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Policy Responses to Capital Flows in Emerging Markets

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Prepared by Mahmood Pradhan, Ravi Balakrishnan, Reza Baqir, Geoffrey Heenan,
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EXECUTIVE SUMMARY

Policy makers in many emerging markets (EMs) have had to cope with a resurgence of capital flows, and this has led to challenges in macroeconomic management and pressures in asset markets. The latest rise in inflows to EMs reflects both cyclical and structural factors. The multi-speed nature of the recovery from the global financial crisis has led to a cyclical widening of both yield and growth differentials between advanced economies and EMs. Structural factors suggest that capital flows to EMs are likely to be sustained over the long term, albeit with periods of heightened volatility.

While recipient countries have used macroeconomic policies to deal with the recent surge in inflows, many countries have also employed more direct measures. These *capital flow management measures* (CFMs) have been motivated by concerns about overheating, external competitiveness, financial stability, and sterilization costs of reserve accumulation, among other factors.

This note documents the recent rise in capital inflows to EMs in Asia relative to previous episodes of high inflows and provides an empirical assessment of the impact on local markets and yields. It then reviews conventional macroeconomic policy responses and other prudential measures. While most of the analysis pertains to Asian EMs, the paper also reviews the experience of selected non-Asian EMs—Brazil, South Africa, and Turkey.

Several key stylized facts emerge from the analysis:

- While the overall level of capital inflows in this wave has been comparable to that in previous episodes, the pace of increase has been faster. That countries with different economic fundamentals and cyclical positions have all attracted large inflows suggests the importance of global liquidity as a push factor driving some of these inflows.
- The composition of inflows has generally shifted toward portfolio inflows. Banking flows have been slow to recover as global deleveraging has continued.
- Foreign inflows have led to a significant decline in local bond yields in some EMs. Importantly, however, monetary policy can still be effective in raising long-term rates.

The use of conventional macroeconomic policies by EMs has varied widely both within and outside Asia. This divergence of responses reflects differences in macroeconomic fundamentals between countries and the limitations of these policies in some countries. These limitations stem from political economy issues, such as popular opposition to nominal appreciation, from institutional concerns, such as the cost of sterilization, and from building risks in specific asset markets.

While there are important differences in the ways Asian EMs have responded to the challenge of managing inflows, some of the measures have been prudential in nature and do not aim to control the volume of portfolio inflows. Rather, these measures are designed to reduce both risks to financial stability and the volatility of inflows. The limited evidence so far suggests that these measures have been effective in altering the composition of inflows and in limiting credit growth and asset price inflation. Aggregate capital flows do not appear to have been affected.

It is difficult to provide a generalized assessment regarding the effectiveness of CFMs. The appropriate use of CFMs will necessarily be determined by the particular macroeconomic, institutional, and market circumstances faced by each country. To the extent that appropriate macroeconomic adjustment has been made, these measures may be complementary to—rather than a substitute for—macroeconomic policy responses.

I. INTRODUCTION¹

Since March 2009, policy makers in many emerging markets (EMs) have had to cope with a resurgence of capital flows, and this has led to challenges in macroeconomic management and pressures in asset markets.² The factors underlying the latest rise in inflows to emerging markets are both cyclical and structural. The multi-speed nature of the recovery from the global financial crisis has led to a cyclical widening of differentials between advanced economies and EMs, both in terms of nominal yields and real growth rates, and has spurred inflows to EMs. Advanced economies, faced with weak growth prospects and high unemployment, have maintained low interest rates and accommodative liquidity conditions, while many emerging markets have had to begin hiking interest rates to curb rising inflationary pressures.

On the structural side, investor perceptions of the risks associated with EM assets have abated. While the global crisis took a heavy toll on the United States and Europe, EMs were resilient, in part due to strong and decisive responses by policy makers in most of these economies. EMs also generally exhibit better external and fiscal fundamentals than many advanced economies, and this has been reflected in a positive trend for EM sovereign ratings, reinforcing the attractiveness of these markets for foreign investors. Indeed, a significant proportion of the recent wave of inflows has been due to a fundamentals-based rebalancing of institutional portfolios toward EM assets. This combination of cyclical and structural factors suggests that capital flows to EMs are likely to be sustained over the long term, albeit with periods of heightened volatility.

As in other episodes of large inflows, recipient countries have used macroeconomic policies to ameliorate the impact of these inflows on domestic demand and the exchange rate. Many countries have also used other measures to manage capital inflows, including minimum holding-period requirements, limits on foreign currency derivative positions, taxes on inflows, currency-specific reserve requirements, and others. These *capital flow management measures* (CFMs) have been motivated by concerns about overheating, external competitiveness, financial stability, and the sterilization costs of reserve accumulation, among other factors.³

The return of capital flows to EMs largely reflects the higher return opportunities and should help EMs fund their investment and development needs. Capital inflows can also spur financial market development, which in turn can foster medium-term rebalancing—either by financing projects in underdeveloped sectors through a lower cost of capital or by stimulating

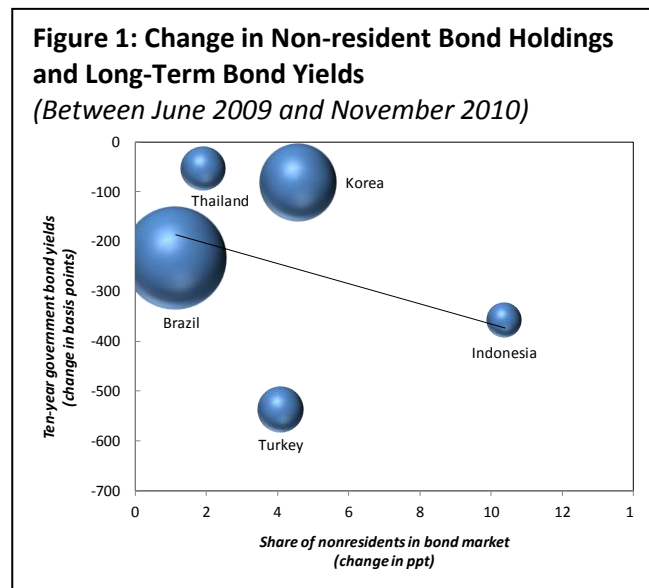
¹ The paper draws on our previous work with Robert Benelli, Laura Lipscomb, and Laura Papi (IMF, 2010c). We are also extremely grateful to many colleagues, including especially Meral Karasulu and Subir Lall for very helpful comments. Research assistance was provided by Fritz Pierre-Louis, Patricia Olmedo, Dulani Senevirante, and Yiqun Wu. Safieh Hekmat and Nong Jotikasthira assisted with document production.

² For a review of performance of EMs during the global crisis and their policy response, see IMF, 2010b.

consumption—or raise the economy’s growth potential through a more efficient allocation of capital.⁴

At times, however, sharp surges in capital inflows pose policy challenges, since they might run counter to the objectives of domestic macroeconomic policies, for example in countries where inflation pressures are substantial or where they lead to excessive exchange rate appreciation. Inflow surges could also jeopardize financial stability, especially when they lead to sharp asset price movements, are highly volatile and concentrated in short maturity instruments, or are intermediated largely through the domestic banking system.

The impact of inflows on EM asset prices has been most notable in local currency bond yields. The larger markets, shown in Figure 1 by the larger circles, have been better able to absorb flows. From the start of the latest surge in mid-2009 to November 2010, 10-year government bond yields fell by about 100 basis points (bps) in Korea, 200 bps in Brazil, 350 bps in Indonesia, and nearly 500 bps in Turkey (5-year bonds). Over the same period, these countries experienced large foreign inflows to their local bond markets. While these flows have helped reduce government borrowing costs as well as the cost of capital to firms, they may at times overwhelm the absorptive capacity of recipient economies in the short term.



This paper documents the recent rise in capital inflows to EMs in Asia and provides an empirical assessment of the impact on local markets and yields. It then reviews conventional macroeconomic policy responses and other prudential measures. While most of the analysis pertains to Asian EMs, the paper also reviews the experience of selected non-Asian EMs—Brazil, South Africa, and Turkey.

The main message from the paper is that while EMs share a common concern about surges in inflows, their policy responses have varied and likely reflect a number of country-specific factors.⁵ The analysis also points to the need to tailor policy responses, including CFMs, to the particular nature of the inflows and the characteristics of markets where the inflows end up. In Asia, recent macro-prudential measures have mostly been well targeted at specific

³ See IMF (2011a) for a discussion of the nomenclature associated with capital flow management measures.

⁴ For an analysis of the benefits of financial globalization, see Dell’Ariccia and others, 2008.

⁵ See also Ostry (2010) for a discussion of countries’ experience with capital controls during the recent crisis.

types of portfolio flows and leverage of banks' foreign currency exposure, rather than being generalized controls on all flows. These measures have not impeded longer-term portfolio flows. As a result, they have not weakened confidence in these countries. However, some of these measures may have an adverse impact on the future development of the markets and may complicate monetary and exchange policy implementation. The experience of selected non-Asian EMs suggests that, as in Asia, their macroeconomic and other policy responses have varied. The fiscal policy response to inflows has been limited, and monetary policy has borne the dual burden of coping with inflows and responding to cyclical considerations. Notwithstanding sharp exchange-rate appreciation in these countries, their use of prudential and other measures has also varied.

The paper is organized as follows. Section II compares the most recent surge in capital inflows to Asian EMs with previous surge episodes. Section III presents empirical estimates of the determinants of local bond yields in selected EMs. It finds that higher foreign inflows lead to significantly lower yields in recipient countries but also that policy rates are still effective in determining longer-term yields. Section IV outlines the policies undertaken by Asian EMs to address rising inflows and overheating of asset markets. It discusses the conventional macroeconomic policy measures that have been taken and the various limitations these measures face. It then explores country experiences with CFMs, the motivation behind the measures, and the measures' effectiveness. Section V presents the experiences of several EMs outside Asia in dealing with inflows. Section VI concludes with policy perspectives drawn from the recent experience in dealing with large flows.

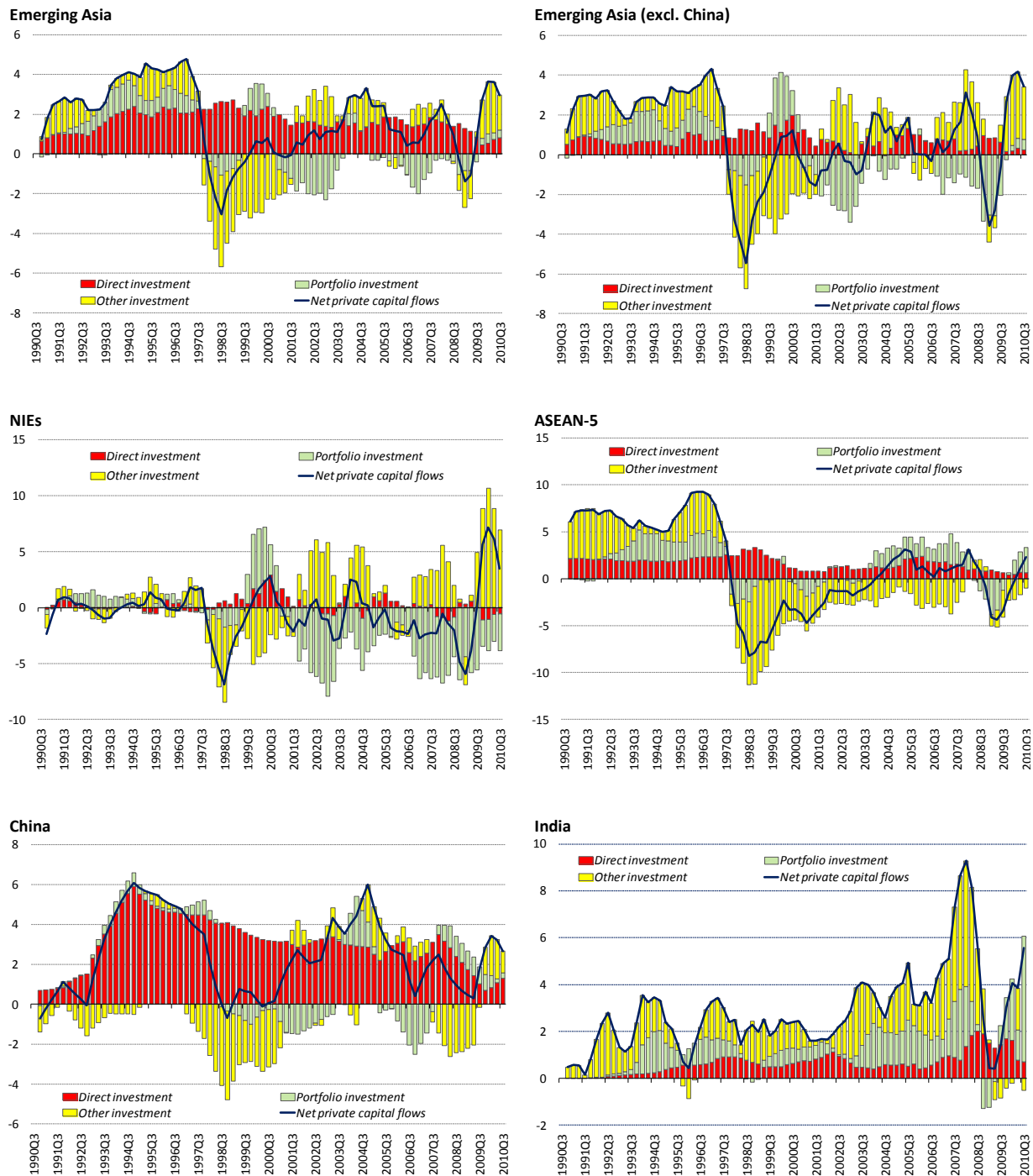
II. COMPARING THE RECENT SURGE OF CAPITAL FLOWS TO PREVIOUS EPISODES: WHAT'S DIFFERENT THIS TIME?

