divided depending on whether the economy of concern is open or closed based on the de jure measure of financial openness (financially open regime in (1) vs. financially closed regime in (2) for LDC, and open in (3) and closed in (4) for EMEs). The country-year with the de jure measure of capital openness above 0.70 is regarded as “open,” and the country-year with the openness measure below 0.30 as “closed.” The subsamples are also divided depending on whether the level of financial development is “high” ((5) for LDC and (7) for EME) or “low” ((6) for LDC and (8) for EME)). The level of financial development is measured by the first principal component (FD) of private credit creation, stock market capitalization, stock market total values, and private bond market capitalization, all as shares of GDP. If FD is greater than the median level of a particular year, it is regarded as “high” financial development. “Low” is for the level of FD below the annual median.<sup>33</sup>

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<sup>32</sup> The volatility of the S&P price index is used instead of VIX because the latter dates only back to 1990. However, the correlation between the two measures of stock market volatility is about 92%.

<sup>33</sup> Because the private bond market capitalization data go back only to 1990, the FD series before 1990 are extrapolated using the FD composed of private credit creation, stock market capitalization, and stock market total values, which goes back to 1976.

Columns (1) through (4) in Table 5 show that only “open” financial openness regimes have the significantly negative estimates for net capital inflows for both LDC and EME groups.<sup>34</sup> That is, if a developing or emerging market economy is highly open to cross-border capital flows and receives a greater amount of capital inflows, it tends to have a smaller degree of interest rate pass-through, i.e., monetary policy authorities would have a weaker grip on long-term interest rates. When the subgroup of developing countries is divided depending on the level of financial development, again, only developing or emerging market economies with developed financial markets tend to have a negative correlation between net capital inflows and the degree of interest rate pass-through. As in the case of external financial openness, more developed financial markets may make it harder for policy makers to have a control on the longer-term interest rates.

#### **4. Concluding Remarks and Policy Implications**

In this paper, I focused on the issue of monetary policy management the Asian and Pacific emerging market economies when bigger advanced economies started showing some signs of recovery or economic stabilization and considering to change the direction of their monetary policies. As the world economy may be moving on to the next phase, or the post-, post-global financial crisis period, the current situation can be a regime shift for the emerging market economies. In the immediate post-global financial crisis period, due to advanced countries’ both conventional and nonconventional monetary measures, many small open emerging market economies experienced a rise in capital inflows and thereby currency appreciation pressure. Now that the U.S. has started signaling the possibility of tapering their nonconventional monetary measures, emerging market economies have started fearing the possibility of capital flight as it happened in the late 1990s. The fear has been also shared by policy leaders in Asia and the Pacific, who are concerned about the similarities between the current situation and the situation of their economies on the eve of the Asian financial crisis in 1997. As the boom induced by the influx of capital before the crisis was punished by the crisis in 1997-98, they have been wondering if the immediate post-global financial crisis boom will turn into a similar financial crisis.

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<sup>34</sup> The sample period can change depending on the availability of “financially open” regimes. That is, because there was no “open” regimes for developing or emerging market economies until 1989, the estimation for the “financially open” regimes can only start for the period starting in 1989. While the “closed regimes” can have a longer sample period, the starting year is changed to be the same as the one for the open regime estimations, so that the “open” and “closed” regimes estimations can have the same comparable sample period.

This paper first looked into the current economic conditions of Asian EMEs to explore the similarities and differences between the pre-Asian crisis situation and the current one. The economic indicators, those often used as predictors of financial crises, showed that the current situation is more favorable for most of the Asian emerging market economies. Most of the Asian EMEs are experiencing more favorable current account balances and hold much more international reserves. Compared to the pre-Asian crisis period, indicators of asset markets do not suggest signs of overheating.

Second, the current policy mix appears different from that of the pre-crisis period. Compared to the 1990s before the crisis, emerging market economies in Asia on average have higher levels of monetary autonomy and exchange rate flexibility. Generally, greater monetary autonomy and exchange rate flexibility can help policy makers to stabilize their economies.<sup>35</sup>

However, it has been increasingly argued that financial globalization has been playing a bigger role in determining domestic asset prices and interest rates. If that is the case, even with greater monetary autonomy, monetary authorities may not be able to keep controls of financial markets and the real economy as Rey (2013) argues. In fact, in recent years, the correlation of long-term interest rates between Asian EMEs and the United States has been rising while the correlation of short-term rates does not show such a trend. In other words, Rey's (2013) "irreconcilable duo" – the trilemma reduces to a dilemma between monetary autonomy and free capital mobility – may be applicable to long-term interest rates, though not to the short-term interest rates.

I conducted an estimation exercise to examine whether net capital inflows can contribute to weakening the link between short-term and long-term interest rates. The estimation results supported such a possibility. Despite the recent concern, however, the effect of net capital inflows on the extent of interest rate pass-through is greater in the pre-Asian crisis period than in recent years including the Great Moderation period and the post-global financial crisis years. Developing or emerging market economies with regulatory regimes open to cross-border capital flows tend to have a greater negative relationship between net capital inflows and the extent of

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<sup>35</sup> More strictly speaking, whether greater monetary autonomy or greater exchange rate flexibility or stability can help stabilize output movements can depend upon how open the economy of concern is. Aizenman, et al. (2011) show that for a more closed economy (e.g. Indonesia), greater monetary independence would be more effective to stabilize output movements because it helps stabilize investment. For a more open economy, greater exchange rate stability would be more helpful since it stabilizes the real exchange rate movement. The negative impact of greater exchange rate stability (due to the lack of automatic stabilization from currency movements) can be mitigated if the economy holds a large amount of international reserves, which many Asian EMEs do.

interest rate pass-through. Furthermore, those with more developed financial markets tend to be more vulnerable to the relationship between net capital inflows and the interest rate pass-through.

Now, what do all these findings mean to the economies in Asia and the Pacific?

First, as the economies in the region become more open toward cross-border capital flows, policy makers need to be aware of the possibility that receiving more capital flows may lead to weakening the link between short-term and long-term interest rates, making it more difficult to manage macroeconomic and financial stability.

Second, despite the possibility of losing a grip on the longer-end of the yield curve, at this point, there may still be some time before the economies in the region lose the grip, because they still have some room for further financial liberalization (Figure 6).

Third, as with the case of financial liberalization, there is still room for further financial development in the Asian economies. Figure 17 illustrates the level of financial development from various perspectives, such as private credit creation, stock market capitalization, stock market total value, private bond market capitalization, public bond market capitalization, all as shares of GDP, and the composite index, or the first principal component, of financial development constructed using all the other variables except for public bond market capitalization.<sup>36</sup>

These panels of figures show that Asian emerging market economies are expected to continue to develop their financial markets toward catching up with Japan or other industrialized countries. While China has been on its way to catching up with Japan or even the U.S. in terms of market size, the U.S. is still the sole winner in terms of stock market total values. More importantly, China or other emerging market economies have lagged behind industrialized countries in terms of private bond market capitalization. Considering that only well-developed financial systems provide deep and liquid private bond markets, Asian EMEs need to further develop their financial markets.

The lagged development of financial markets, especially bond markets, can mean that external financing tends to have short-term maturities. According to Figure 18, corporate securities with the maturities of five years or less account for more than 50% of the total. The share of corporate securities with longer maturities than 10 years is about 10%. As a reference

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<sup>36</sup> The sample average for “ex-China Emerging Asia” does not include Hong Kong or Singapore because of these economies’ special roles as financial centers.

point, as of 2013, the average maturity of U.S. corporate bonds is about 14 years, much higher than that of the Asian counterparts.

Asian economies have traditionally had a corporate finance structure highly dependent on debt financing (Figure 19). As IMF (2010) and many researchers have argued, heavy reliance on debt financing can help inhibit the development of investment for long-term and risky projects. Hence, debt-financing itself also tends to be more short-term oriented.<sup>37</sup> At least, it is safe to say that there is much room for longer-term debt securities to grow in Asian EMEs.

All these points suggest that at present, the possibility of losing controls on longer-term interest rates can be less of an issue for Asian economies, because their financial system is still based on short-term financing. Therefore, Asian emerging economies are facing an interesting dilemma. While they want to develop financial markets to finance more effectively for longer-term needs, if that happens, the extent of retaining controls over longer-term interest rates will become a greater issue.

The last issue worth discussing, though briefly, is macro prudential measures, which have received much attention since the breakout of the global financial crisis. Several EMEs, including those in Asia and the Pacific, have implemented these measures in the immediate aftermath of the global crisis to manage potential impacts of surging capital inflows on macroeconomic and financial stability. Balakrishnan, et al. (2012), IMF (2012), and Pradhan, et al. (2011) provide comprehensive reviews and analyses pertaining to macro prudential policies implemented in Asian and other EMEs.

Generally, despite the IMF's change in the view of capital controls to allow countries to implement capital controls policies as preemptive measures for macroeconomic and financial stability – the IMF call such measures “capital flow measures,” the effectiveness of capital controls is controversial at best. The consensus in the literature is that capital controls can change the composition of capital flows but not the entire volume of cross-border capital flows. It has been also argued that capital controls on outflows are more effective than those on inflows (Hutchison, et al., 2010).<sup>38</sup>

Rey (2013) supports the idea that countries can resort to capital controls to retain monetary autonomy as a way to deal better with the global financial cycle. Klein and Shambaugh

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<sup>37</sup> As Figure 18 shows, it applies to Japan as well.

