Capital flows, exchange rate regime and monetary policy

Sweta C Saxena[1]

Introduction

Financial globalisation can provide significant benefits to developing countries but at the same time poses significant risks. There is strong evidence to suggest that developing economies could benefit from financial globalisation, given that certain framework conditions are fulfilled.[2] Hence, there is a trend towards open capital accounts, as illustrated by Malaysia, which recently shed controls that had been brought in 1998 in the aftermath of the Asian crisis. The move towards higher capital mobility confronts central banks with some difficult choices in implementing monetary policy:

1. *Control of exchange rate or interest rate?* If central banks want to stabilise exchange rates, they have to accept the consequences for domestic interest rates. If they wish to gain control over their domestic interest rates, then they have to accept higher volatility in their exchange rates. Hence, their independence to choose interest rates can be constrained under an open capital account.

2. *Exchange rate or inflation as the nominal anchor?* The move towards inflation targeting implies giving up the exchange rate as the nominal anchor for monetary policy, which means floating exchange rates with higher volatility. Does this mean that the central bank should not care about exchange rate stability as such? Conventional wisdom would have central banks pay attention to the exchange rate *if* it interferes with the price stability goal. But what happens when the economy is dollarised (Peru) or some contracts are denominated in foreign currency (Israel)? What should countries that are building net foreign liabilities (denominated in foreign currency) do when faced with the choice of exchange rate stability vis-à-vis price stability? This paper will address some of these issues.

To foreshadow the main results, the paper finds that the emerging markets have become more financially globalised, as can be seen in a build-up of gross foreign asset and liability positions, increased presence of foreign investors in local currency bond markets and increasing correlations of stock markets in the emerging markets with those of the industrial countries. In fact, some countries have been able to issue longer-term local currency bonds in the international markets, in spite of so-called "original sin". Such an integration is desirable as it increases international risk-sharing, but it can also increase the impact of foreign shocks on domestic economies. The recent May–June sell-off is a testimony to this. Although many emerging markets (mainly Asia) improved their net external positions between 1996 and 2004, the situation has worsened for others (mainly CEE countries due to deteriorating current account balances). In the light of significant external liabilities

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[2] See Kose et al (2006), for details.

(denominated in foreign currencies), CEE economies in particular are exposed to substantial exchange rate risk.

On the impact of capital flows and the exchange rate regime on monetary policy, the paper finds that domestic short-term interest rates are significantly affected by foreign interest rates, especially for countries with high capital mobility and less than fully floating exchange rates. The link between domestic and foreign interest rates is also in line with Moreno (2008) that finds that the foreign long-term interest rate affects the domestic long-term interest rate more than the domestic policy rate. The results also indicate that the credibility gained by central banks in keeping inflation low and maintaining a stable macroeconomic environment is helping to stabilise long rates more generally.

The rest of the paper is organised as follows. Section 1 discusses the constraints imposed by capital flows on macroeconomic policy (the so-called impossible trinity or trilemma). Section 2 investigates the impact of foreign interest rates on domestic interest rates under various exchange rate and capital mobility regimes. Section 3 analyses the indicators of financial globalisation and the issues related to exchange rate stability vis-à-vis price stability (especially in the light of balance sheet effects and dollarisation issues). Section 4 concludes.

1. The impossible trinity

The transmission of monetary policy depends on the openness of the capital account and the exchange rate regime. The famous trilemma from the Mundell-Fleming model states that countries cannot simultaneously fix their exchange rate, have an open capital account and pursue an independent monetary policy. Only two out of these three objectives are mutually consistent.[3] If the capital account is closed, then domestic interest rates would transmit to domestic demand, irrespective of the exchange rate regime. However, if the capital account is open, then domestic monetary policy will be determined by the exchange rate regime and the degree of substitutability between domestic and foreign financial assets. Under a floating regime, monetary policy can work either through the interest rate and liquidity channel or through the exchange rate channel. Under the latter channel, the impact of monetary policy on aggregate demand is larger if domestic and foreign assets are substitutable, as policy-induced changes in interest rates affect the exchange rate, which in turn affects output and inflation. However, the higher substitutability between domestic and foreign assets offsets the impact of monetary policy through capital flows in a fixed exchange rate regime. Hence, monetary authorities can move domestic interest rates independently of foreign rates only if there is a lesser degree of substitutability under a fixed exchange regime.