A. Background: Three Waves of Capital Inflows to Asia

Net capital flows to Emerging Asia⁶ have rebounded strongly since the end of the global crisis but have not surpassed previous peaks (Figure 2). Prior to the current rebound, there have been two waves of large inflows over the past two decades: the first began in the early 1990s and ended abruptly with the 1997–98 Asian Crisis, and the second started in the early 2000s and again ended abruptly with the global financial crisis in 2008. For the region as a whole, the peak in net capital inflows since the early 1990s was reached in the second quarter of 1996, at about 6¾ percent of aggregate regional GDP. It is too early to tell if the current surge, which has been remarkable in its speed, is part of another large (third) wave.

⁶ Defined as all of Asia excluding Japan, Australia, New Zealand, and low-income countries.

Figure 2. Emerging Asia: Net Private Capital Flows, 1990-2010
(In percent of GDP; 4-quarter moving average)



Sources: CEIC Data Company Ltd; IMF, *Balance of Payments Statistics*, *World Economic Outlook*; and staff calculations.

Note: Missing historical observations have been approximated by annual data obtained from the WEO database.

Flows could yet rebound and rise above previous highs, but based on data through the third quarter of 2010 net capital flows appear to have peaked at around 4¼ percent of regional GDP during the current episode. These trends for the region mask substantial differences among countries and across time. For ASEAN-5 countries net capital flows were substantially higher during the 1990s wave than at any time subsequently, when investment booms were funded by external banking flows, whereas in India net capital flows peaked just before the global crisis, when they were more than double the peak of the 1990s boom. And, in yet another variation, the newly industrialized economies (NIEs) of Asia (Hong Kong SAR, Korea, Singapore, and Taiwan Province of China) have seen net flows peak *after* the global crisis. The speed of the recovery has also varied across time, with the current surge showing the fastest recovery—net inflows into Asia’s emerging markets as a whole rebounded sharply within five quarters, from the recent trough in the first quarter of 2009 to the recent peak of the second quarter of 2010. In contrast, the length between the troughs and the peaks was 24 quarters during the pre-Asia crisis period and 25 quarters during the period before the global financial crisis.⁷

Following the second round of quantitative easing in the United States in 2010, and given the weak state of advanced economies, market sentiment in Asia had been focused on the “wall of inflows,” its impact on asset markets, and possible policy reactions. Since the first weeks of 2011, market concerns about inflation and policy uncertainties, on the one hand, and improved growth prospects for the United States, on the other, have led to a perception in the region that flows are likely to be more volatile in the short term, even if over the longer term flows to Asia will likely be sustained.

Against this backdrop, the aim of this section is to address the following two questions:

- How does the current rebound in inflows compare with the previous great waves for various individual countries and subgroupings of countries within Asia, in terms of both size and composition?
- Is the rebound in capital flows leading to unsustainable increases in asset prices?

B. Size and Composition of Flows Across Waves

Since a main theme of this paper is the impact of capital flows on the real economy and financial stability, this section focuses on net rather than gross flows.⁸ To highlight periods of especially large inflows, “surges” are identified for each country, largely following the methodology outlined in IMF (2007).⁹ Broadly, a surge in capital flows for a particular country is defined as a period of two or more quarters during which net capital flows as a

⁷ For the period before the Asia crisis, the trough is defined as the start of the sample period (1990:Q3).

⁸ Trends in net flows can, however, mask important changes in the behavior of gross flows. When examined in gross terms, the wave before the global financial crisis looks unparalleled, with all regions except ASEAN-5 experiencing record high gross inflows *and* outflows (See Figure 1 of Annex I). When considering only surge episodes within the waves, even ASEAN-5 countries registered relatively higher gross inflows and outflows in the pre-global financial crisis wave.

⁹ Specifically, net capital flows after stripping out official bilateral and multilateral flows. This measure excludes all flows to the general government and monetary authorities within the “other investment” component of the financial account, which is expected to be driven largely by non-market factors (e.g., bilateral sovereign loans and transactions with the IMF). This concept of capital flows is different from the “private” concept used in IMF (2007), since the definition used here includes purchases by nonresident governmental entities of Asian government bonds.

proportion of GDP are significantly larger (one standard deviation) than the trend of capital flows *or* above the 75th percentile of the distribution of net capital flows.¹⁰

In total, including episodes since the global financial crisis, there have been 29 surge episodes since 1989 (see Annex I, Table I.1). While the 2000s wave had the highest number of surge episodes, the 1990s wave was generally marked by surges of longer duration (averaging 5½ years for Emerging Asia). With regard to flows since the global financial crisis, there have been six surge episodes. China and the NIEs all experienced surges in the post-global crisis period, but given currently available data, the surges all appear to have ended before the second half of 2010. A surge is underway only in India, based on data up to the third quarter of 2010. It should also be noted that despite the recent measures taken by several ASEAN-5 countries in response to large inflows, none of those countries qualifies (by this criteria) as having experienced a surge since the global crisis.

Comparing the surges across the different waves, the wave of the 1990s was the biggest for emerging Asia as a whole, with a weighted-average net capital inflow of 5 percent of GDP. The pre-global crisis wave and the current rebound are around the same size, with weighted-average inflows of about 4 percent of GDP each. In contrast to the aggregate trend, the NIEs—in particular Hong Kong SAR and Korea—have had larger surges since the global financial crisis. The NIEs are currently experiencing an average inflow of above 8 percent of GDP, compared to less than 5½ percent during the 1990s and 2000s. In China, net inflows across surges have decreased in each subsequent wave, as is the case also for the ASEAN-5.

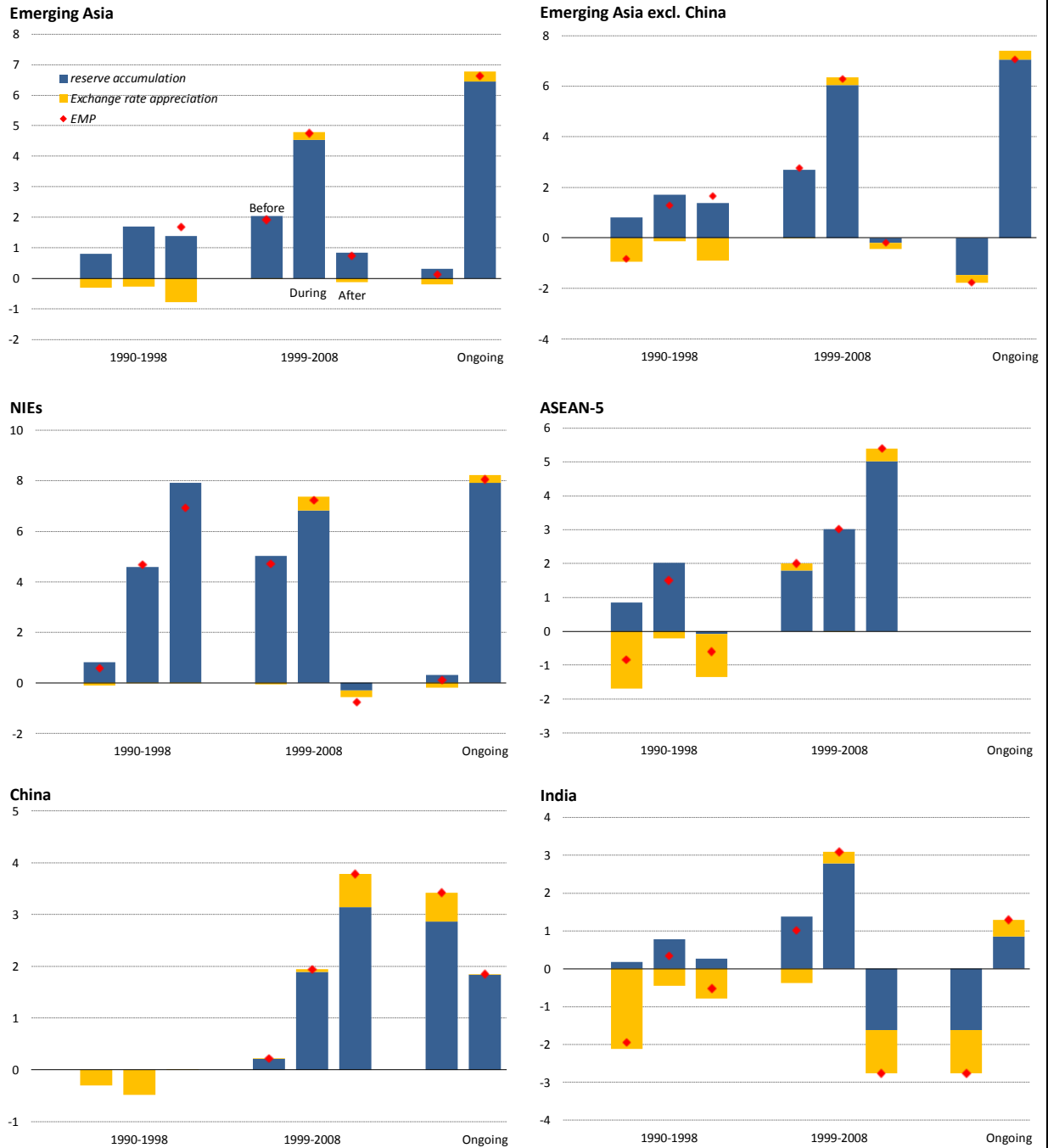
In terms of composition across surges in the different waves, China has seen a notable shift from foreign direct investment to banking flows (Figure 2). In India, while banking flows were the main source of inflows in the period before the global financial crisis, portfolio flows have dominated during the current surge. In Hong Kong SAR, the recent surge is dominated by extraordinary banking-related flows, likely reflecting its status as a financial center, while in Korea portfolio debt flows have been at record levels.

C. Asset Prices and Overheating Concerns

During the current surge, asset price valuations have generally not reached levels seen in previous waves. In response to exchange market pressures, the region has generally tended toward intervention and reserve accumulation rather than letting the exchange rate bear the brunt of the pressure, although it should be noted that the Chinese and Indian currencies have appreciated more than in previous episodes (Figure 3). Overall, however, recent exchange market pressures have generally not reached the peaks of the pre-global crisis period, except for Hong Kong SAR and Korea. Moreover, despite the appreciations of 2010, real effective exchange rates remain significantly below the levels of the early 2000s, except in the case of China.

¹⁰The trend is taken to be the eight-quarter moving average. There are a number of other supplementary rules to avoid very short gaps between episodes of surges: (i) if only one quarter with positive inflow separates two adjacent surges, it is combined with the two adjacent episodes to form one continuous episode; (ii) if inflows remain elevated following the first period of a surge, they are counted in the surge (the elevated level is defined as above 50 percent of the flow in the previous quarter); and (iii) if inflows dip for one period following a surge and then return to elevated levels, they are counted in the surge. Corrections have been made to take into account large errors and omissions in the balance of payments that could represent unrecorded capital flows.

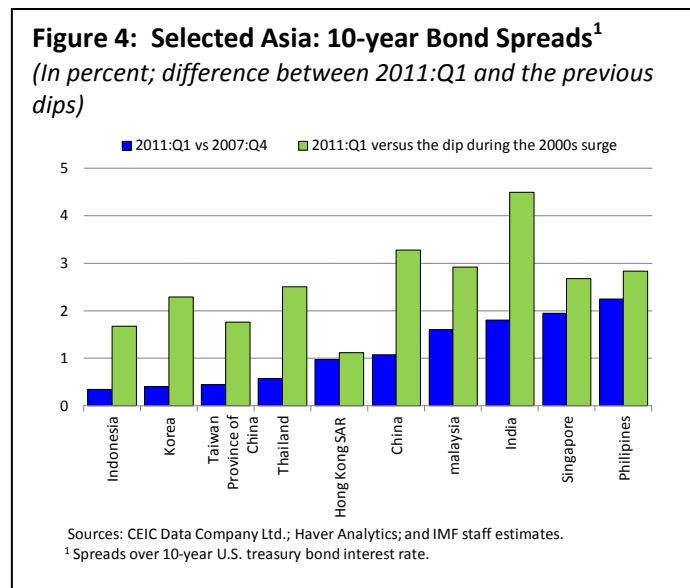
Figure 3. Emerging Asia: Exchange Market Pressure Index During Surge Episodes
(Index)



Source: IMF staff calculations.

Regarding other assets, Table 1 is a heat map that compares the deviations of peak levels from long-term averages (z-scores) across waves for equity, bond, and real estate valuations.¹¹ The overall picture is that asset valuations are not generally excessive relative to history, except for some localized instances of overheating. This is demonstrated by the predominantly green shading for the rightmost columns, which are based on current asset prices. Previous capital inflow episodes were associated with much higher asset valuations, as shown by the areas shaded red. Peak valuations for equities were extremely rich in the previous waves, with valuations two standard deviations above their average in many countries. Currently, valuations appear to be in line with longer-term averages, with price earnings ratios below 17 in all countries.

The picture is almost identical for bonds. 10-year sovereign bond spreads were wider in early 2011 compared with the dip reached before the global financial crisis (2007:Q4) and dip during the surge in the 2000s (Figure 4). The current narrowing relative to pre-crisis peaks likely reflects the generally greater attractiveness of Asian debt markets now (especially given unusually low absolute levels of yields in the advanced markets), spurred in part by expectations of currency appreciation and lower risk premia relative to advanced economies.



¹¹ A z-score represents the deviation of latest observation from either the period average expressed in the number of standard deviations.

Table 1. Heat Map for Selected Asian Economies

	Equity forward looking price/earnings ratios ^{a,b}			Residential price/rent ratios ^{a,b,c}		
	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	118.8
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 ^{a,d}			Debt/equity ratios ^a		
	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	43.7
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.

^a 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.

^b 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.

^c 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.

^d These are year over year changes in credit-to-GDP ratios.

In property markets, there were strong signs of overheating in the build-up to the Asian crisis according to house price-to-rent indicators, with the possible exception of Indonesia.¹² There were fewer such signs before the global financial crisis, except for price-to-rent ratios in Indonesia, Malaysia, and Taiwan Province of China. As of 2010:Q4, price-to-rent ratios appeared relatively strong only in China and Hong Kong SAR.