<sup>38</sup> For more on the discussions of capital flow measures, see Habermeier, et al. (2011) and Ostry, et al. (2011)



(2013), however, argues that partial capital controls would not allow countries to retain monetary autonomy, but that only extensive capital controls policy would. We may need to wait for time to see how effective these prudential capital flow management policies turn out to be.

Even if foreign factors or the monetary policy of the center country is influential and affects the ebbs and flows of capital for EMEs as an aggregate, it does not mean all the EMEs would experience the surges of capital flows. To the same extent of global factors, domestic or “pull” factors also matter. That is, each country’s economic and institutional characteristics do affect the allocation of global capital. Furthermore, not all the countries that experience massive capital inflows would experience a financial crisis. However, we need to be aware of all the potential channels and linkages among economic and noneconomic factors. The link between financial globalization and the extent of interest pass-through can be one of them.

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## **Appendix: Country Groups**

### Industrialized countries (IDC):

Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Malta, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States.

### Emerging Market Economies (EMEs)

Argentina, Bangladesh, Botswana, Brazil, Brunei, Bulgaria, Cote d'Ivoire, Cambodia, Chile, China, Colombia, Czech Republic, Ecuador, Egypt, Arab Rep., Ghana, Hong Kong, China, Hungary, India, Indonesia, Israel, Jamaica, Jordan, Kenya, Korea, Rep., Lithuania, Malaysia, Mauritius, Mexico, Morocco, Nigeria, Pakistan, Peru, Philippines, Poland, Russian Federation, Singapore, Slovak Republic, Slovenia, South Africa, Sri Lanka, Thailand, Trinidad and Tobago, Tunisia, Turkey, Venezuela, RB, Vietnam, Zimbabwe.

### Emerging Asia

China, Hong Kong, China, India, Indonesia, Korea, Rep., Malaysia, Philippines, Singapore, Thailand, Vietnam

**Table 1: Economic Indicators for Selected Asian Economies  
In the Pre-Asian Crisis (1992-96) and the Post-GFC (2010-12) Periods**

	China			Hong Kong, China			India			Indonesia			Korea		
	1992-96	2010-12	change	1992-96	2010-12	change	1992-96	2010-12	change	1992-96	2010-12	change	1992-96	2010-12	change
<b>Cumulative CA</b>	1.23%	7.75%	6.52		12.23%		-4.89%	-6.00%	-1.11	-9.58%	-2.04%	7.54	-6.05%	8.86%	14.92
<b>Credit growth</b>	0.20%	4.50%	4.29	1.26%	18.75%	17.48	-0.30%	1.27%	1.57	1.56%	1.53%	-0.03	0.05%	-3.13%	-3.18
<b>Stock market growth</b>	1.71%	-10.24%	-11.95	23.95%	-63.78%	-87.73	3.36%	2.44%	-0.92	5.75%	10.10%	4.35	-1.07%	10.22%	11.29
<b>Inflation</b>	14.08%	3.79%	-10.28	8.50%	3.89%	-4.61	9.51%	10.05%	0.54	8.63%	4.92%	-3.70	5.34%	3.06%	-2.29
<b>Real output growth</b>	12.44%	9.15%	-3.29	4.93%	4.38%	-0.55	6.40%	6.70%	0.30	7.61%	6.31%	-1.29	7.40%	4.02%	-3.38
<b>Exchange rate stability index</b>	80.22%	70.58%	-9.64	100.00%	100.00%	0.00	73.79%	24.91%	-48.88	83.26%	41.74%	-41.52	64.74%	25.94%	-38.80
<b>Int'l Reserves (% of GDP)</b>	8.46%	43.94%	35.48	36.79%	117.56%	80.77	4.28%	15.09%	10.81	7.26%	12.69%	5.43	5.85%	28.21%	22.36
<b>Int'l Reserves (% of Ext. Debt)</b>	55.68%	498.35%	442.67				20.19%	96.42%	76.23	13.28%	50.44%	37.15			

	Malaysia			Philippines			Singapore			Thailand			Vietnam		
	1992-96	2010-12	change	1992-96	2010-12	change	1992-96	2010-12	change	1992-96	2010-12	change	1992-96	2010-12	change
<b>Cumulative CA</b>	-22.59%	27.49%	50.08	-15.57%	10.27%	25.84	52.55%	72.97%	20.42	-26.93%	5.39%	32.31	-8.19%	4.06%	12.25
<b>Credit growth</b>	11.26%	-0.59%	-11.85	5.36%	0.57%	-4.79	2.43%	1.71%	-0.72	11.26%	7.59%	-3.66		5.70%	
<b>Stock market growth</b>	30.77%	18.51%	-12.26	13.24%	17.87%	4.63	13.17%	2.81%	-10.36	7.16%	18.21%	11.05		-0.02%	
<b>Inflation</b>	3.79%	2.19%	-1.61	7.61%	3.90%	-3.71	2.15%	4.19%	2.04	4.82%	3.36%	-1.46	5.68%	12.21%	6.54
<b>Real output growth</b>	9.57%	6.06%	-3.50	3.47%	6.03%	2.56	8.80%	7.09%	-1.71	8.09%	4.79%	-3.30	8.90%	5.97%	-2.93
<b>Exchange rate stability index</b>	43.15%	31.10%	-12.05	42.81%	38.63%	-4.18	45.52%	52.70%	7.18	69.01%	37.85%	-31.16	80.44%	57.84%	-22.61
<b>Int'l Reserves (% of GDP)</b>	31.51%	44.55%	13.04	9.42%	29.05%	19.62	82.56%	98.36%	15.80	20.06%	49.44%	29.38	6.71%	13.57%	6.86
<b>Int'l Reserves (% of Ext. Debt)</b>	85.37%	133.27%	47.89	19.35%	91.67%	72.32				43.28%	216.04%	172.75	5.91%	24.34%	18.43

Notes: "Cumulative CA" is the sum of current account balances over the period and expressed as the ratio to the GDP as of the last year of the period (i.e., 1996 or 2011). "Credit growth" and "Stock market growth" are the annual changes in the ratios of private credit creation and stock market capitalization as ratios to GDP, respectively.



**Table 2: “Heat Map” for Selected Asian Economies (from IMF’s REO 2011)**

	Equity forward looking price/earnings ratios <sup>a,b</sup>			Residential price/rent ratios <sup>a,b,c</sup>		
	Peak during the 1990s surge	Peak during the 2000s surge	Peak during the current episode	Peak during the 1990s surge	Peak during the 2000s surge	Peak during the current episode
	China	24.0	32.8	14.2	...	100.0
Hong Kong SAR	15.8	21.1	17.2	170.3	126.6	144.5
India	23.6	21.7	17.5	...	103.1	91.9
Indonesia	22.2	15.6	14.4	106.6	108.9	100.9
Korea	20.7	12.3	12.2	121.8	101.0	99.5
Malaysia	27.2	17.1	15.5	...	106.0	101.8
Philippines	20.0	19.6	16.5	379.0	191.9	99.1
Singapore	27.2	22.6	14.3	171.2	130.4	117.3
Taiwan Province of China	33.2	23.9	29.4	...	120.8	112.7
Thailand	43.0	13.3	11.5	183.4	127.4	101.8

	Growth of credit-to-GDP ratios <sup>a,d</sup>			Debt/equity ratios <sup>a</sup>		
	Peak during the 1990s surge	Peak during the 2000s surge	Peak during the current episode	Peak during the 1990s surge	Peak during the 2000s surge	Peak during the current episode
	China	10.6	10.5	24.3	66.7	61.6
Hong Kong SAR	25.9	12.2	19.1	38.1	30.8	19.7
India	1.4	5.4	4.1	155.2	85.2	72.9
Indonesia	16.8	3.7	2.0	190.4	106.3	41.7
Korea	24.9	20.4	16.2	264.1	81.8	67.3
Malaysia	24.9	9.4	21.3	59.3	45.7	33.6
Philippines	12.6	2.0	4.0	67.0	39.8	16.1
Singapore	11.8	21.0	10.9	44.5	36.8	28.2
Taiwan Province of China	16.9	8.3	1.7	46.2	56.3	28.4
Thailand	19.0	5.7	6.1	166.0	68.2	34.3

Sources: CEIC Data Company Ltd.; Haver Analytics; Thompson Reuters I/B/E/S database; Organization for Economic Co-operation and Development; Worldscope ; and IMF, *International Financial Statistics* , and staff estimates.

<sup>a</sup> The colors represent the deviation from long-term average expressed in the number of standard deviations (z-scores). Green signifies less than 1.5 standard deviations above, orange 1.5–2 standard deviations above, and red greater than 2 standard deviations above. For methodologies, see Annex 1.9 of IMF (2010c). ... denotes lack of data.

<sup>b</sup> For countries particularly affected by the Asian crisis (Indonesia, Korea, Malaysia, and Thailand), the period 1998 – 2000 is excluded in determining the peaks because of anomalous behavior during the crisis.

<sup>c</sup> The price/rent ratios are scaled to be equal to 100 in 2002:Q3 for Taiwan Province of China and 2008:Q4 for other economies.

<sup>d</sup> These are year over year changes in credit-to-GDP ratios.