Overall, while net capital flows to Emerging Asia as a whole have rebounded strongly since the global crisis, they have yet to reach historic highs. Notwithstanding some country differences, there is limited evidence of current asset imbalances, although there are some signs of excess credit creation that may point to economy-wide overheating.

¹² Pre-Asian crisis data is not available for China, India, Malaysia, and Taiwan Province of China.

III. DO NONRESIDENT INFLOWS REDUCE LONG-TERM BOND YIELDS IN EMERGING MARKETS?

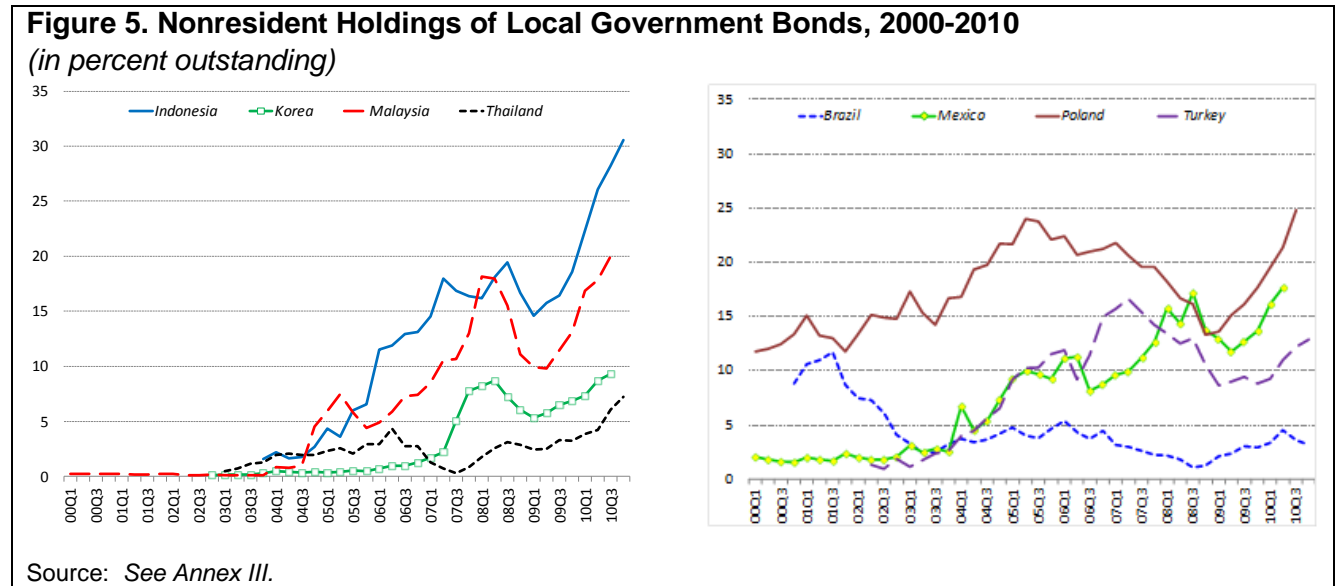
This section explores one of the mechanisms through which financial globalization transmits low rates in advanced economies to emerging economies, using an empirical model. Long-term interest rates in EMs are modeled as a function of nonresident inflows into EM local currency government bond markets. The results show that these inflows have contributed significantly to the observed decline in EM long-term yields, both in the recent wave of inflows and in the mid-2000s episode.

However, monetary policy can still affect long-term interest rates in the face of moderate capital inflows. The results suggest that a 25-bps tightening can offset the effect of a 2-percentage-point rise in nonresident bond purchases on long-term yields. In other words, policy makers may be able to keep long-term rates stable when faced with moderate levels of capital inflows by tightening the policy stance. Moreover, in EMs, the key rates that matter for economic activity are still mostly anchored to short-term rates, ensuring that monetary policy continues to play a critical role in managing aggregate demand. (IMF, 2011b)

A. How Important Are Nonresident Investors in Local Bond Markets?

The recent surge in capital inflows has significantly raised nonresident investment in local bond markets. Figure 5 shows nonresident holdings of local government bonds as a percentage of the total outstanding volume. There are three striking features:

- Nonresident participation in EM government debt markets has risen steadily since the trough of the global financial crisis in mid-2009, barring some temporary reversal coinciding with debt crises in Europe. With the recent wave of inflows, nonresident participation has reached new peaks in Indonesia and Poland and more than doubled in Korea, Malaysia, and Thailand.
- Nonresident participation varies markedly across EMs. It is high in Indonesia, Mexico, Poland, and Turkey, in the 20–25 percent range, and relatively lower in Brazil, Korea, and Thailand, with less than 10 percent of outstanding bonds held by nonresident investors.
- Even where nonresident participation is relatively high, it is still less than 25 percent of the market, so domestic investors continue to be the dominant participants in all the EMs in this sample.



B. Has the Most Recent Surge in Inflows Depressed Bond Yields?

A quick look at the data indicates that capital inflows may have played a role in lowering bond yields in EMs during the recent surge episode. While nonresident participation rose in line with capital inflows from mid-2009 onward, bond yields continued to decline across the board, reaching all-time lows in some EMs. Yields fell by an average of 130 bps for the eight countries in the sample.¹³ The correlation between the two series for the period June 2009-December 2010 is -0.8, suggesting that nonresident bond purchases could have played a role in the recent decline in bond yields. While it does not indicate causality, this correlation was less evident in previous episodes. Another stylized fact that suggests inflows led to lower yields is that inflationary expectations in EMs have been increasing over the last 18 months while long-term nominal yields have been falling (Annex II, Figure II.2).

Figure II.3 of Annex II depicts policy interest rates and the spread between the 10-year and 1-year local currency-denominated government bonds for selected EMs. The chart shows that, on average, long-term rates have not moved in line with policy rates. The correlation between the two series over the entire period is large and negative for all countries. This “decoupling” is particularly evident in the mid-2000s, when nearly all countries were tightening monetary policy but longer-term rates were falling at the same time.

How can nonresident investment bring down bond yields when it accounts for a small share of the market? The answer is twofold: First, especially in the initial phase of the surge, foreign “real money” investors went into longer maturities to benefit from the relatively higher interest rates in emerging markets. And second, since domestic holders of such long-

¹³ Figure II.1 of Annex II plots the nominal 10-year government bond yields for a select number of emerging markets against the nonresident share of bond holdings.

term bonds are mostly institutional investors that typically hold to maturity, even the small amount of foreign investment going into the long end of the yield curve can have a large marginal impact.

C. Empirical Methodology and Data

The literature on the decline in U.S. Treasury yields during the mid-2000s is vast and inconclusive, but the relatively small amount of research done on EMs conclusively finds a role for nonresident investment in explaining asset price or interest rate movements.¹⁴ A common finding in these studies is that policy rates have a strong influence on short-term rates but not on long-term rates, which are influenced more by inflationary expectations, changes in risk premia, and, to some extent, global factors. Those global factors include monetary policy conditions in the advanced economies, investor risk appetite, and nonresident investor demand for local bonds.

The econometric specification used here is based on Warnock and Warnock, (2009) (hereafter, WW), which examined the behavior of the U.S. Treasuries in the mid-2000s. WW models the long-term Treasury yield as a function of the short-term rate, long-term inflationary expectations, a measure of the risk premium, the expected output gap for the following year, the lagged structural fiscal deficit, and nonresident holdings of U.S. Treasuries.

A multi-country version of the WW specification, with small changes to accommodate data availability, can be written as follows:

$$r_{i,t}^{LT} = c + \alpha_i + \beta_1 r_{i,t}^{ST} + \beta_2 \pi_{i,t}^e + \beta_3 x_{i,t}^e + \beta_4 \rho_{i,t} + \beta_5 f_{i,t} + \beta_6 y_{i,t}^e + \beta_7 B_{i,t} + \varepsilon_{i,t} \quad (1)$$

where for country i , $r_{i,t}^{LT}$ is the nominal long-term government bond yield, $r_{i,t}^{ST}$ is the nominal short-term interest rate, $\pi_{i,t}^e$ is the 12-month ahead inflation expectations, $x_{i,t}^e$ is the expected change in the exchange rate vis-à-vis the U.S. dollar over the next 12-months, $\rho_{i,t}$ is a measure of the risk premium on the long-term bond, $f_{i,t}$ is the fiscal balance, $y_{i,t}^e$ is the one-year ahead expected output gap, and $B_{i,t}$ is the foreign holdings of bonds in percent of total outstanding. Another modification made to the WW specification is the addition of the expected change in the exchange rate. An expected appreciation would increase the nominal return in foreign currency from holding EM bonds, possibly contributing to nonresident demand and lower yields. On the other hand, depreciations are often associated with adverse external shocks that could lower aggregate demand and lead to a reduction in nominal yields.¹⁵

¹⁴ Among other studies, they include Moreno, 2008; Hartelius, Kashiwase, and Kodres, 2008; Andritzky, Bannister, and Tamirisa, 2005, and Peiris, 2010.

¹⁵ Excluding large financial shocks that lead to capital outflows.

Equation 1 is estimated for a panel of eight emerging markets: Brazil, Indonesia, Korea, Malaysia, Mexico, Poland, Thailand, and Turkey. These countries were chosen both because they have been receiving large inflows into their local bond markets and also because high-frequency data on nonresident holdings of bonds is available. Ten-year bond yields are taken as the long-term benchmark (5-year bond for Turkey); policy rates are used for the short-term rate; 12-month-ahead inflation and exchange rate expectations are taken from the consensus survey; the risk premium is proxied by country-specific long-term sovereign credit default swap (CDS) spreads; the general government fiscal balance is in percent of quarterly GDP; real activity is captured by industrial production and real GDP growth; and nonresident holdings of bonds are collected from various sources (as presented in the previous section).

D. Estimation Results

Equation 1 is estimated using a fixed-effects panel model over two samples: a quarterly sample over 2000:Q1-2010:Q4 and a monthly sample over 2006:M1-2010:M12. The monthly or “short” sample takes advantage of the foreign bond holdings data, which is available at a higher frequency from 2006 onwards, and hones in on the more recent behavior of long-term yields. The quarterly or “long” sample, on the other hand, covers the other period of interest, the mid-2000s, but uses lower frequency data. The results are robust regarding the sample period, use of alternative variables, and estimation method. Estimates from both panel models are presented in Table 2.

The results show that nonresident participation in the local bond market does have a significant impact on long-term yields. Both models find that each percentage point increase in nonresident participation reduces long-term bond yields by about 5 bps on average. This result is robust to the specification and estimation method. The result is nearly identical to the one in Peiris (2010), which found that for a similar set of countries a one percentage point increase in nonresident purchases lowers bond yields by 6 bps.

However, higher rates of nonresident investment in bonds do not render policy rates weak in affecting long-term rates. These results show that more than half the increase in policy rates gets transmitted across the yield curve into long-term rates. This implies that a 25 bps increase in the policy rate can, on average, balance out the dampening effect of a 2 percentage point increase in nonresident holdings on long-term yields.

Table 2. Summary of Results^a

Impact on Long-Term Bond Yields	Short/Monthly Model		Long/Quarterly Model	
	Coefficient	t-Statistic	Coefficient	t-Statistic
Policy rate	0.65 ***	5.53	0.74 ***	7.29
Inflation expectations	0.49 ***	2.94	-0.02	-0.11
Expected depreciation	-0.05 *	-1.82	-0.23 ***	-2.61
VIX ^b	0.04 **	2.24	0.02	1.00
Fiscal balance	0.06 *	1.71
Real activity ^c	0.08 ***	6.55	0.05 **	2.12
Nonresident holdings of bonds	-0.04 **	-2.24	-0.05 **	-2.30
Constant	0.23	0.18	2.31 ***	3.12
Adj. R-squared		0.94		0.86
Sample	2006:M1 - 2010:M12		2000:Q1 - 2010:Q4	
No. of observations		333		252

^a The t-statistics are corrected for serial correlation and cross-sectional heteroskedasticity. Estimates are robust, qualitatively and quantitatively, to different assumptions about the error terms. In both samples, the Hausman test strongly rejects a random-effects specification and the country fixed effects are found significant. *** denotes significance at 1 percent, ** denotes significance at 5 percent, and * denotes significance at 10 percent.

^b The results are qualitatively the same when the VIX is replaced by long-term sovereign CDS spreads.

^c Year-on-year growth of the 3-month moving average industrial production in the monthly model. Year-on-year growth of seasonally adjusted quarterly GDP in the quarterly model.

Real economic activity and the fiscal balance are the other significant variables. Real activity appears to raise long-term yields by 5 bps to 8 bps for every percent increase in quarterly growth. The result is the same between the monthly model using industrial production and the quarterly model using GDP growth. On an annualized basis this coefficient becomes even larger, capturing the impact of higher growth on inflation expectations and thereby adding upward pressure on long-term yields. A higher fiscal balance affects long-term rates by a similar magnitude, about 6 bps on a quarterly basis, which is very close to the results in Peiris (2010), and Baldacci and Kumar (2010).

As expected, inflation expectations add significantly to long-term yields, although the result is significant only in the monthly model. A one percentage point increase in expected inflation over the coming year adds about 50 bps to long-term yields for the 2006–10

estimation period. In contrast, an expected one percentage point depreciation against the U.S. dollar is found to lower long-term rates by 5 bps to 23 bps.

The sign of the risk coefficient in the shorter sample model is positive, as expected, and significant, with each percentage point increase in sovereign CDS spreads adding 4 bps to bond yields. The coefficient is positive in the monthly model, but turns to zero in the quarterly version. This may reflect the relative importance of risk measures in the shorter term, while over the longer term macroeconomic fundamentals and expectations matter more for yields.

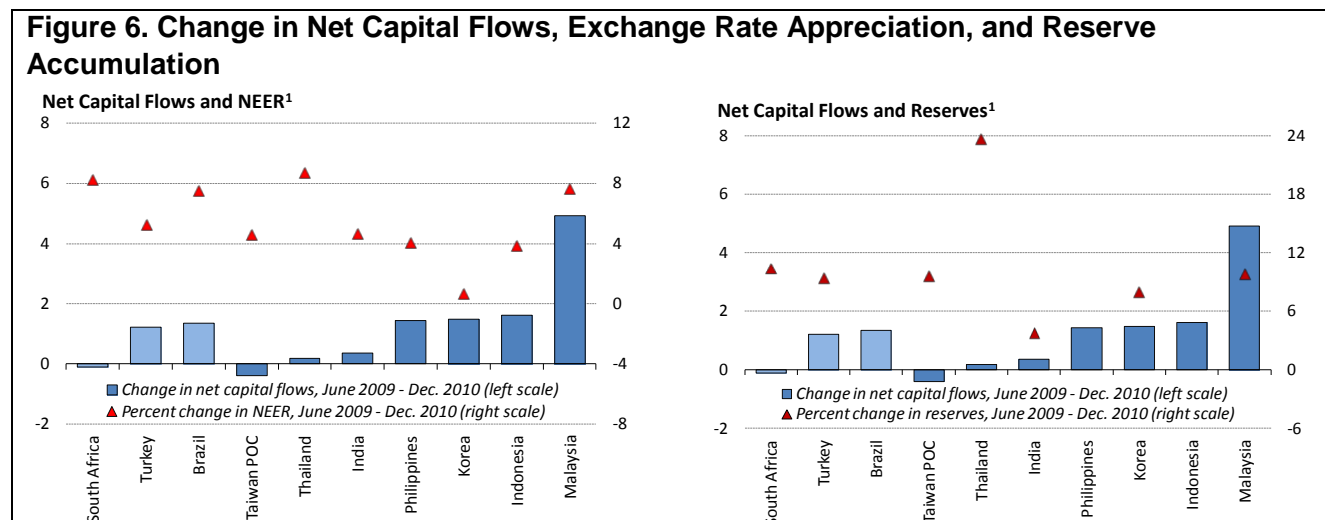
Why does nonresident investment have a larger impact on long-term yields in EMs, especially when they make up a small share of the market? The answer is twofold: First, and especially in the initial months of a surge, nonresident “real money” investors go into longer maturities compared to the pre-surge period. This is because a surge usually begins with significant growth and interest rate differentials between advanced and emerging economies, so the anticipated gain on the longer end of the yield curve is greater. And second, because domestic (institutional) holders of such long-dated bonds typically hold to maturity, even the small amount of nonresident investment going into this segment creates enough movement to bring down yields.

IV. CONVENTIONAL AND UNCONVENTIONAL POLICY RESPONSES TO INFLOWS

A. Conventional Macroeconomic Policy Responses in Emerging Asia

Most country authorities in Emerging Asia have addressed large capital inflows by relying mostly on reserve accumulation and, to a lesser extent, on currency appreciation. Currencies across the region depreciated significantly in the aftermath of Lehman Brothers’ collapse but have bounced back, in many cases rapidly, with the onset of the recoveries and the stabilization of global financial markets. Similarly, reserves fell sharply in most countries as central banks used reserves to buffer the shock originating from the sudden drying up of foreign exchange (FX) funding, but reserves recovered quickly as the authorities stepped up their foreign exchange rate intervention following the resumption of capital flows.

However, the regional trend masks some differences in country responses (Figure 6). In India, for example, reserves have remained below their pre-Lehman levels as the central bank has abstained from intervention since November 2009, allowing the exchange rate to take the brunt of the adjustment. On the other hand, intervention was rapid in Indonesia and Thailand, where reserves are now about 60 percent above their pre-crisis levels. But these countries also allowed significant exchange rate appreciation because the flows have been large and persistent.



¹ June 2009 – September 2010 data for Brazil, Korea, South Africa, and Turkey.

Looking forward, almost all countries still have more room to pursue conventional macroeconomic responses. From a macroeconomic policy standpoint, the exchange rate should be allowed to appreciate if it is undervalued, whereas if it is overvalued appreciation pressures can be attenuated by the accumulation of foreign exchange reserves (and by sterilization if there are inflationary concerns). In addition, when inflows are persistent, accumulating reserves and resisting exchange rate appreciation pressures may make inflows even stronger as expectations of appreciation are maintained. In Asia, exchange rate valuations suggest that countries generally have room to allow more exchange rate appreciation. There is also a case for allowing increased currency volatility to discourage speculative flows, even in countries where the currency may be close to its fundamental value. If the economy is at risk of overheating, fiscal policy can be tightened (which will reduce appreciation pressures as well as create space for more active monetary policy), though lags in implementation can limit the short-term scope for fiscal consolidation. And as the empirical results in Section III confirm, monetary policy remains effective and should be used as one of the policy instruments to deal with overheating pressures and capital flows.

From a more medium-term perspective, policy makers are also endeavoring to deepen local capital markets to increase their absorptive capacity and thus better accommodate capital inflows. This will entail efforts to expand the domestic investor base as well as improve market infrastructure, including simplifying debt issuance procedures and rationalizing other regulatory requirements.

B. Extending the Policy Toolkit—Macro Prudential Responses in Selected Asian Economies

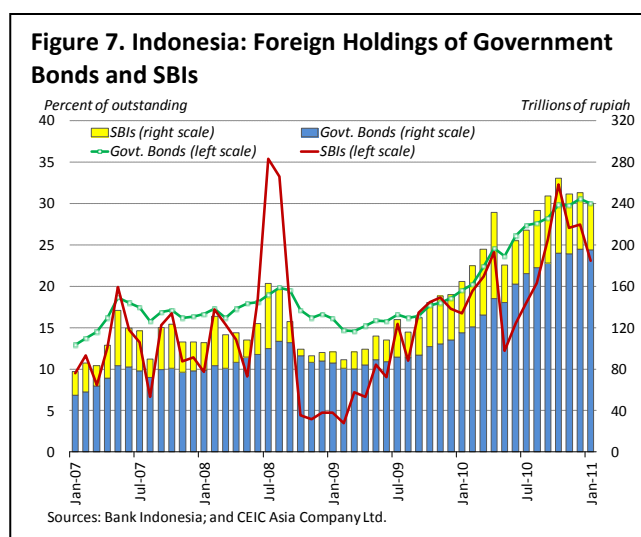
Five broad objectives were targeted by macro prudential measures: (i) to mitigate complications for central bank market operations that stemmed from inflows to short-term instruments, (ii) to limit inflows to local bond markets, (iii) to reduce risks in both the

banking system and the real economy, (iv) to limit vulnerabilities stemming from private sector external borrowing, and (v) to curb speculative activity in foreign exchange markets that was seen to be contributing to exchange rate volatility.

The capital flow management measures implemented or announced since 2009 in Asian economies are summarized in Table 3. The form and extent of these unconventional measures in Asia varied widely, reflecting three issues: (i) the limits to macroeconomic policy adjustments that each economy faced, (ii) the specific financial sector pressures each economy faced, which in turn depended on the size and composition of inflows, and (iii) a concern about the volatility of inflows.

Indonesia—Managing the Impact of Inflows on Central Bank Operations

Strong foreign demand for central bank securities has complicated sterilization efforts. As inflows gathered pace through 2009 and into 2010, Bank Indonesia (BI) rebuilt its international reserves, partially sterilizing its intervention by selling one- and three-month central bank bills (SBI). However, an increasing proportion of these securities was being bought by foreign investors, leading to concerns that these sterilization operations were attracting even more inflows. From June 2010 onwards, BI increased the pace of its intervention and sterilization, seeking to limit further currency appreciation, and imposed a one-month holding period requirement on SBIs. Since then, BI also gradually lengthened the tenor of the SBIs it offers to nine and 12 months, and has introduced nontradable term deposits for banks of up to six months' tenor.



Since the measures were imposed, foreign holdings of both SBIs and Indonesian government bonds have increased both in absolute terms and as a proportion of the total outstanding (Figure 7). But the measures have been effective in reducing foreign ownership of SBIs as a proportion of outstanding liquidity-absorbing instruments, as nontradeable term deposits

Table 3. Capital Flow Management Measures In Asian Economies

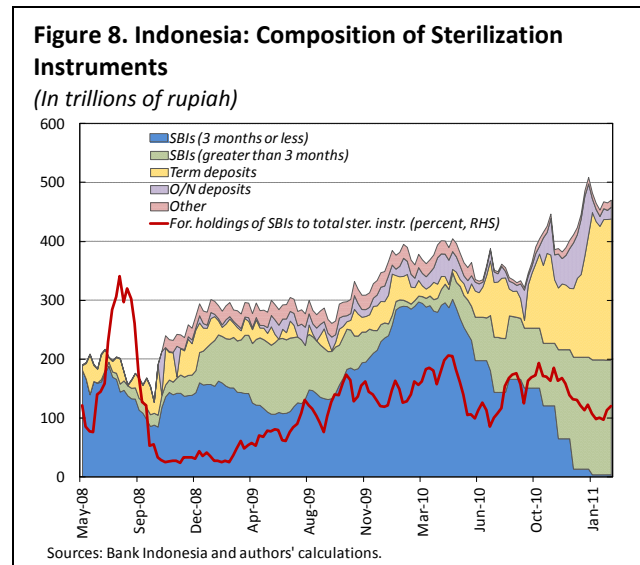
Policy Tool	Recent Country Examples	Motivation/Objective
Limits to direct and indirect FX exposure	Korea (June 2010): Capped FX forward positions of banks relative to their equity capital. Reduce corporate FX hedging limit from 125% to 100% of export receipts.	By limiting derivatives positions, the measure indirectly targets a reduction in external borrowing by the private sector, particularly the banking sector. This exposure was also associated with carry trades onshore, including through “over hedging” of dollar receivables by Korean exporters.
Increase restrictions on external borrowing	India (Dec. 2009): Re-instated interest rate cap on eligible external commercial borrowing that was eliminated during the crisis.	To limit access to foreign credit to best corporate credits and prevent high cost borrowing.
Minimum holding period on central bank bills	Indonesia (June 2010): One month holding period on central bank bills (SBIs) instated for both domestic and foreign investors	To limit volatility of flows. SBIs had been subject to sharp shifts in positions relative to global risk appetite, as they were used as a carry trade vehicle. Holding period limits the volatility of flows on exit from positions.
Limited foreign access to central bank instruments	Indonesia (June 2010- present): Phased out one- and three-month SBIs in favor of nine- and 12-months SBIs, and expanded supply of nontradeable term deposits up to six months tenor, which are only available to banks operating in Indonesia.	To reduce volatility of inflows, and address concerns that central bank sterilization was attracting further inflows. Short-term SBIs, largely used to sterilize FX intervention, were a favored vehicle for carry trades.
Other restrictions on foreign access	Taiwan Province of China (Nov. 2009): Financial Supervisory Commission (FSC) barred access to time deposit accounts for foreign investors. Taiwan Province of China (Nov. 2010) FSC extended existing investment of nonresident inbound remittances in domestic securities to 30 percent, to include government securities of remaining maturity greater than one year.	To dampen speculative flows. Time deposits are one avenue for carry trades/ currency speculation. Reduced access of nonresidents to government bonds.
Measures to encourage outbound investment by residents	Malaysia (Oct. 2010): Announced that the overseas investment limit of the Employee Provident Fund would be raised from 7 percent to 20 percent. Philippines (November 2010): Increased ceilings on residents’ purchase of FX and foreign assets from authorized agent banks. Prepayment of private sector FX loans allowed. Thailand (February, September 2010): Raised ceilings on residents’ outward direct investment, lending abroad, and foreign currency holdings.	
Reserve requirements on foreign currency and nonresident accounts	Taiwan Province of China (Jan. 2011): Raised reserve requirement on local currency accounts held by non-residents to 90 percent on balances exceeding the outstanding balance on December 30, 2010. Balances below end-2010 levels subject to 25 percent reserve requirement. Require reserves for such accounts are no longer remunerated. Indonesia (March 2011): Raised reserve requirement on foreign currency accounts from 1 to 5 percent. A further increase to 8 percent is scheduled for June 2011.	To effectively bar banks from offering interest-bearing accounts to nonresidents. To limit bank vulnerabilities to inflow volatility, and to reduce incentives for banks to intermediate short-term inflows.
Withholding tax on foreign holdings of government bonds	Thailand (Oct. 2010): Reimposed 15 percent withholding tax (withdrawn in 2005) for state bonds on foreign investors. Korea (Jan. 2011): Reintroduced 14 percent withholding tax on foreign holdings of government bonds and central bank securities. In both cases, the impact has been limited due to wide coverage of double taxation treaties.	To slow inflows into government bond markets.

Sources: Country authorities.

have become a more important sterilization tool (Figure 8). BI also reimposed a limit on banks' external short-term borrowing to 30 percent of capital in January 2011, limiting their capacity to intermediate short-term inflows.

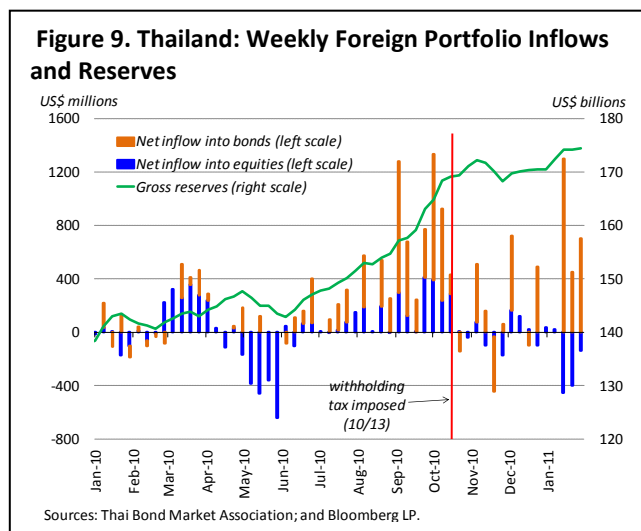
These changes to the central bank's sterilization instruments may create some difficulties for its monetary operations and market development objectives. First, the holding period requirement and longer tenor of SBIs reduce banks' incentives to actively trade or repo these instruments for their own liquidity management. At the same time, the increasing reliance of BI on nontradeable term deposits to withdraw liquidity will limit money market activity. Second, as the central bank conducts operations

further along the yield curve, there could be more uncertainty regarding its announced interest rate target. The original specification of the BI operational framework was that its policy rate was a target for the one-month SBI rate, and that short-term interbank rates would converge to this target. However, in the past year, the yields on longer-dated SBIs have been anchored to the policy rate, while overnight interbank rates have been 50–75 bps lower than the BI rate. Finally, the coordination of monetary policy and debt management have become more complicated as BI has lengthened the tenor of its operations, but the government started selling 3-month treasury bills in March 2011.