**Table 3: Determinants of the Effectiveness of Monetary Policy – OLS**

	FULL 1970-2011 (1)	IDC 1970-2011 (2)	LDC 1970-2011 (3)	EME 1970-2011 (4)	FULL 1990-1996 (5)	IDC 1990-1996 (6)	LDC 1990-1996 (7)	EME 1990-1996 (8)	FULL 2000-2007 (9)	IDC 2000-2007 (10)	LDC 2000-2007 (11)	EME 2000-2007 (12)
Inflation Volatility	-0.805 (0.493)	-6.281 (1.313)***	-0.200 (0.514)	0.348 (0.520)	-0.819 (1.205)	-1.651 (3.505)	-0.887 (1.417)	-0.772 (1.629)	-0.870 (0.539)	-38.177 (9.662)***	0.167 (0.517)	-0.219 (0.420)
Output Volatility	-1.476 (0.740)**	-0.917 (1.008)	-0.677 (0.900)	-2.530 (1.463)*	1.604 (1.887)	1.725 (2.563)	2.180 (2.236)	0.442 (3.519)	-3.070 (1.256)**	12.677 (6.699)*	-0.892 (1.384)	-0.474 (1.951)
Output Gap	0.135 (0.373)	0.641 (0.512)	0.113 (0.480)	-0.339 (0.744)	0.361 (0.905)	0.259 (1.165)	0.585 (1.187)	-0.824 (2.043)	1.172 (0.972)	8.706 (2.573)***	-0.614 (1.022)	-0.744 (1.227)
Net K Flow	-0.396 (0.119)***	-0.219 (0.123)*	-0.372 (0.156)**	-0.209 (0.218)	-1.183 (0.469)**	0.003 (0.772)	-1.194 (0.701)*	-1.310 (0.785)*	-0.804 (0.244)***	-0.147 (0.560)	-0.443 (0.238)*	-0.217 (0.311)
Adjusted R2	0.84	0.93	0.07	0.12	0.04	-0.04	0.09	0.14	0.92	0.96	-0.01	-0.03
N	1,307	666	641	438	218	119	99	59	425	178	247	175

Notes: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . The estimates for constant and the dummy for high inflation ( $\pi > 50\%$ ) are omitted.

	FULL 2010-2011 (13)	IDC 2010-2011 (14)	LDC 2010-2011 (15)	EME 2010-2011 (16)
Inflation Volatility	-6.096 (4.856)	4.634 (5.795)	-6.588 (5.106)	-10.879 (8.718)
Output Volatility	-0.615 (3.498)	-3.596 (2.596)	-0.078 (4.041)	-12.435 (4.683)**
Output Gap	1.234 (1.627)	0.444 (0.973)	1.282 (2.166)	-1.269 (4.144)
Net K Flow	0.309 (0.625)	-0.618 (0.655)	0.689 (0.881)	-1.379 (1.251)
Adjusted R2	-0.01	0.03	-0.03	0.16
N	118	47	71	49

**Table 4: Determinants of the Effectiveness of Monetary Policy – 2SLS**

	FULL 1970-2011 (1)	IDC 1970-2011 (2)	LDC 1970-2011 (3)	EME 1970-2011 (4)	FULL 1990-1996 (5)	IDC 1990-1996 (6)	LDC 1990-1996 (7)	EME 1990-1996 (8)	FULL 2000-2007 (5)	IDC 2000-2007 (6)	LDC 2000-2007 (7)	EME 2000-2007 (8)
Inflation Volatility	-0.548 (0.497)	-6.175 (1.356)***	-0.160 (0.515)	0.112 (0.535)	-1.018 (1.188)	-8.885 (4.733)*	-1.593 (1.364)	-1.545 (1.358)	-0.655 (0.535)	-34.866 (9.795)***	0.000 (0.553)	-0.100 (0.537)
Output Volatility	-2.172 (0.810)***	-1.615 (1.300)	-1.903 (1.001)*	-4.014 (1.582)**	2.247 (2.067)	1.845 (4.571)	1.708 (2.842)	0.902 (2.570)	-3.432 (1.433)**	5.994 (6.926)	-3.069 (1.843)*	-2.898 (2.305)
Net K Flow	-1.258 (0.463)***	0.536 (0.626)	-1.815 (0.541)***	-2.853 (0.767)***	-3.384 (0.891)***	7.558 (4.125)*	-4.546 (1.969)**	-4.439 (1.898)**	-1.166 (0.540)**	0.485 (0.608)	-1.614 (0.768)**	-2.019 (0.935)**
Adjusted R2	0.85	0.94	0.03	.	.	.	.	.	0.93	0.96	.	.
<i>N</i>	1,213	611	602	501	203	112	91	77	398	164	234	191

Notes: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . The estimates for constant and the dummy for high inflation ( $\pi > 50\%$ ) are omitted. The variable for net capital inflows is instrumented with interest rate differentials with the U.S. rate; real output growth differentials with the U.S.; relative real income to the U.S. level; the domestic country's level of de jure financial openness (the Chinn-Ito index); the volatility of S&P stock market price index; and the currency crisis dummy.

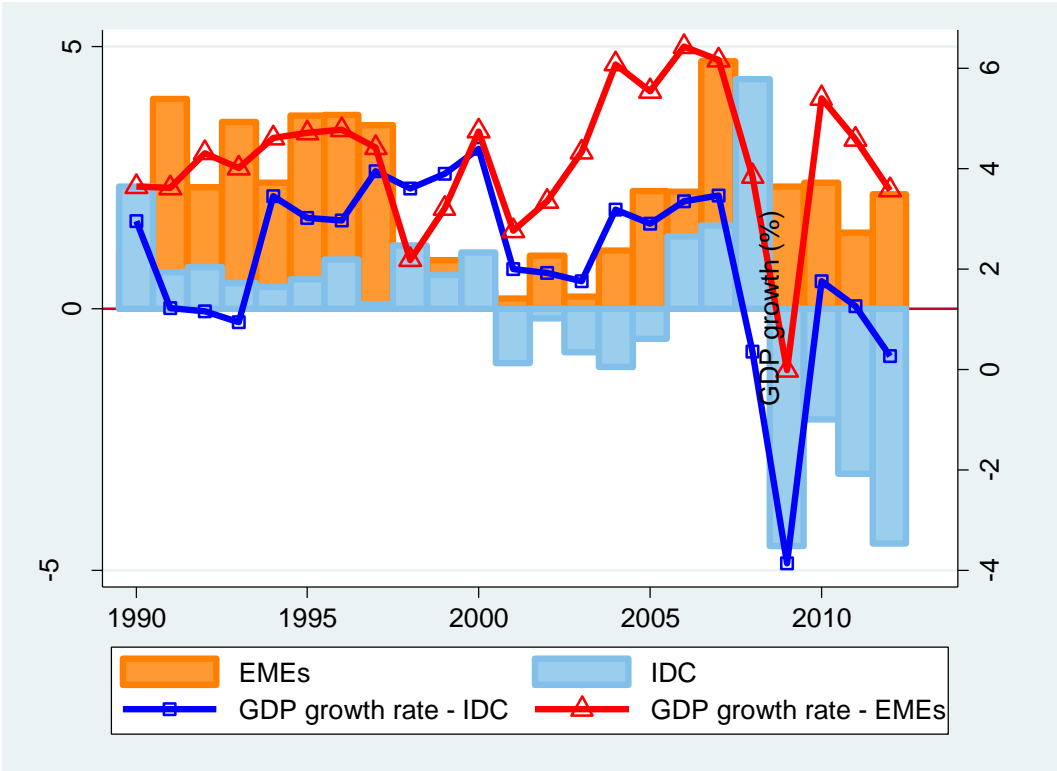
	FULL 2010-2011 (9)	IDC 2010-2011 (10)	LDC 2010-2011 (11)	EME 2010-2011 (12)
Inflation Volatility	-17.341 (12.158)	2.186 (6.459)	-21.578 (14.579)	-36.053 (21.858)
Output Volatility	2.231 (4.809)	-1.593 (1.912)	3.370 (5.886)	-0.240 (9.400)
Net K Flow	1.459 (1.625)	0.215 (0.730)	3.387 (3.003)	3.424 (4.985)
Adjusted R2	0.02	-0.07	-0.00	0.09
<i>N</i>	109	43	66	53