Korea and Thailand—Limiting Inflows into Local Bond Markets

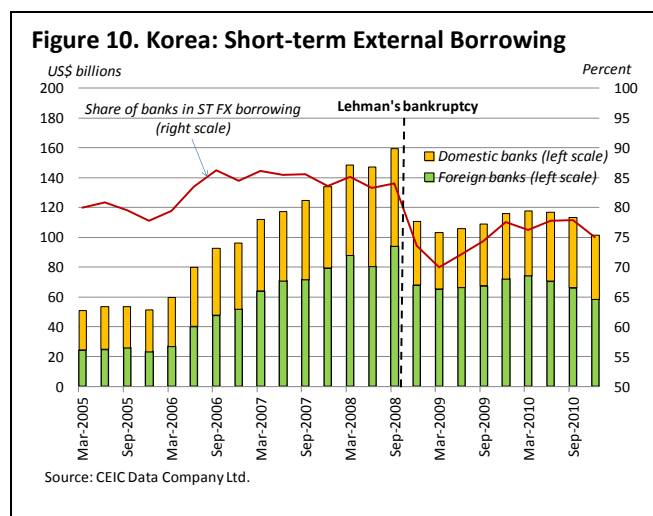
Both Thailand and Korea reimposed withholding taxes on foreign investors' holdings of government securities to limit inflows into local bond markets, but these measures have had little effect so far. In both countries, the impact of these measures on investor behavior are likely to be limited, given the wide coverage of double-taxation treaties signed by each country. After the Thai authorities reinstated the withholding tax in October 2010, inflows fell, dampened by uncertainty about its exact implementation, but by December they had resumed (Figure 9). Similarly, Korea reintroduced a withholding tax on foreign purchases of state bonds in January 2011.



Korea—Limiting Private-Sector Foreign Exchange Borrowing

Korea tightened limits on bank and corporate foreign-currency funding. In June and then in October, 2010, existing limits on the size of banks' foreign currency derivatives contracts (relative to bank capital) and corporates (relative to export receivables) were reduced. Since banks that offer currency forwards typically hedge their positions by borrowing externally, the limits on forwards indirectly constrain foreign borrowing by banks (relative to their capital).

The measures aimed at banking system vulnerabilities appear to have succeeded in preventing banks' external debt from returning to pre-crisis levels. In particular, the limits on forward contracts relative to underlying commercial transactions as well as the limits on foreign-exchange derivative positions relative to bank capital both appear to have contributed to a sizable reduction in banks' outstanding external short-term debt (Figure 10). However, the decline



in demand for currency forwards from shipbuilders, due to a smaller order book post-crisis, has also been a contributory factor. Moreover, the measures to limit forward contracts between banks and corporates apply only to onshore entities, allowing corporates to engage in offshore contracts using non-deliverable forwards (NDFs). Offshore banks are still able to offset their short KRW positions resulting from the NDFs by investing in the onshore government bond market.

Korea's measures might not curb capital flow volatility but could mitigate excessive exposures among those market segments the authorities feel are most vulnerable. The measures have already led to a reduction in FX derivative positions and related short-term external borrowing among onshore banks. However, if spreads adjust to make FX-derivatives business more profitable, banks may seek to expand their capital bases to allow them to expand their FX-derivatives books. In addition, since these measures are largely targeted at bank flows and the capital account remains open, other market segments will continue to benefit from global capital inflows, though they will also be subject to reversals.

Taiwan Province of China—Curbing Currency Speculation

Taiwan Province of China has taken a range of measures aimed at reducing speculation in its foreign exchange markets. The authorities have been concerned that high-frequency onshore and NDF trading were driven mainly by speculators and led to excessive volatility. Since

NDF markets are settled in U.S. dollars, there is little that the central bank can do to control offshore market behavior. Instead, the central bank focused on reducing local banks' foreign exchange positions in both onshore and NDF markets, including discouraging nonresident deposits by imposing punitive reserve requirements. The aim of these measures was to limit local banks' capacity to provide liquidity to NDF markets. The National Supervisory Commission also took steps to limit nonresident investments in local bank deposits and government securities.

These attempts to curb speculation in the new Taiwanese dollar appear to have had little impact on the behavior of the currency. The exchange rate continued its trend appreciation, at least until the downturn in global risk sentiment early in 2011. Volatility increased in late 2010 and early 2011, while foreign exchange market turnover and inbound remittances for investment purposes have remained high. Although these measures should have reduced the capacity of local banks to take speculative positions in offshore markets, this would only affect currency behavior if trading were dominated by speculative flows. Instead, the appreciation of the exchange rate appears to have been driven by the economy's strong current account and foreign demand for longer-term investments, including equities. In these circumstances, measures aimed at curbing speculative flows might have limited impact and conventional macroeconomic adjustments that would influence current account fundamentals would be a more appropriate response.

Across Asia—Macprudential Measures to Reduce Financial Stability Risks

Concerns that inflows could fuel excessive credit growth and asset price bubbles, particularly in real estate, have prompted many Asian economies to tighten domestic prudential requirements in order to reduce potential threats to financial stability. Several jurisdictions introduced or tightened real estate lending criteria, including China, Hong Kong SAR, India, Korea, Malaysia, Singapore, Taiwan Province of China, and Thailand (Table 4). Hong Kong SAR also raised the stamp duty on all property transactions. In many cases, these measures have been targeted at particular market segments (defined by geographical area or price) where risks are seen to be mounting. A broader range of measures has been introduced to bolster financial system stability in a number of countries. Such policies have included changes in requirements for loan-loss provisioning and capital adequacy and limits on maturity mismatches on bank balance sheets, in line with global initiatives. Many central banks have increased reserve requirements, though in part this reflects the unwinding of measures taken at the height of the financial crisis to alleviate funding pressures.

Table 4. Recent Property Market Measures in Asian Countries

Property Market Measure	Recent Country Examples	Motivation/Objective
Reductions in LTV ceilings	<p>Hong Kong SAR (Oct. 2009): Mortgages for luxury property capped at 60 percent LTV ratio.</p> <p>Korea (2009): Ceiling on LTV ratios lowered in Seoul.</p> <p>India (Jan. 2011) Imposed cap on LTV ratios for lower end of housing market.</p> <p>Thailand (Jan. 2011): Cap on LTV ratio for certain types of residential housing at 90 percent.</p> <p>China (2010): Lower LTV ratios for second and third homes</p> <p>Singapore (Jan 2011): Cap on LTV ratio for mortgage lending lowered from 70% to 60% for individuals with one or more outstanding housing loans at the time of the new housing purchase; LTV ratios for non-individuals lowered to 50%.</p>	<p>To curb real estate speculation, in part due to inflows from mainland, particularly at top end of market.</p> <p>To dampen real estate prices.</p> <p>To preempt a surge in mortgage lending.</p> <p>Series of incremental measures target residential property speculation amid signs of overheating.</p>
Other real estate lending restrictions	<p>Hong Kong SAR (Oct. 2009): Loan amount for non-luxury property capped at US\$1.5 million. Guidance on mortgage rates.</p> <p>India (Oct 2009): Increase in provisioning requirements for real estate credit. (Jan, Mar. April 2010) incrementally increased required reserves for banks. (Jan. 2011) further increased provisioning requirement and risk weights on real estate loans.</p> <p>China (2010): Greater administrative guidance on financing including higher down payments requirements for mortgages. There was a mandated increase in mortgage rates for second homes, third mortgages were officially discouraged.</p>	<p>To address potential risks in banking sector from recovery of credit growth.</p> <p>To lessen speculative activity by lowering transaction volumes and leveling off prices.</p>
Real estate taxes	<p>China (2010): Taxes on resale of properties within five years increased.</p> <p>Hong Kong SAR Stamp duty increased</p> <p>Singapore (Aug 2010): Holding period for the imposition of Seller's Stamp Duty (SSD) was lengthened from 1 year to 3 years; (Jan 2011): SSD rates raised and holding period increased to 4 years.</p>	

Sources: Country authorities.

The focus on curtailing leverage and bubbles in property markets reflects the region's history of real estate volatility and the impact on financial stability. Even though recent inflows to stocks have been substantial for some economies in the region, there have been no measures targeted at equity markets. This reflects the fact that equity price volatility is not perceived to be a significant threat to financial stability. The equity exposure of domestic banks tends to be low, and stocks are a relatively small part of household wealth, compared with property.

Many of these domestic macroprudential measures do not directly affect capital inflows, but the measures could limit them by altering both domestic and foreign investors' expectations for asset returns, altering banks' demand for external funding, and raising expectations that more restrictive measures could follow. Apart from China and some other economies, overall credit growth in most countries remains broadly in line with historical norms, and property price inflation has slowed in the most overheated markets. These measures therefore appear to have been effective in limiting the buildup of risks to financial stability.

V. POLICY RESPONSES IN SELECTED COUNTRIES OUTSIDE ASIA¹⁶

How have countries outside Asia responded to capital inflows? This section describes the recent experiences of Brazil, South Africa, and Turkey in managing capital inflows. These are large emerging economies with liquid capital markets and flexible exchange rates that have attracted large inflows since the crisis. They have also supplemented macroeconomic policy responses with other measures to cope with inflows. As such, they provide an interesting comparison with the Asian experience described above.

While these three countries share some similarities with one another in their experiences, the differences are striking, especially in policy responses (Table 5). This comparison suggests that even though concerns with capital inflows may be common, policy responses are necessarily country-specific and have varied. This section first compares the magnitude of inflows and their impact on asset markets and then reviews the countries' policy responses.

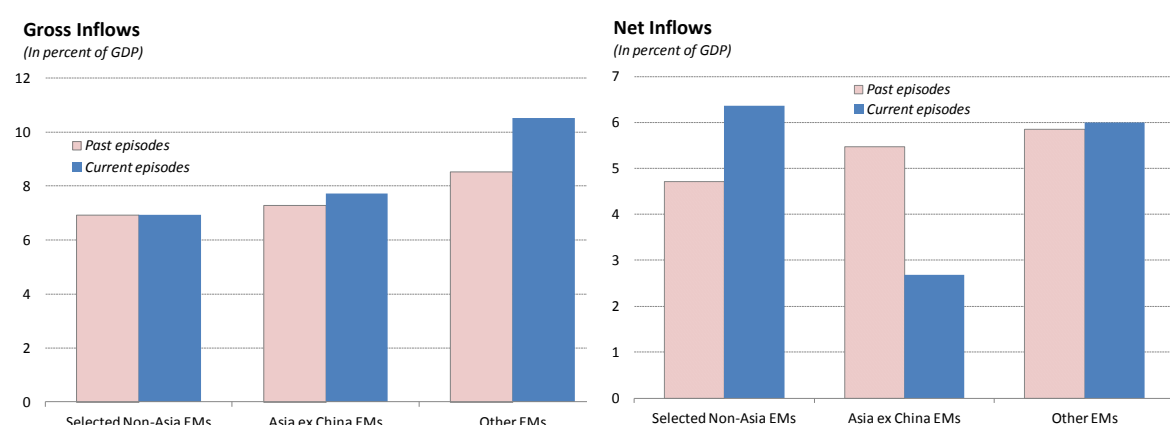
Table 5. Comparison of Recent Country Experiences with Capital Inflows

Similarities	Differences
<ul style="list-style-type: none"> • Large magnitude of inflows • Sharply appreciated exchange rates • Concurrent concerns of export competitiveness and financial stability • Use of prudential measures 	<ul style="list-style-type: none"> • Impact of capital flows on domestic asset markets and credit growth • Whether the fiscal stance has been conducive to coping with inflows • Direction of policy rate changes • Use of capital controls and capital-control-like prudential measures

A. Magnitude of Inflows

Brazil, South Africa, and Turkey have faced inflows of similar size to those they faced in past episodes but larger than what Asian EMs have faced, as discussed above (Figure 11). Comparing across country groups, the magnitude of gross inflows in the current episode in these three countries is similar to that in Asian EMs, but considerably higher in terms of net inflows. Consequently, exchange rates have risen more in South Africa and Brazil—by close to 40 percent since the post-crisis trough—than they rose in selected Asian countries. However, Asian countries have also resorted to higher reserve accumulation, making it difficult to assess how much exchange rates would have risen in the absence of this reserve build up.

¹⁶ This section is based on IMF (2011a). The discussion of Brazil, South Africa, and Turkey draws heavily on country annexes therein authored by, respectively, Roberto Benelli, Ricardo Llaudes, and Manuela Goretti. Malika Pant and Federico Gabriel Presciuttini assisted in the preparation of this section.

Figure 11. Magnitude of Inflows in Current and Past Episodes

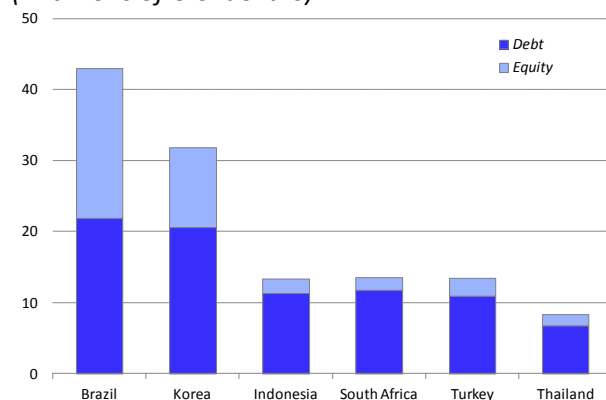
Source: IMF, *International Financial Statistics*.

Notes: *Gross inflows* refers to the sum of inward FDI, portfolio liabilities, and other investment liabilities. *Net inflows* refers to the sum of foreign direct investment, portfolio, and other investment balances. *Selected Non-Asia EMs* comprises Brazil, Peru, South Africa, and Turkey. The figure compares inflows in the current episode (2009:Q2/Q3 onwards) to past episodes identified in IMF (2011b) as follows: Brazil, 1999:Q2–2002:Q2 (Episode 1), Brazil 2006Q3–2008Q3 (Episode 2); South Africa, 1995:Q1–2000:Q3 (Episode 1), South Africa, 2004:Q1–2008:Q3 (Episode 2); Turkey, 1999:Q3–2000:Q3 (Episode 1), and Turkey, 2002:Q4–2008:Q3 (Episode 2).

As in Asia, portfolio flows have grown in relative and absolute importance in Brazil, South Africa, and Turkey (Figure 12). Portfolio flows account for about 60 percent of all gross inflows in these three countries, on average, in the current wave of inflows; this is their highest relative share compared to earlier waves. As documented in IMF (2011a), the *pace* of portfolio inflows—measured as total portfolio inflows over a period divided by the number of quarters in the period—has quadrupled from 0.3 percent of GDP

per quarter in the previous wave to 1.2 percent of GDP per quarter in the current wave for EMs as a whole. Portfolio flows also tended to be more volatile. In South Africa, for instance, after two years of large inflows, portfolio flows turned negative in early 2011 and led to downward pressure on the exchange rate. The larger role played by portfolio flows, especially compared to banking flows, could reflect the fact that international banks' balance sheets are still weak on account of deleveraging pressures, and many banks may need to raise capital to conform with prospective changes in regulations.

Inflows to the three countries have been driven by a varying combination of strong growth prospects, relatively healthy balance sheets, and large capital markets. These three countries are at different stages of the economic cycle. Brazil and Turkey have emerged rapidly from the crisis, and markets expect strong growth prospects in the near term. South Africa lost

Figure 12. Net Portfolio Flows, 2010:Q1-Q3
(In billions of U.S. dollars)

Source: IMF, *International Financial Statistics*.

more than a million jobs during the crisis, which pushed its unemployment rate to 25 percent. Structural challenges constrain South Africa's ability to sustain growth in the 6–7 percent range, which is needed to reduce unemployment to median OECD levels. Nevertheless, all three countries have large and liquid asset markets that have attracted inflows as sentiment toward EMs as an asset class has improved. That countries at different stages of the economic cycle have attracted large capital inflows suggests that global liquidity has played an important role in this wave of inflows.

Inflows have been associated with a fall in bond yields, although their impact on stock markets and credit growth has varied in the three countries considered in this section. All three offer sizable interest-rate differentials to international investors, prompting significant inflows to bond markets. While long-term yields have fallen in all three countries, the experience with equity markets has varied. The stock market in Brazil rallied significantly in 2009 but remained about flat in 2010, perhaps due to a large issuance of new stock by the corporate sector. Stock markets have also rallied in South Africa and Turkey and inflows have contributed to high credit growth in Turkey. Credit growth also picked up in Brazil, though in large part this was due to the role played by public credit support programs. In South Africa, relatively weak growth in domestic demand—similar to the situation in some Asian countries—and market uncertainty have both constrained business investment and credit growth.

B. Macroeconomic Policy Responses

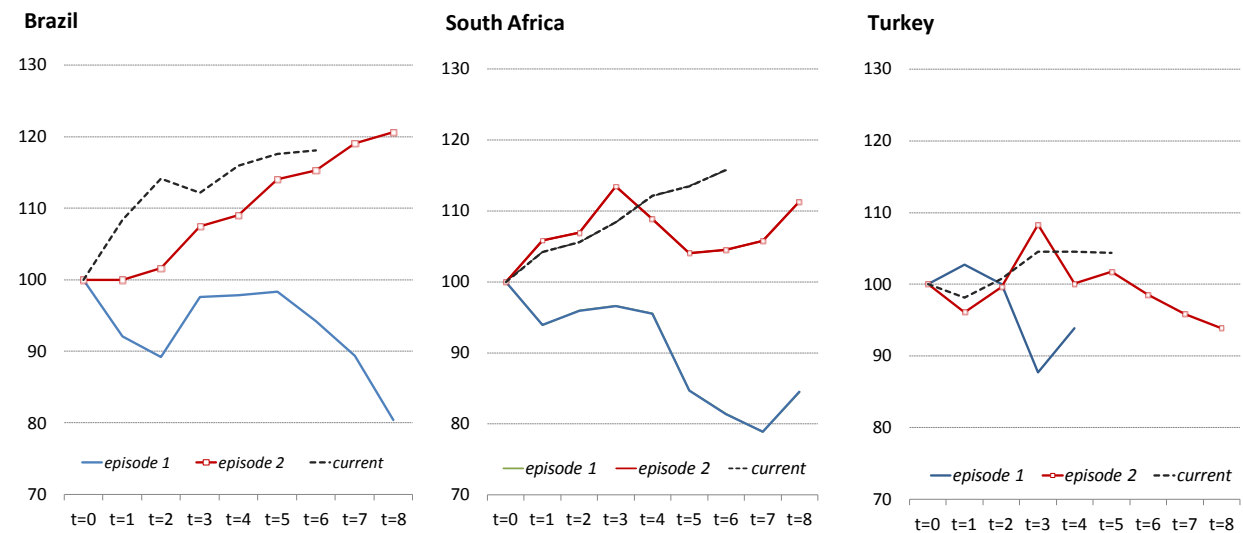
Brazil, South Africa, and Turkey face differing cyclical positions. The Brazilian economy is expected to have grown 7½ percent in 2010, the highest rate in two decades, and the output gap is estimated to have closed in early 2010. Turkey has also recovered rapidly from the crisis, although its cyclical position is less advanced than that of Brazil: the output gap in Turkey is estimated to have closed around end-2010, although underlying inflation pressures appear contained so far. As in Brazil, in Turkey credit growth remains rapid, with recent lending surveys indicating continued strong loan demand. South Africa experienced a large increase in unemployment during the crisis and still has a large output gap, which is expected to last through 2012.

The fiscal policy response to inflows has been limited in the three countries. South Africa has been gradually removing its fiscal stimulus since 2010, a withdrawal that should be completed by 2012. On the other hand, fiscal policy was expansionary in both Brazil and Turkey in 2010 on a cyclically-adjusted basis. The headline fiscal balance has improved in Turkey, but fiscal conditions there have been loose, with most of the large revenue windfall from favorable macroeconomic conditions (an extra 2 percent of GDP) having been spent. Reflecting a growing recognition of the problems associated with pro-cyclical fiscal policy in the midst of capital inflows, Brazil announced a package of measures in February 2011 that will imply a structural fiscal tightening in 2011.

In the absence of a fiscal response, monetary policy has borne the dual burden of responding to capital inflows and cyclical developments. Amid the outlook for a modest recovery, South Africa has been able to keep policy rates at historic lows, reducing incentives for carry trades. The authorities are also considering a draft New Growth Pact that seeks to achieve a more depreciated real exchange rate through a combination of looser monetary policy and tighter fiscal policy. In contrast, both Brazil and Turkey have sought to tighten monetary conditions to address potential overheating concerns. Both countries have introduced prudential measures (higher local currency reserve requirements, higher capital requirements for particular loans, loan-to-value limits for particular mortgages) to limit credit growth. But while Brazil has raised policy rates by a cumulative 250 bps since the trough in the crisis, Turkey has lowered rates to a record low level to curb capital inflows. Turkey also reduced the overnight borrowing rate to widen the interest rate corridor with the repo policy rate, generate greater volatility in short-term market rates, and reduce the scope for one-way bets. Since early-November 2010, when it first widened the interest rate corridor, Turkey's currency has appreciated less than that of many other emerging markets. The currency has also appreciated less in Turkey during this inflow episode compared to past episodes (Figure 13), although the modest appreciation this time around could also be due to other factors.

Figure 13. Nominal Appreciation in Selected Non-Asian Countries

(NEER, 100 = start of capital inflow episode in quarter t_0)



Source: IMF, Information Notice System.

Notes: The figure compares appreciation in the current episode of capital inflows (2009:Q2/Q3 onwards) to past episodes identified in IMF (2011) as follows: Brazil, 1999:Q2–2002:Q2 (Episode 1), Brazil 2006:Q3–2008:Q3 (Episode 2); South Africa, 1995:Q1–2000:Q3 (Episode 1), South Africa, 2004:Q1–2008:Q3 (Episode 2); Turkey, 1999:Q3–2000:Q3 (Episode 1), and Turkey, 2002:Q4–2008:Q3 (Episode 2).

C. Beyond Macroeconomic Policy Responses—Capital Flow Management Measures

To varying degrees, Brazil, South Africa, and Turkey have also used measures going beyond macroeconomic policies, as did the Asian cases considered above. These measures, summarized in Table 6, include CFMs and other measures designed to increase the economy's capacity to absorb capital inflows or to strengthen the ability of the financial sector to cope with financial stability risks. Distinguishing between measures designed to influence capital inflows (CFMs) and other measures can be challenging, though in practice CFMs often tend to be of a temporary nature and to be deployed in the midst of the inflow surge. Non-CFMs, or more strict prudential measures, tend to be of a more permanent nature, such as capital adequacy requirements, maximum loan-to-value ratios, limits on net open foreign exchange positions, and limits on foreign currency mortgages.

South Africa has made the least use of CFMs, in part because it has the least concern about domestic overheating and because of its authorities' commitment to exchange rate flexibility. As discussed above, inflows there have not led to rapid credit growth, rising inflation, a diminishing output gap, or other signs of macroeconomic overheating. Even so, the authorities have worried about the effects of rapid exchange rate appreciation on the real economy. The primary policy action, going beyond the use of macroeconomic policies, has been to liberalize limits on outflows. However, it is not clear if the previous ceilings on outflows were binding and, therefore, the effectiveness of the liberalization measures is difficult to assess.

Turkey has eschewed capital control-type measures but made considerable use of other prudential measures.

- During 2010, capital inflows were mostly in the form of credits from foreign banks to Turkish banks (short-term loans and deposits), repatriation of Turkish banks' assets onshore, and nonresidents' purchases of government debt securities. Changes in foreign exchange lending regulations contributed to inflows.
- In designing a response to these developments, the authorities have to date viewed capital controls as inappropriate for dealing with a temporary inflow surge because such controls conflict with their commitment to free mobility of capital and a freely floating exchange rate, and also because they could raise the long-term cost of foreign financing needed to supplement the low domestic saving rate and finance a current account deficit.
- The authorities' response has therefore consisted of a series of measures aimed at directly affecting domestic liquidity developments and have tended to avoid measures that discriminate on the basis of residency or currency. To moderate credit growth, Turkey raised the levy on the interest from consumer loans and introduced limits to

Table 6. Capital Flow Management (CFM) and Other Measures in Brazil, South Africa, and Turkey

(October 2009–January 2011)

Country	Measures
Brazil	<p><i>October 2009</i> – Introduced a 2 percent tax (IOF) on portfolio equity and debt inflows</p> <p><i>October 2010</i></p> <ul style="list-style-type: none"> (i) IOF tax rate increased to 4 percent for fixed-income investments and equity funds (IOF on individual equities left at 2 percent). (ii) IOF increased to 6 percent for fixed-income investments and extended (at the 6 percent rate) to margin requirements on derivatives transactions. (iii) Some loopholes for IOF on margin requirements closed. <p><i>December 2010</i></p> <ul style="list-style-type: none"> (i) Raised bank capital requirements for most consumer credit operations with maturities of over 24 months, which apply primarily to car loans. (ii) Raised the unremunerated reserve requirements on time deposits from 15 percent to 20 percent. The additional (remunerated) reserve requirement for banks' sight and time deposits were also increased from 8 percent to 12 percent. <p><i>January 2011</i> – Imposed reserve requirements for banks' short dollar positions in the cash market, to be implemented over 90 days.</p> <p><i>March 2011</i> – Imposed 2 percent tax on local corporate offshore borrowing or debt issuance of less than one year's maturity.</p>
South Africa	<p><i>October 2009</i> – The authorities (i) raised the lifetime limit on individuals' investment offshore to R4 million from R2 million per year and (ii) raised the single discretionary allowance to R750,000 from R500,000.</p> <p><i>March 2010</i> – Banks were allowed to invest abroad up to 25 percent of non-equity liabilities.</p> <p><i>October 2010</i> – Authorities (i) eliminated the 10 percent levy on the capital that South Africans could transfer upon emigration, (ii) raised the limit on individuals' investment offshore to R4 million per year from R4 million in a lifetime, and (iii) raised the single discretionary allowance to R1 million from R750,000.</p> <p><i>December 2010</i> – Limits that resident institutional investors can invest offshore were raised by 5 percentage points, and now range from 25 to 35 percent depending on the type of institutional investor.</p> <p><i>January 2011</i> – Authorities allowed qualifying international headquarter companies to raise and deploy capital offshore without exchange control approval.</p>
Turkey	<p><i>December 2010</i></p> <ul style="list-style-type: none"> (i) To extend maturities, reduced withholding tax rate on bonds issued abroad by Turkish firms to 7 percent (1–3 years maturity), 3 percent (3–5 years maturity), and zero percent (maturities longer than 5 years). (ii) Lira reserve requirement ratio (RRR) differentiated across maturities, ranging from 5 percent for deposits with maturity of at least one year to 8 percent for those with maturity up to one month. FX RRR kept at pre-crisis level of 11 percent. Remuneration of reserve requirements halted. (iii) The Banking Regulation and Supervision Agency (BRSA) introduced limits to LTV ratios (previously reserved for securitized mortgages) for all mortgages, with 75 percent for housing loans and 50 percent for commercial loans. (iv) The Resource Utilization Support Fund (RUSF) levy on the interest from consumer loans was raised to 15 percent (from 10 percent). <p><i>January 2011</i> – Lira RRR further increased across maturities, ranging from 9 percent for deposits with maturity of up to three months and non-deposit liabilities to 12 percent for demand deposits. RRR for longer term Lira and FX deposits left unchanged.</p>

Source: IMF, 2011a.