**Table 5: Determinants of the Effectiveness of Monetary Policy – 2SLS for Different Regimes**

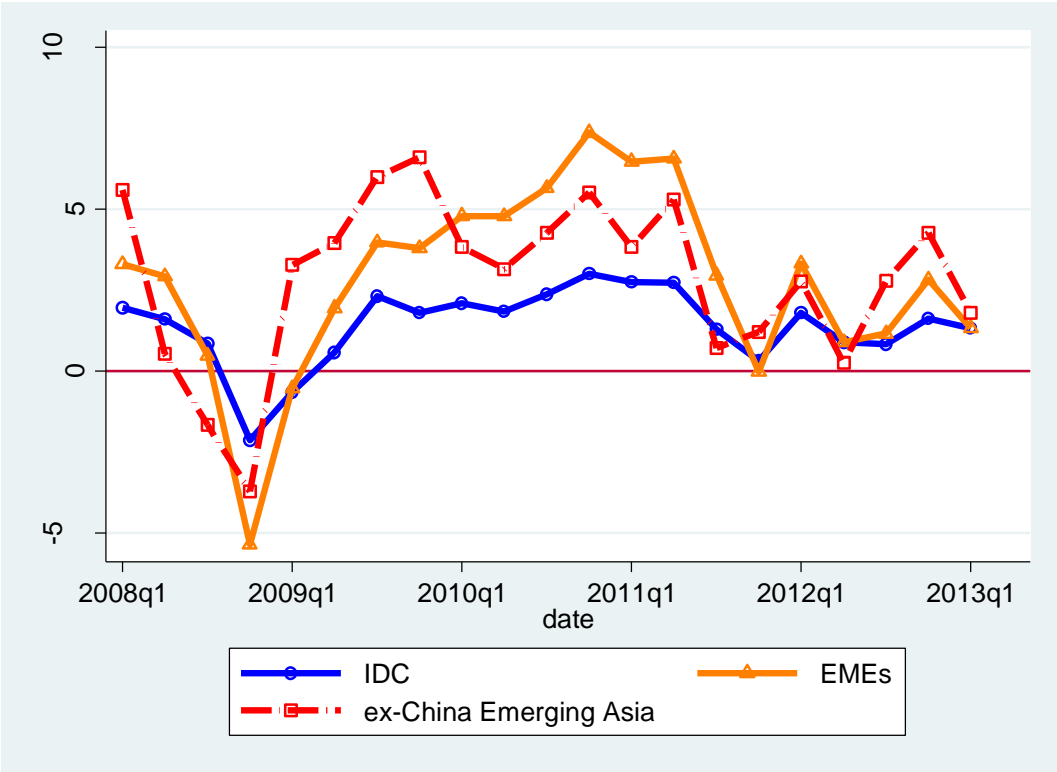
	LDC- KA-OPEN 1989-2011	LDC- KA-CLOSED 1989-2011	EME- KA-OPEN 1989-2011	EME- KA-CLOSED 1989-2011	LDC- FD-HIGH 1976-2011	LDC- FD-LOW 1976-2011	EME- FD-HIGH 1976-2011	EME- FD-LOW 1976-2011
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Inflation Volatility	-1.264 (0.706)*	0.429 (0.781)	-0.260 (1.294)	0.314 (0.784)	2.011 (0.421)***	-0.195 (0.689)	2.047 (0.455)***	-0.289 (0.731)
Output Volatility	-2.663 (1.724)	1.382 (1.560)	-7.431 (3.591)**	2.147 (1.700)	-2.670 (1.063)**	-1.437 (1.813)	-3.688 (1.253)***	-1.476 (2.503)
Net K Flow	-1.187 (0.452)***	-0.394 (1.208)	-1.983 (0.690)***	-0.256 (1.156)	-1.568 (0.510)***	-0.439 (0.837)	-1.903 (0.541)***	-0.677 (0.961)
Adjusted R2	.	0.18	.	0.20	0.20	0.06	0.16	0.06
<i>N</i>	189	176	145	127	216	320	199	281

Notes: \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ . The estimates for constant and the dummy for high inflation ( $\pi > 50\%$ ) are omitted. The variable for net capital inflows is instrumented with interest rate differentials with the U.S. rate; real output growth differentials with the U.S.; relative real income to the U.S. level; the domestic country's level of de jure financial openness (the Chinn-Ito index); the volatility of S&P stock market price index; and the currency crisis dummy.

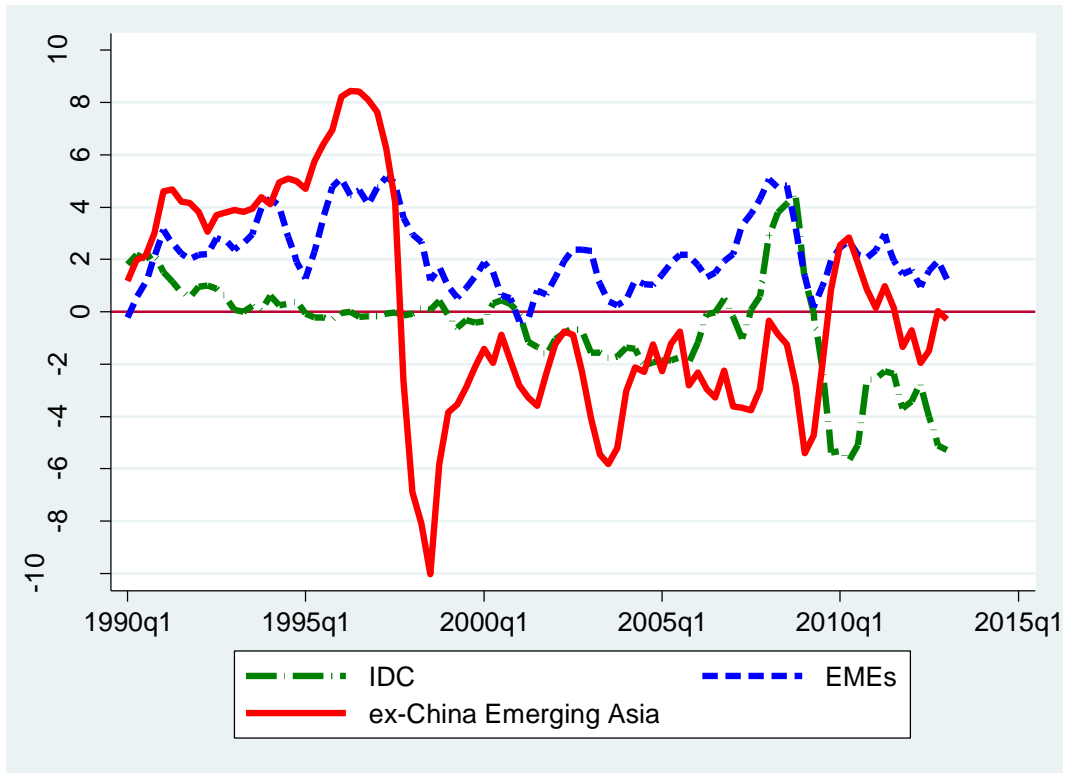
**Figure 1: Net Capital Flow and GDP Growth Rates for Industrialized countries and EMEs**



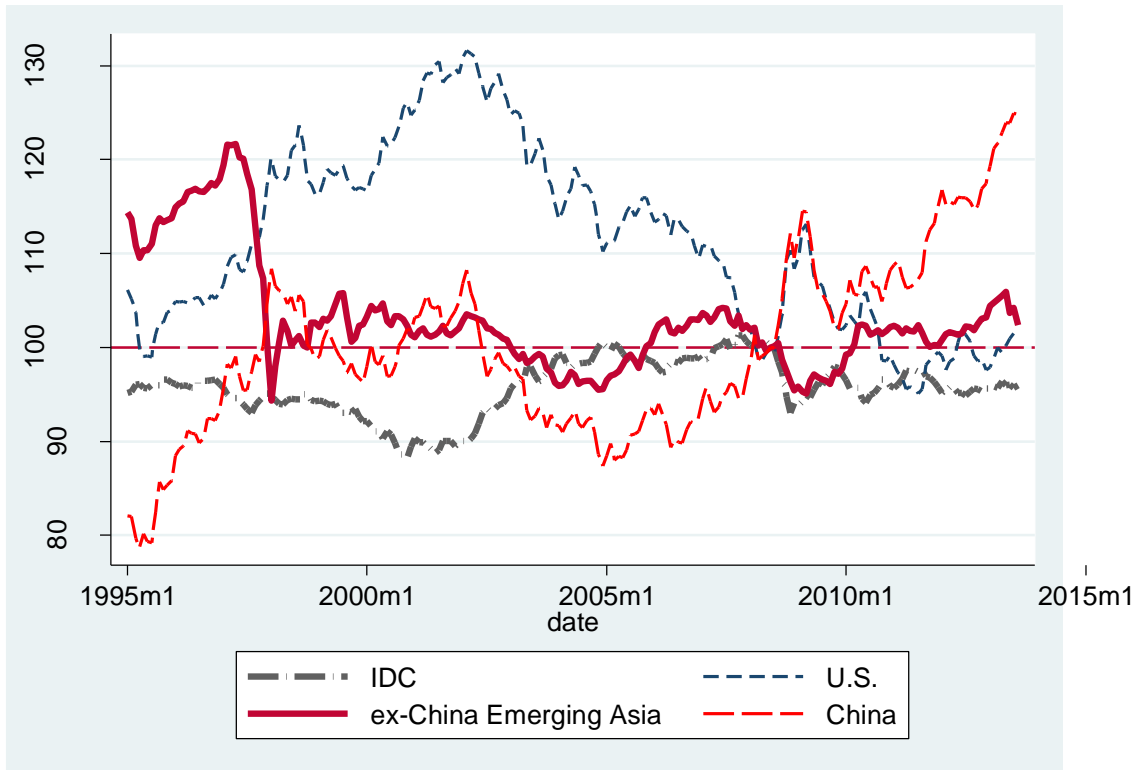
**Figure 2: Average Amount of Reserve Asset Changes**



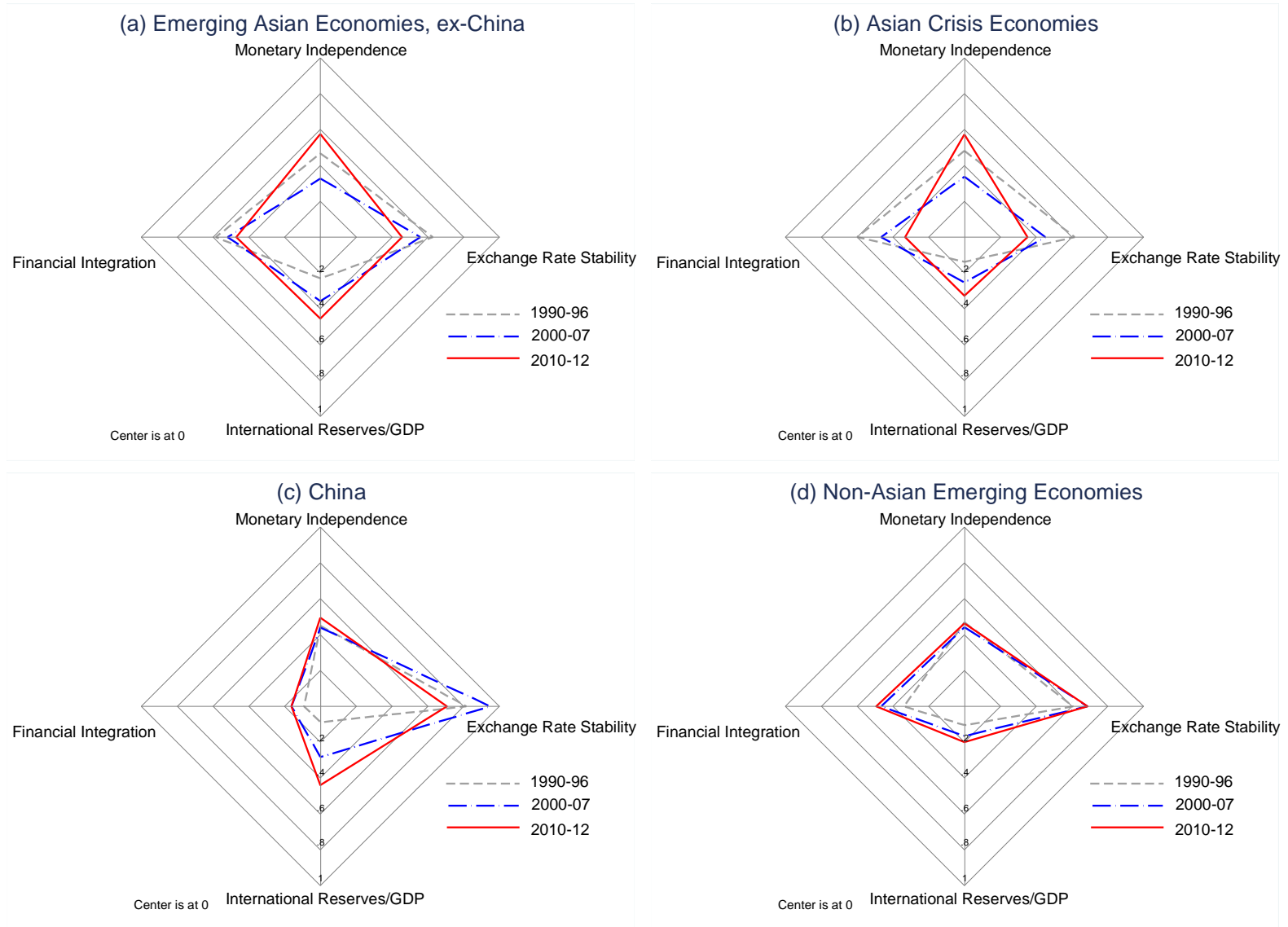
**Figure 3: Net Capital Flows for Different Country Groups**