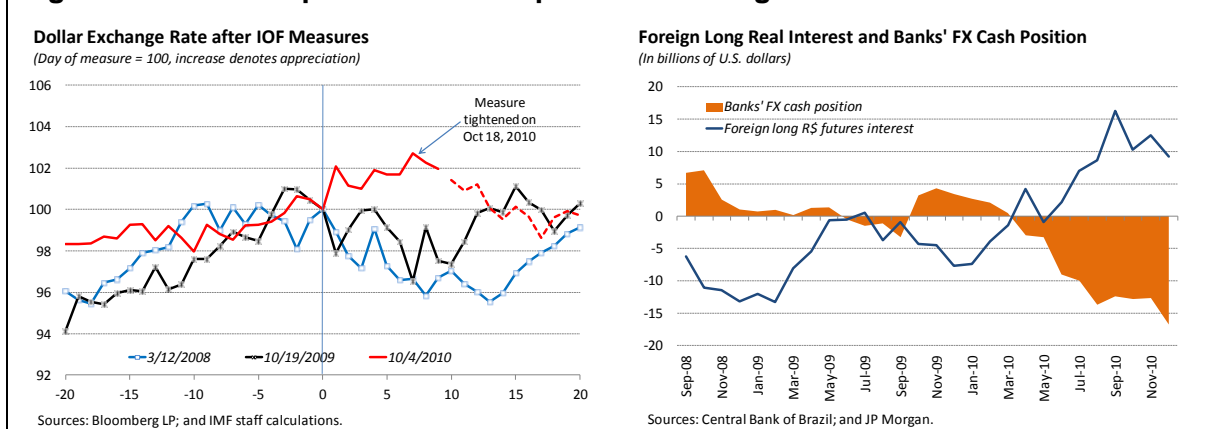
Notes: Capital flow management measures (CFMs) refer to certain administrative, tax, and prudential measures that are designed to influence (some or all) capital inflows. The table also includes other measures that are designed to increase the capacity of the economy to absorb capital inflows or to strengthen the ability of the financial sector to cope with financial stability risks.

loan-to-value (LTV) ratios for housing loans and some other real estate loans. Turkey also halted the remuneration of reserve requirements and raised reserve requirement ratios across maturities to complement other measures to limit credit growth.

- Overall, the central bank and government strategy seems to have been effective at discouraging very short-term capital inflows.

In Brazil, where the currency has appreciated the most among these three countries since the crisis, the authorities have made the broadest use of measures to stem capital inflows. Of the three non-Asian countries considered in this section, Brazil has arguably experienced the greatest impact of capital flows. Inflows have been broad-based across both the fixed-income and equity-capital markets, the nominal exchange rate has appreciated the most since the trough of the crisis (compared to South Africa and Turkey), the output gap closed in early 2010, and credit has grown rapidly, though in large part due to the role played by public banks. Faced with these broad-based flows and pronounced effects on the domestic economy, the authorities have responded with a broad range of measures going beyond macroeconomic responses.

- In October 2009, Brazil reinstated a tax on portfolio inflows (Imposto de Operações Financeiras, or IOFs) to discourage carry trades. This tax, which was originally established in 1993 and used intermittently since, was brought back with a broader coverage and a higher rate (2 percent) on nonresident portfolio equity and debt inflows.
- While exchange rate appreciation moderated immediately after the reintroduction of the IOF, it resumed soon thereafter (Figure 14). Subsequently, in October 2010, the IOF rate was raised to 6 percent on nonresident portfolio debt inflows and the tax was also raised to 6 percent (from 0.38 percent) on the margin payments required on derivatives traded in the BM&F Bovespa, including foreign exchange futures. In March 2011, a 2 percent tax was imposed on offshore debt issuance and borrowing by corporates of less than one year maturity.
- The IOF may have had some impact on local currency debt markets, since the entire local nominal yield curve shifted upwards following its tightening in October 2010. Moreover, despite the IOF penalizing longer-term investments relatively less, adjustment may have been more pronounced at the long end of the curve, where nonresident investors are more active. Market participants have also expressed concerns that the IOF could reduce liquidity in the longer end of the yield curve and in the interest-rate swap market.

Figure 14. Brazil: Experience with Capital Flow Management Measures

- The IOF may have encouraged flows into the futures market, thereby affecting the composition of inflows more than the volume. Because the tax on derivatives transactions applied only to actual margin payments rather than to notional amounts, currency positions taken in the domestic futures markets received a favorable tax treatment compared with positions in the underlying cash markets. As a result, there was a large build-up in the long *real* position by nonresident investors in the futures market during 2010. This was matched by a rising short foreign-exchange cash position for counterparty domestic banks that hedged their short *real* forward positions through foreign-exchange borrowing (see IMF, 2011a, for details).
- Consequently, the authorities complemented the IOF with macroprudential measures. These measures included a 60 percent nonremunerated reserve requirement on banks' short FX positions in the spot market that exceed US\$3 billion or Tier I capital (with a phase-in period of 90 days). The new measure is expected to reduce the return to local banks from providing a “bridge” to nonresidents investing in the futures market. By affecting its cost, this measure is thus expected to affect an important channel for carry trades that was left open in the original design of the IOF, while reducing potential vulnerabilities in the banking sector.
- Like Turkey, Brazil also implemented measures to stem credit growth. These included raising capital requirements for certain consumer credit operations and raising unremunerated reserve requirements on local currency deposits.
- Overall, Brazil's experience with CFMs illustrates that even with a broad-based measure such as the IOF, it can be challenging to completely contain inflows.

VI. CONCLUSION AND POLICY PERSPECTIVES

The above analysis highlights some of the key stylized facts about recent capital inflows to EMs:

- While the overall level of capital inflows in this wave is comparable to previous episodes, the pace at which inflows have risen this time has been striking. That countries with different economic fundamentals and cyclical positions have all attracted large inflows suggests the importance of global liquidity as a push factor driving these inflows.
- On average for EMs, recent flows have been not as high as in previous episodes when measured as a proportion of GDP. However, Asian NIEs, particularly Hong Kong SAR and Korea, have experienced larger surges since the global crisis.
- The composition of inflows is different this time around. Apart from China, where portfolio investment is restricted, and the banking centers in Asia (Hong Kong SAR and Singapore), portfolio inflows that are intermediated mainly outside the banking system comprise a much larger share of aggregate flows, and a significant proportion is being invested in public- and private-sector debt securities. Banking flows have suffered as a result of the crisis and the slow recovery of banks together with the prospect of more stringent regulation and higher capital requirements.
- Portfolio flows to fixed-income markets have closely followed the almost secular decline in advanced-country bond yields and have been helped by the very low cost of borrowing in the major currencies.
- The empirical results presented in Section III suggest that nonresident inflows have led to a significant decline in local bond yields in some EMs. Importantly, however, the results demonstrate that monetary policy can still be effective in raising long rates.

The use of conventional macroeconomic policies by EMs has varied widely both within and outside Asia. This divergence of responses reflects not only differences in macroeconomic fundamentals between the countries but also the limitations of these policies in some countries. These limitations sometimes reflect political economy issues, such as popular opposition to nominal appreciation, institutional concerns, such as the cost of sterilization, and building risks in specific asset markets.

While there are important differences among the ways Asian EMs have responded to the challenge of managing inflows, some of the measures discussed above have been prudential in nature and do not aim to control the volume of portfolio inflows. Rather, they are designed to reduce both risks to financial stability and the volatility of capital flows. The limited evidence so far suggests that these measures have been effective in altering the composition of inflows and in limiting credit growth and asset price inflation. Overall capital-inflow

volumes do not appear to have been affected. To the extent that appropriate macroeconomic adjustment has been made, these measures may be complementary—rather than a substitute for—macroeconomic policy responses.

There are two broad implications of these trends that may have a bearing on policy.

First, foreign inflows have become important in determining long-term yields in many emerging market countries and can complicate macroeconomic management. While using conventional macroeconomic tools like policy rates can undo some of these effects, if such flows have embedded leverage reversals of flows may be amplified.¹⁷ Moreover, the impact of volatile capital flows on financial stability can complicate the conduct of monetary policy. Thus, depending on the circumstances at hand, and assuming appropriate macroeconomic policies are in place, CFMs can play a role in responding to the effects of inflows.

Second, in many Asian countries, extending the policy toolkit with the use of macroprudential measures has been targeted at specific types of flows and markets and does not seem to have impeded all capital flows. In Korea, the authorities have tried to limit leverage in the banking system (including in domestic branches of foreign banks) and to strengthen the maturity of banks' funding without trying to limit capital flows to either fixed-income or equity markets. In Indonesia, the authorities have tried to restrict the ability of foreign and domestic investors to move in and out of very short term assets issued by the central bank.

With regard to the wider, ongoing debate on the use of macroprudential policy to deal with large and possibly volatile capital flows, one lesson we would draw is that it is difficult to generalize about the effectiveness of such measures. Any potential measure has to be assessed in a country-specific and market-specific context to examine the incentives and the ability of investors to circumvent it and, beyond these narrow criteria, to examine whether the incentives are effective in achieving their objectives. The appropriate use of CFMs will necessarily be determined by the particular macroeconomic, institutional, and market circumstances faced by each country. The Fund, with its membership, is actively engaged in studying the impact and effectiveness of a wide range of macroprudential measures, including those that are primarily aimed at preserving domestic financial stability.

¹⁷ Much of the leverage in emerging market fixed-income investments comes from borrowing in external markets. As a result, these investments are more sensitive to funding costs and financial market conditions in the advanced countries than similar equity market investments, where investors typically can borrow less.

ANNEX I: EPISODES OF LARGE PRIVATE CAPITAL INFLOWS TO EMERGING ASIA

Table I.1. Episodes of Large Net Private Capital Inflows--Summary Statistics

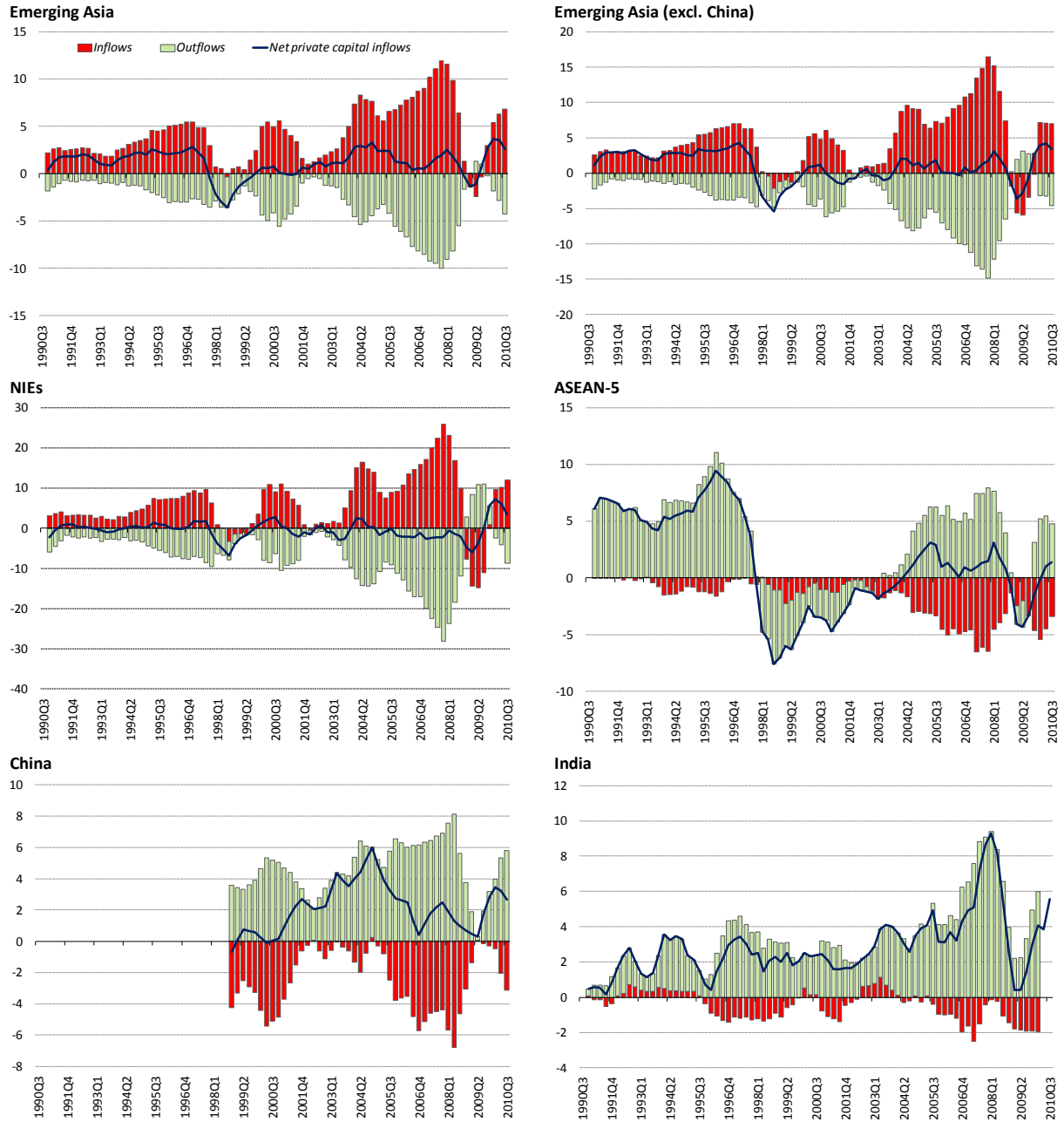
	Emerging Asia	ASEAN-5	NIEs	China	India
Number of episodes	29	10	13	3	3
1989-1998	10	5	3	1	1
1999-2008	13	5	6	1	1
Current	6	0	4	1	1
Percentage of episodes that ended In a sudden stop	62	60	85	0	33
Average size (percent of GDP) ^a					
Net capital flows					
1989-1998	5.0	7.0	5.3	4.8	2.4
1999-2008	4.2	3.2	5.4	3.4	4.8
Current	3.9	...	8.2	3.3	4.8
Gross inflows					
1989-1998	5.2	7.2	5.5	...	2.5
1999-2008	7.9	10.5	13.3	4.7	5.1
Current	4.6	...	6.7	3.5	6.2
Gross outflows					
1989-1998	0.6	0.6	0.9	...	0.2
1999-2008	3.2	1.5	7.8	1.3	0.3
Current	0.0	...	-1.4	0.2	1.3
Duration (in quarters)	13	17	7	16	17
1989-1998	22	28	13	20	23
1999-2008	9	7	6	22	23
Current	5	...	5	5	5

Sources: IMF, Balance of Payment Statistics; and IMF staff calculations.