**Figure 4: Real Effective Exchange Rates**

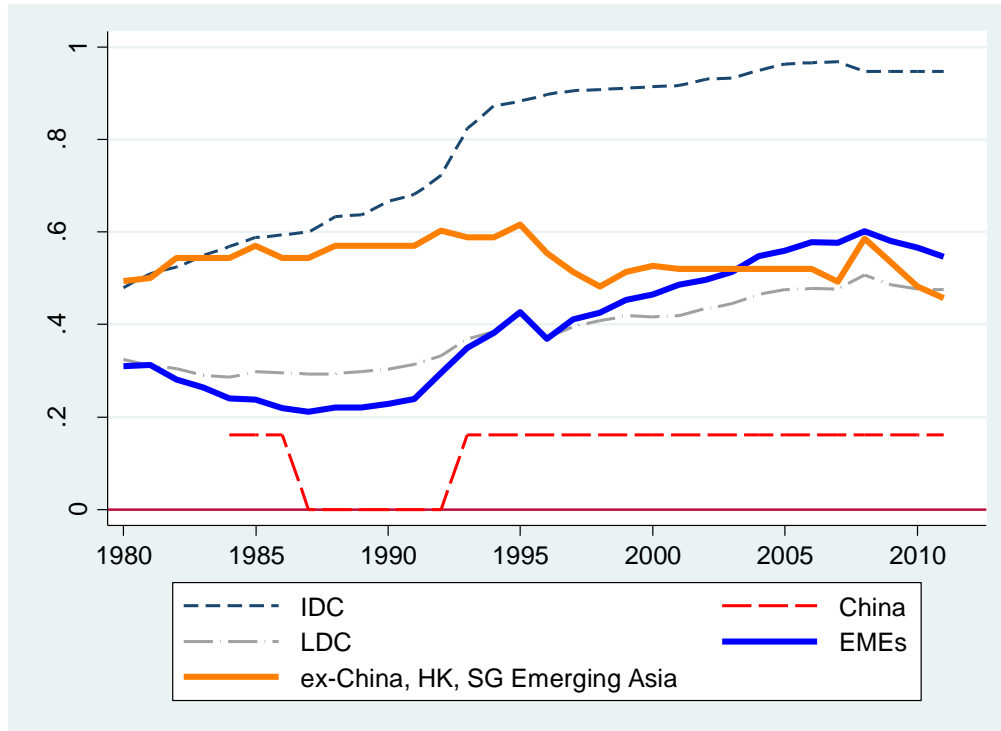


**Figure 5: Policy Mix in the Context of the “Trilemma”**

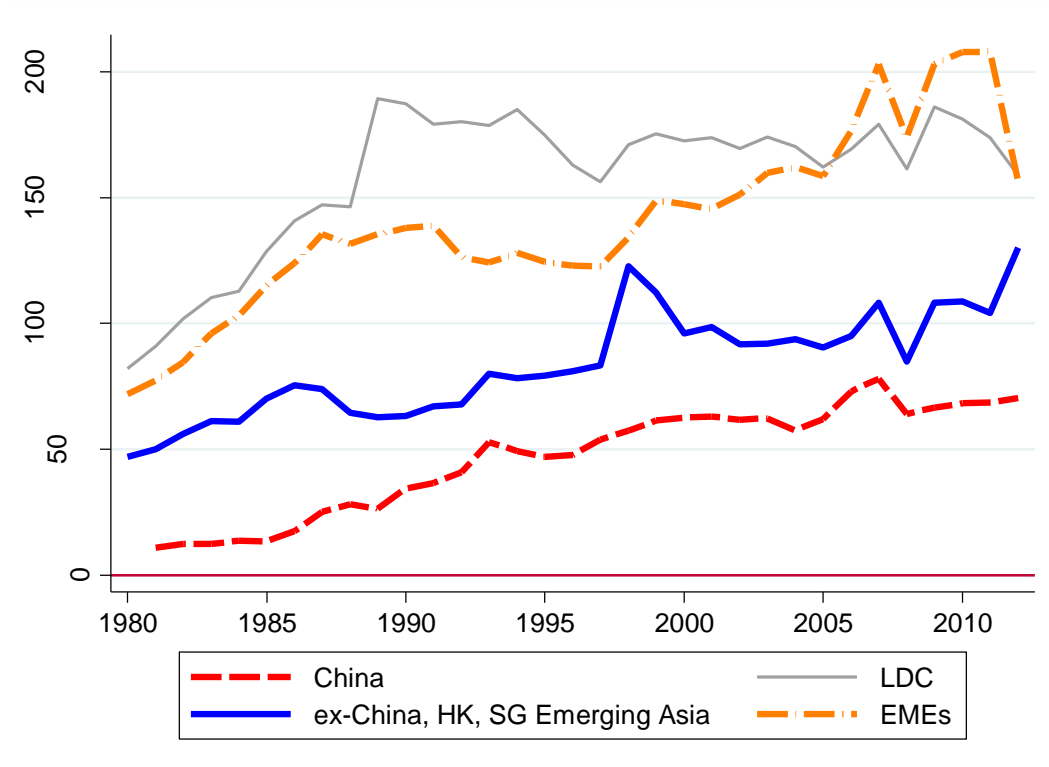


**Figure 6: Financial Openness**

(a) De Jure Openness

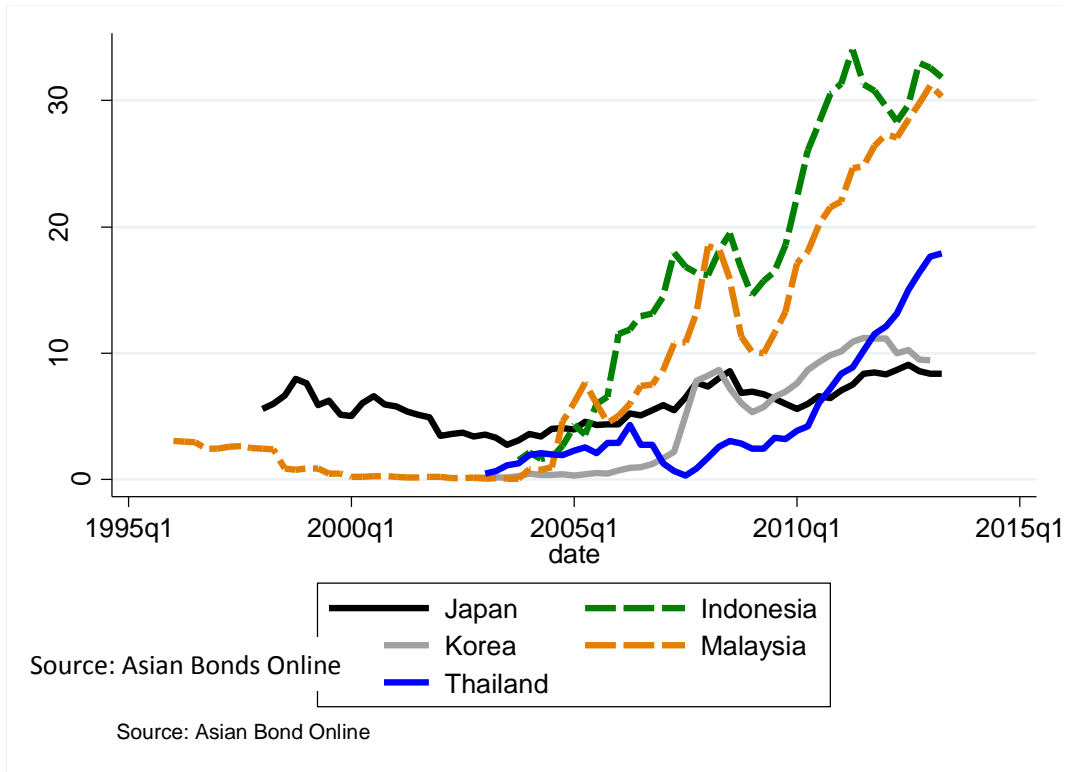


(b) De Facto Openness

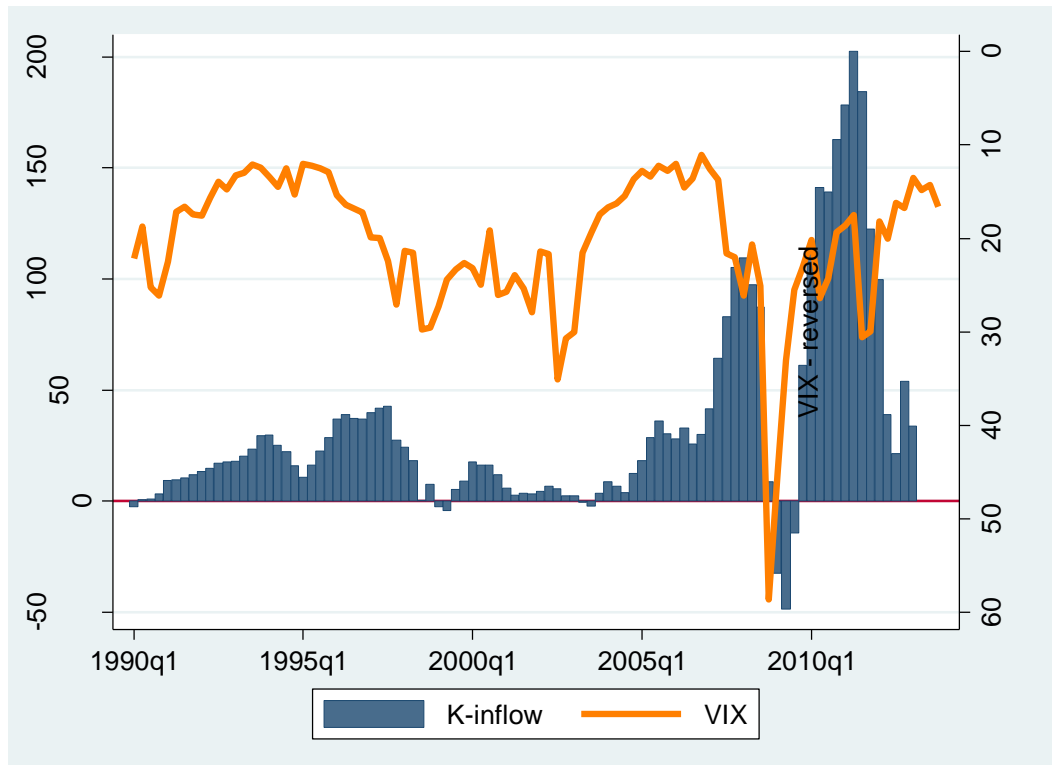




**Figure 7: Share of Foreign Holdings in Local Currency Government Bonds**

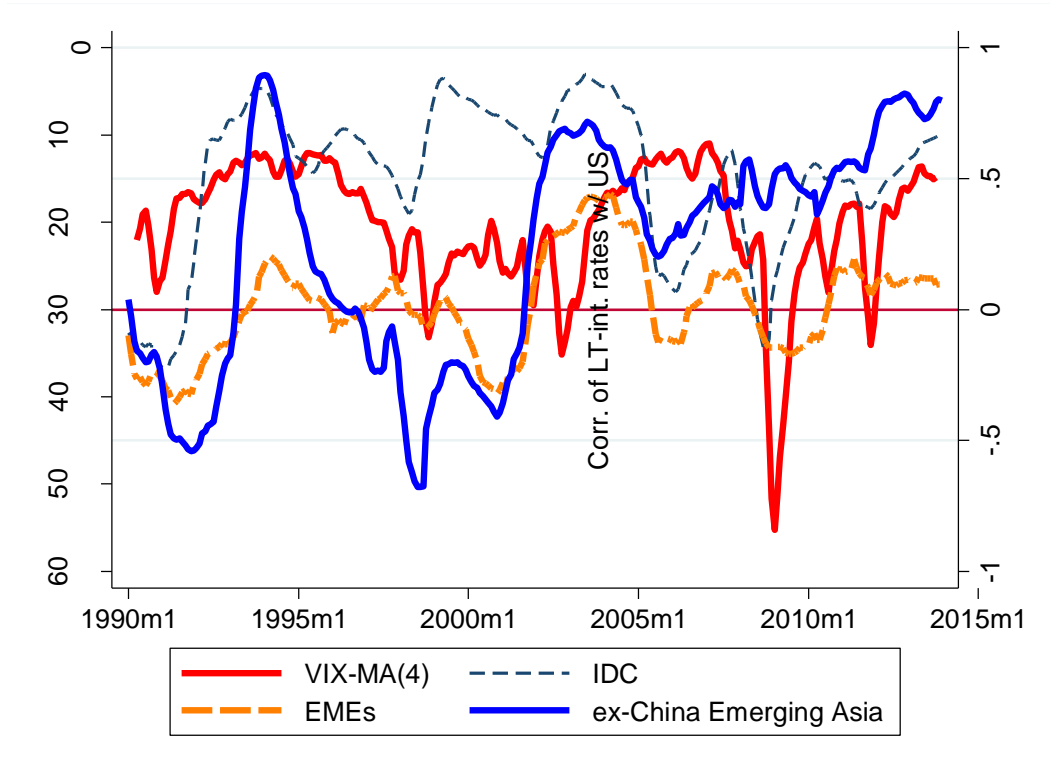


**Figure 8: VIX and Net Capital Flows to EMEs**



Note: VIX is a measure of the implied volatility of S&P 500 index options. Both VIX and net capital flows are shown as four-months moving averages. The scale for the VIX index (on the right-hand side) is reversed.

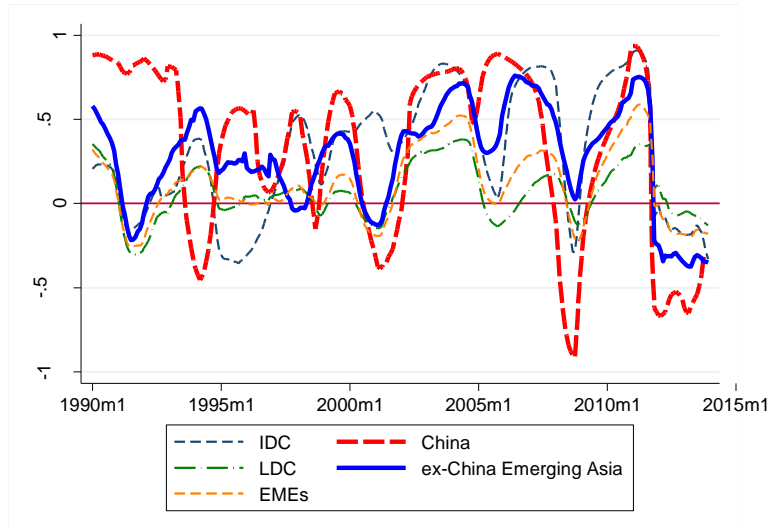
**Figure 9: VIX and Correlations of LT-Interest Rates w/ the U.S.**



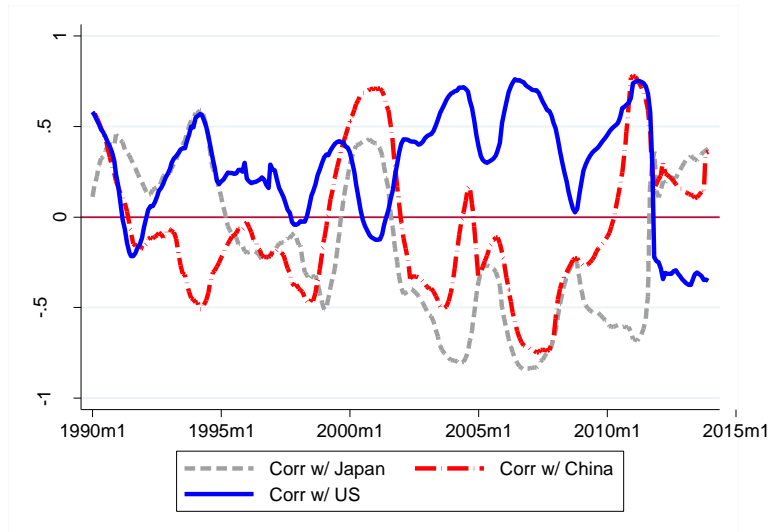
Note: VIX is a measure of the implied volatility of S&P 500 index options and shown as four-months moving average. The scale for the VIX index (on the left-hand side) is reversed.

**Figure 10: Correlations of the Short-Term Interest Rates**

(a) With the U.S.

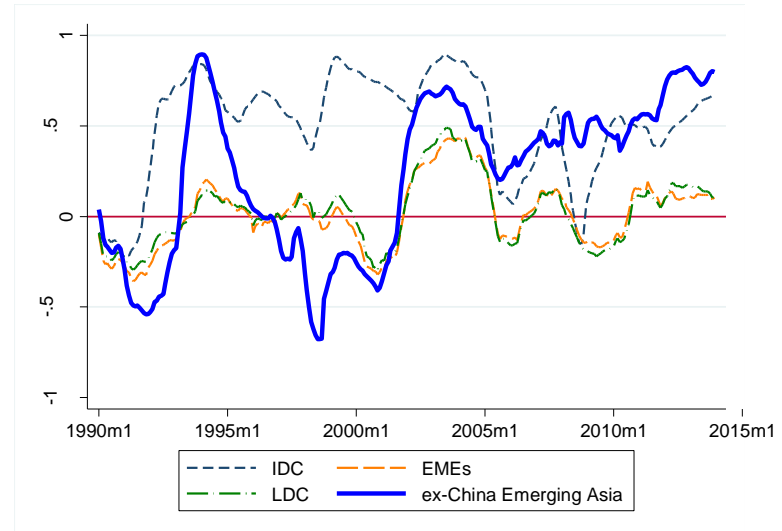


(b) Correlations b/w Emerging Asian ST-Interest Rates with Those of the U.S., China, and Japan

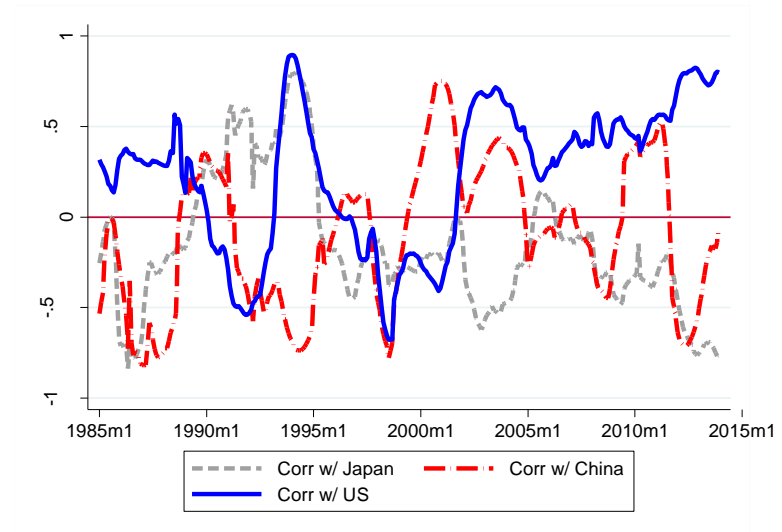


**Figure 11: Correlations of the Long-Term Interest Rates**

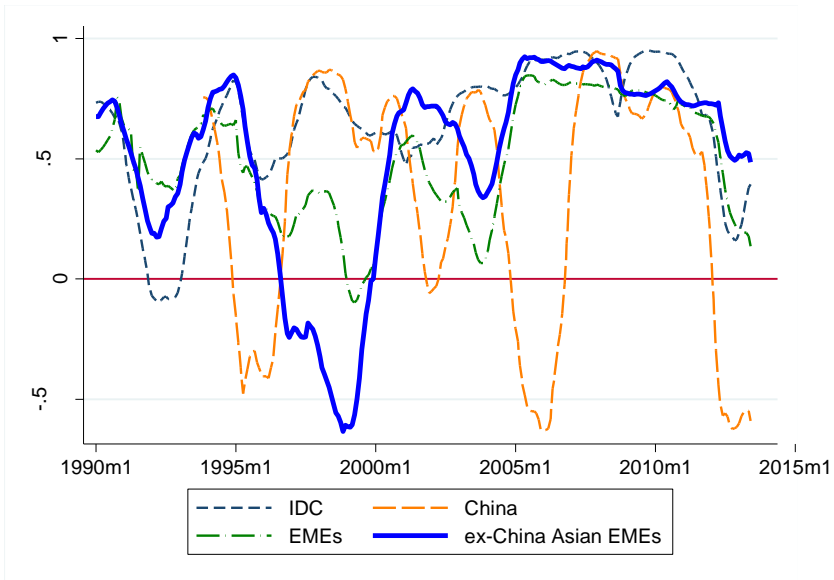
(a) With the U.S.



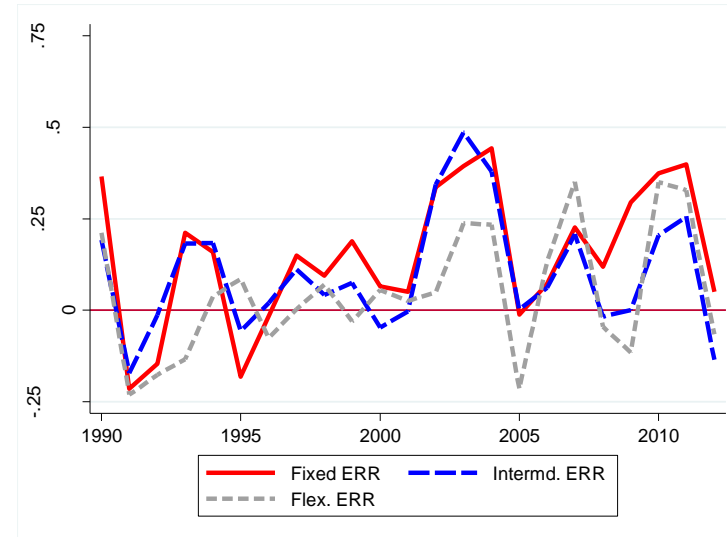
(b) Correlations b/w Emerging Asian LT-Interest Rates with Those of the U.S., China, and Japan



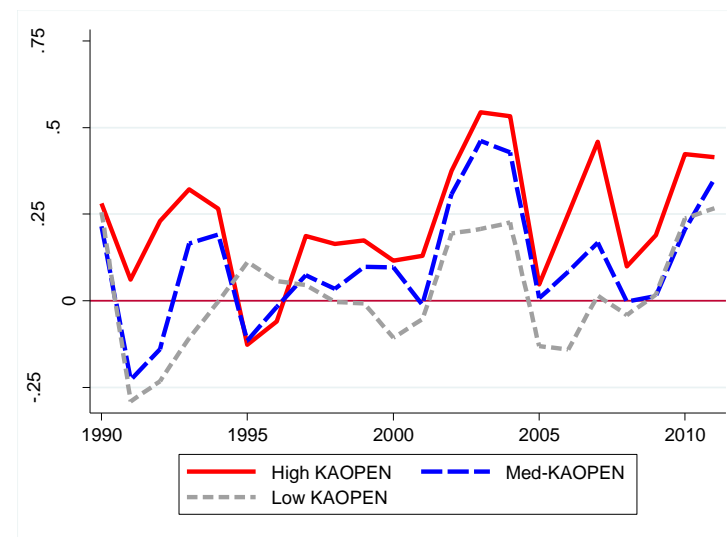
**Figure 12: Correlations of the Stock Market Price Indexes With the U.S.**



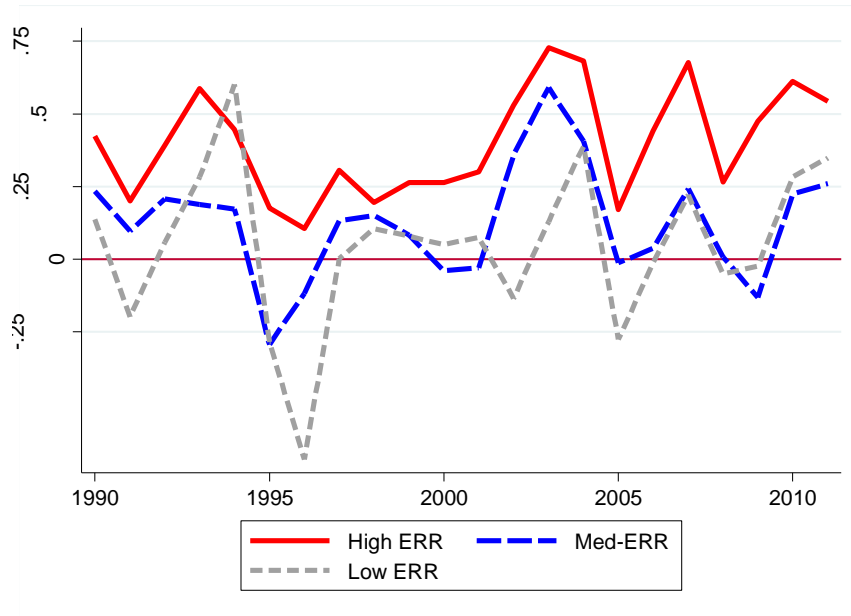
**Figure 13: Correlations of Money Market Rates with the U.S. Rates for Different Exchange Rate Regimes**