^a Market GDP-weighted average across episodes.

Figure I.1. Emerging Asia: Gross Private Capital Inflows and Outflows^a

(In percent of GDP)



Sources: CEIC Data Company Ltd; and IMF, *Balance of Payments Statistics, World Economic Outlook*; and staff calculations.

^a Missing historical observations have been approximated by annual data obtained from the WEO database.

ANNEX II: BOND MARKET INDICATORS IN SELECTED EMERGING MARKETS

Figure II.1. Long-Term Yields and Foreign Share of Bond Market Holdings

(In percent)

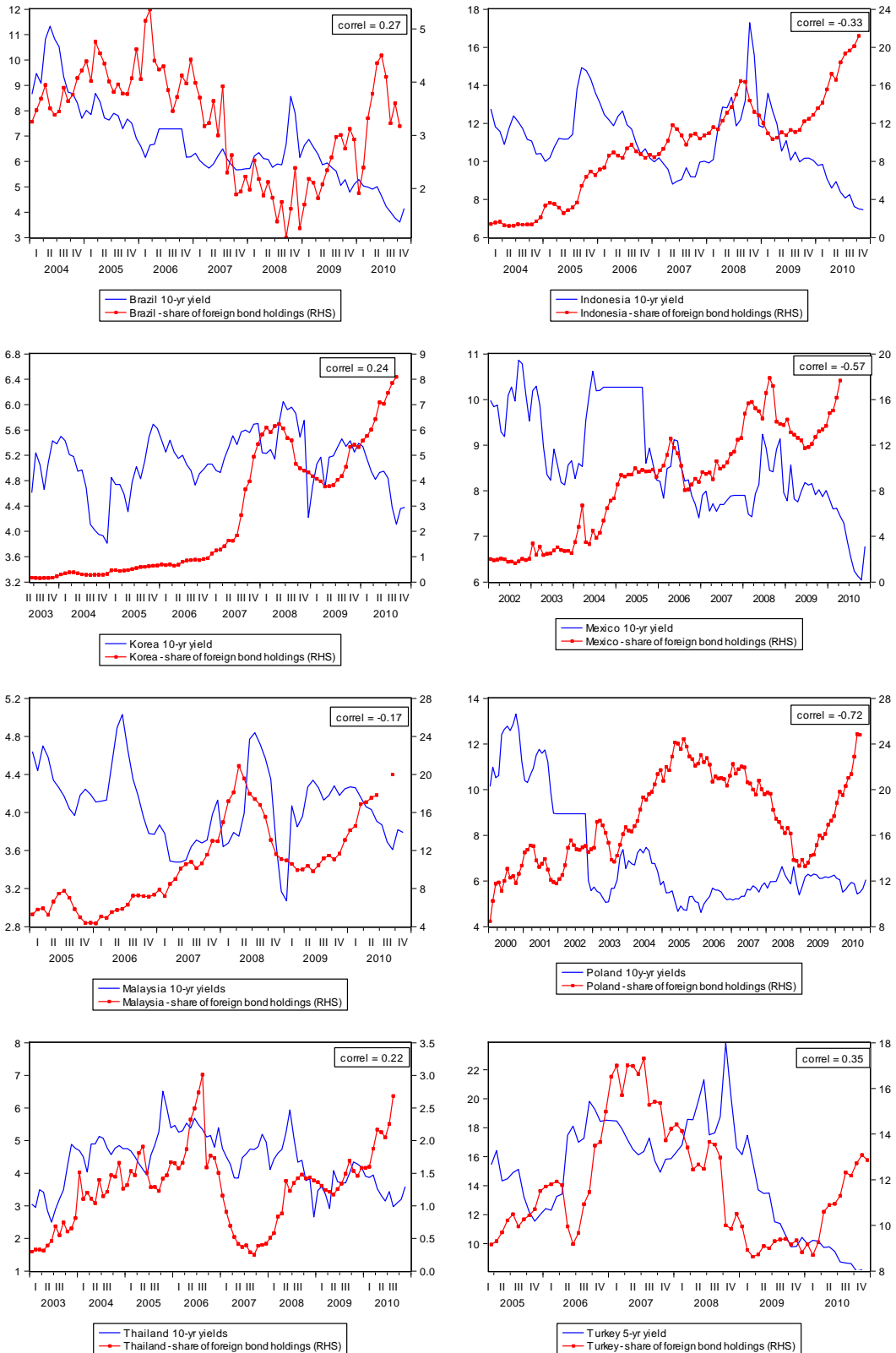


Figure II.2. Policy Rates and Yield Curve
(In percent)

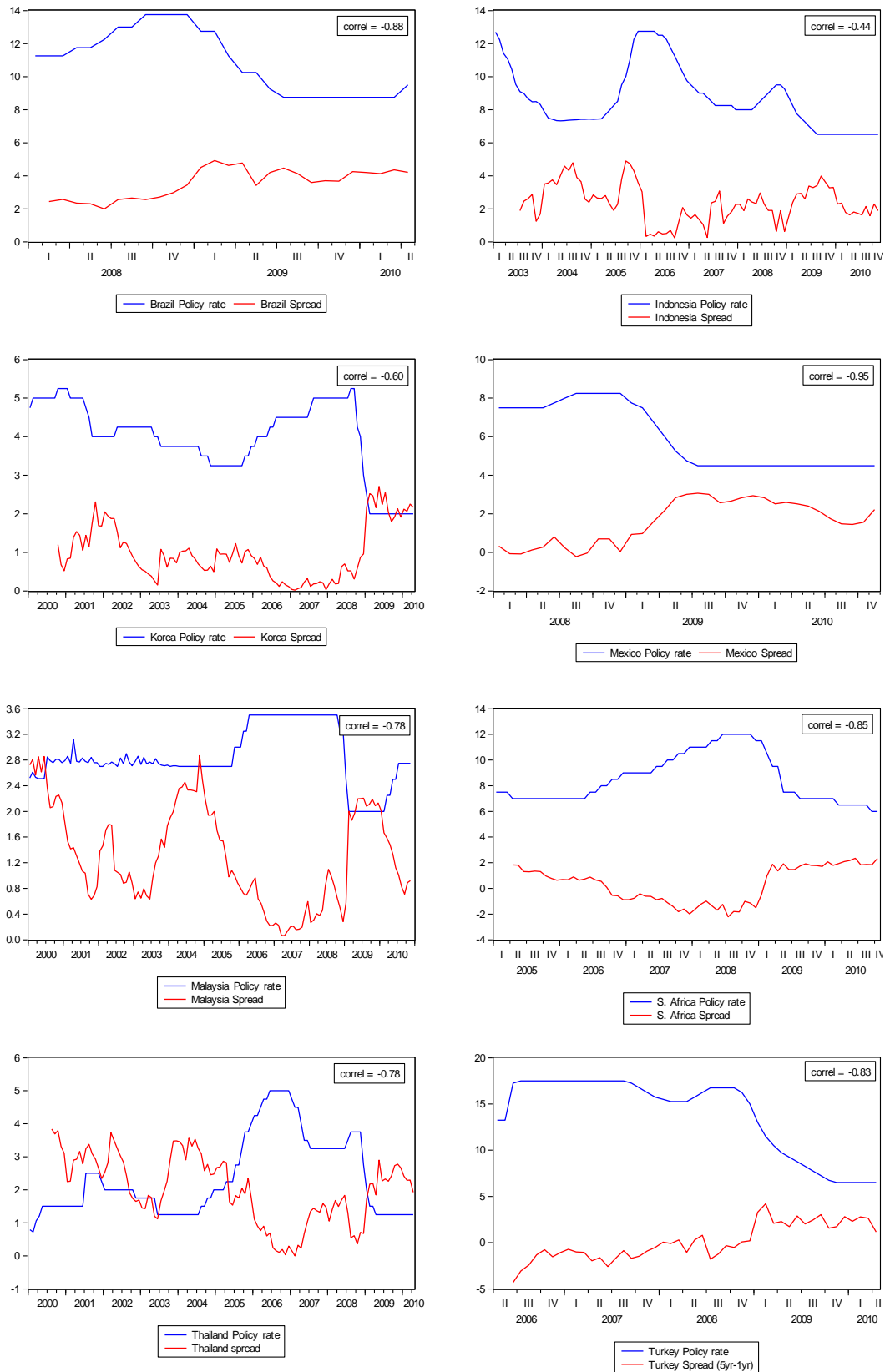
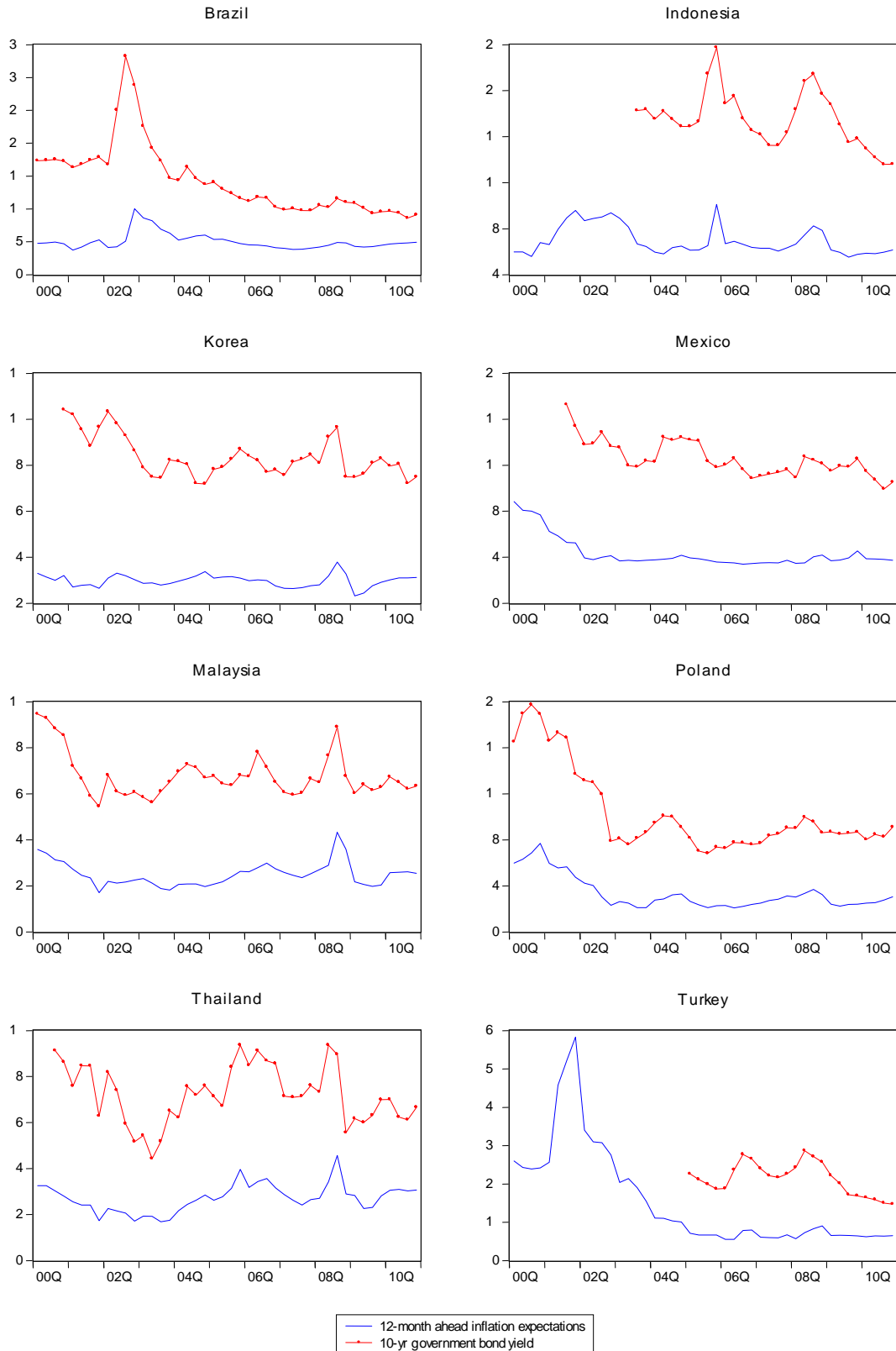


Figure II.3. Long-Term Yields and Inflationary Expectations
(In percentage points)



ANNEX III: DATA SOURCES FOR BOND YIELDS MODEL

Series	Source
12-month ahead inflation expectations	Consensus Forecasts
Industrial production	CEIC Data Co., Ltd.
VIX	Bloomberg L.P.
Nominal GDP	IMF, <i>International Financial Statistics</i>
12-month ahead exchange rate expectations	Consensus Forecasts
Policy interest rates	Bloomberg L.P.
Nominal yield on 10-year and 5-year sovereign bonds	Bloomberg L.P.
Government securities held by nonresidents ^a	Asian Bonds Online (quarterly data for Indonesia, Korea, Malaysia, Thailand), CEIC Data Co., Ltd. (monthly data for Indonesia, Korea, Malaysia, Thailand), Haver Analytics (Brazil, Mexico, Poland), Central Bank of the Republic of Turkey (Turkey)
Government securities, outstanding volume	Asian Bonds Online (quarterly data for Indonesia, Korea, Malaysia, Thailand), CEIC Data Co., Ltd. (monthly data for Indonesia, Korea, Malaysia, Thailand), EMED (Brazil, Poland, Turkey), CEIC Data Co. Ltd. (Mexico).
10-year and 5-year sovereign CDS spreads	Bloomberg L.P.

^aMissing values for Indonesia, Malaysia, and Korea are interpolated using the Catmull-Rom Spline method.

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