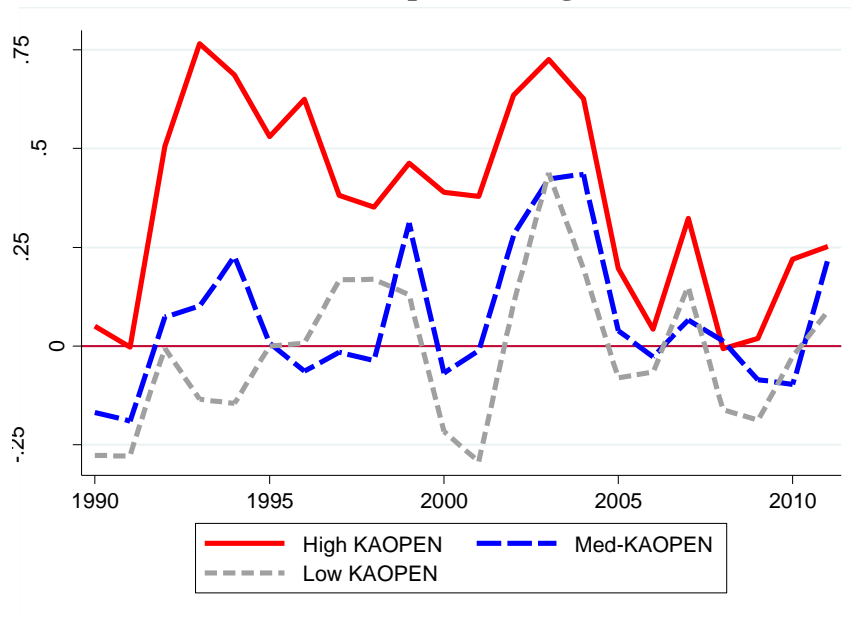
**Figure 14: Correlations of Money Market Rates with the U.S. Rates for Different Financial Openness Regimes**



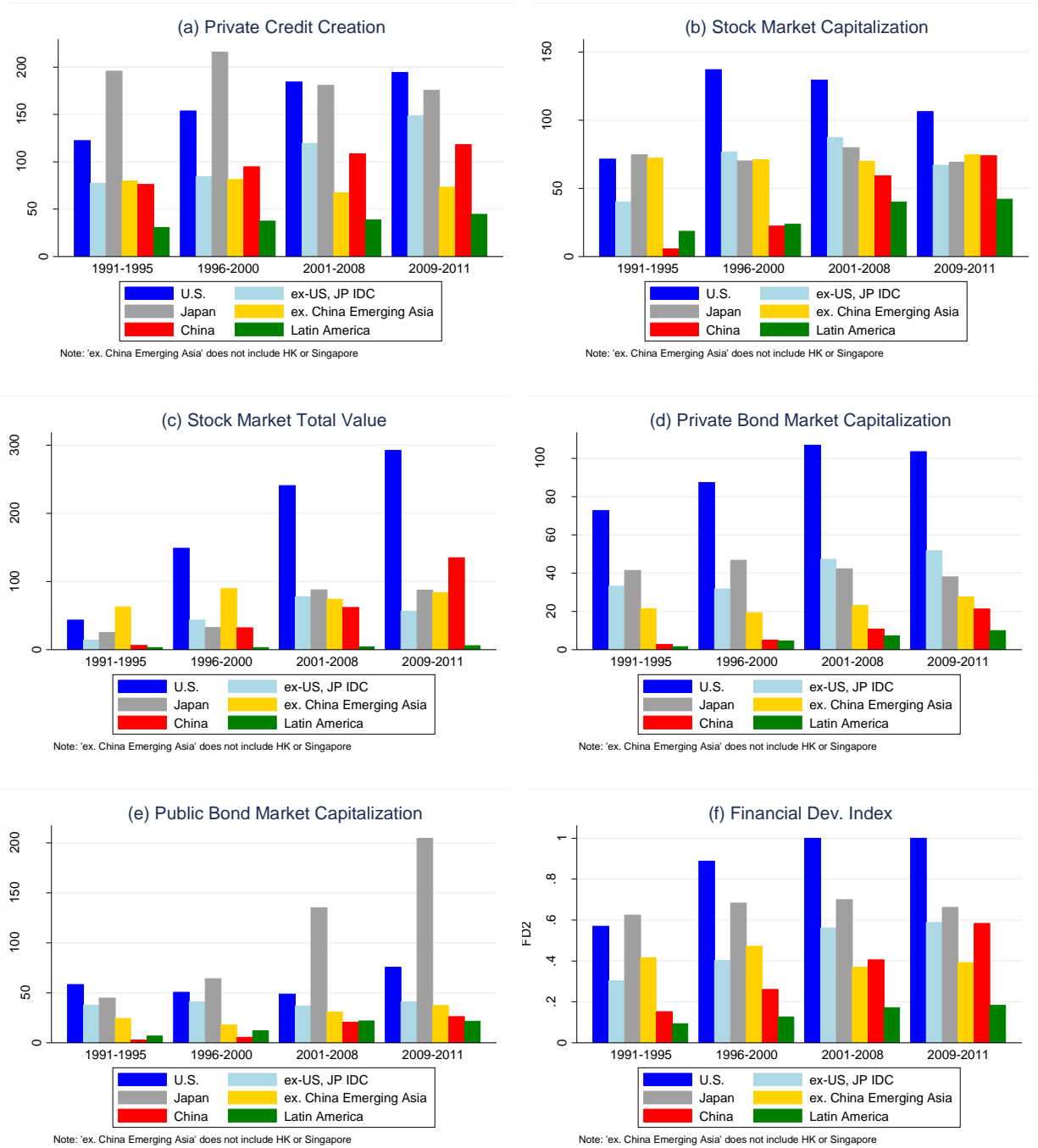
**Figure15: Correlations of Money Market Rates w/ US for different ERR with “Most Open” KAOPEN**



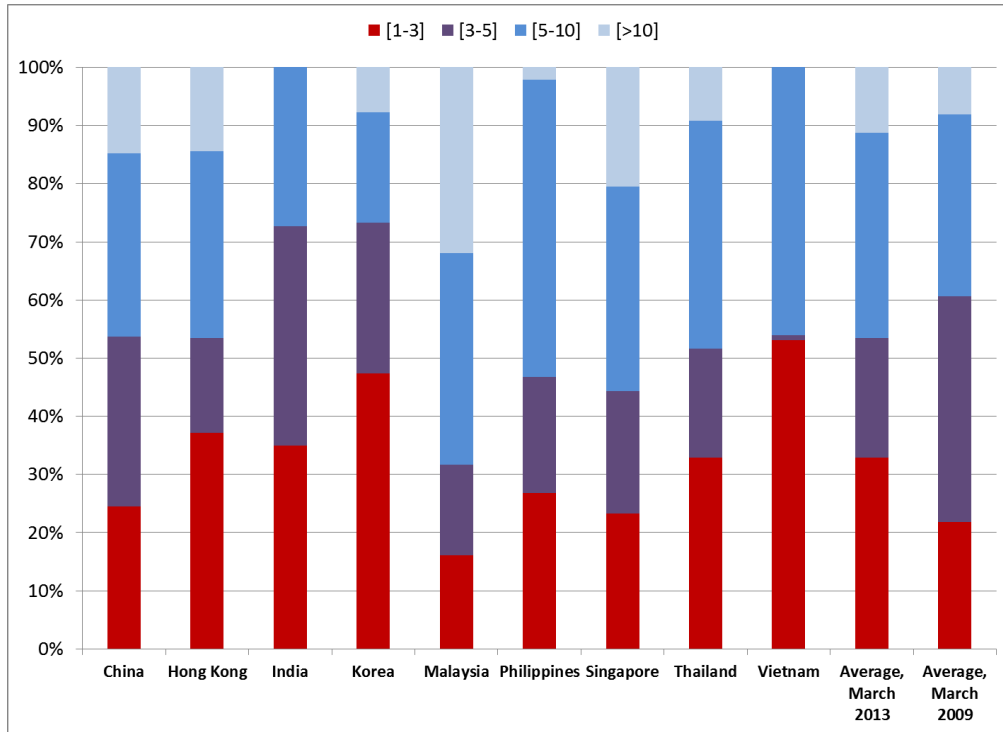
**Figure 16: Correlations of Long-term Interest Rates w/ US for different Financial Openness Regimes**



**Figure 17: Financial Development for Different Types of Markets**



**Figure 18: Shares of Different Maturities, Corporate Securities**



Source: Asian Bonds Online

**Figure 19: Corporate Sector Leverage and Reliance on Short-term Debt: 2000-08**