The foregoing analysis suggests that the exchange rate channel of monetary policy transmission is hampered if the exchange rate is not allowed to move freely. Indeed, nine out of 13 Asian and Latin American emerging economies actually use foreign exchange intervention to complement their conduct of monetary policy. Hence, the impact of capital flows on exchange rates may be offset through foreign exchange intervention. For instance, Malaysia intervenes in the foreign exchange market to prevent large changes in exchange rates that are not supported by fundamentals (Ooi (2008)).

[3] Obstfeld et al (2005) find that this trilemma has been largely borne out by history. They find considerable monetary autonomy for non-pegged regimes in the presence of capital mobility, but loss of this independence for countries with pegged regimes.

2. Do foreign interest rates influence domestic short-term interest rates?

The question of monetary policy independence is closely linked to the choice of exchange rate regime. If it is credible, a fixed exchange rate provides a nominal anchor for monetary policy; if not, monetary policy is dictated by the need to attract capital flows to finance the current account imbalances. If policymakers float their currency, then they gain control over their monetary policy. The central bank can use domestic interest rates to respond to shocks if the exchange rate is floating. Hence, domestic short-term interest rates in countries with floating exchange rates should be less sensitive to changes in international interest rates. But certain factors (eg foreign currency liabilities) prevent countries from following independent monetary policies despite adopting a flexible exchange rate regime.

The relationship between exchange rate regime and monetary policy independence has been tested in a few papers. For a large sample of industrial and developing countries, Frankel et al (2004) show that domestic short-term interest rates, even in countries with floating exchange rates, are linked with international interest rates in the long run. Only a couple of large industrial countries can choose their own interest rates over time. However, Frankel et al (2004) also find that the adjustment of floaters' interest rates to international interest rates is rather slow, implying some monetary independence in the short run. Unlike Frankel et al (2004), Shambaugh (2004) finds that domestic interest rate behaviour is different between pegged and non-pegged regimes: countries with pegged exchange rates follow the base country interest rate more than others.

There is little empirical research linking capital mobility to monetary independence. Shambaugh (2004) and Obstfeld et al (2005) do include a dummy variable for capital controls to study the link between domestic and foreign interest rates. But this measure cannot capture the intensity of capital controls or liberalisation. To address this, this paper introduces a measure of international capital mobility which gauges the intensity of capital liberalisation. A variable for interest rate liberalisation is also introduced.

These academic papers are an interesting line of research, but all of them are dated. The data go up to 2000, but much has changed since then. During the last five to six years, the emerging market economies have become more open on capital account and are following freer exchange rate policies. For example, on a scale of 3, the average index of capital mobility increased from 1.61 during 1975–99 to 2.59 between 2000 and 2006 for a group of 17 emerging economies in Asia and Latin America and including South Africa. The proportion of observations on exchange rate regimes classified as floating increased from 68% to 73% between 1975–99 and 2000–06. Against this background, it would be interesting to see if:

1. higher capital mobility has increased the impact of foreign interest rates on domestic rates; and
2. floating the exchange rate helps reduce the impact of foreign interest rates on domestic rates.

So what should we expect? Consider the following four scenarios and the expected domestic interest rate link with the foreign interest rate:

	Fixed exchange rate	**Flexible exchange rate**
Capital immobility	No link	No link
Capital mobility	Positive link	?

Under no capital mobility, monetary policy would be independent irrespective of the exchange rate regime, implying that domestic interest rates can move independently of foreign interest rates (and hence no link between the two). However, under full capital mobility, the link between the domestic interest rate and the foreign interest rate would be positive under a fixed exchange rate regime, as higher foreign interest rates would induce capital outflow and a depreciation of the domestic currency. In order to prevent depreciation, domestic interest rates should rise.

However, the link between domestic and foreign interest rates is not so clear when capital is mobile and exchange rates are floating. The difficulty in determining the effect arises because central banks often intervene in foreign exchange markets, even when their exchange rates float, to smooth exchange rate fluctuations or accumulate foreign reserves (see BIS Papers no 24). If the central bank does not allow *full* adjustment of the exchange rate by intervening in the foreign exchange market even when the exchange rate is floating, the reaction of the domestic interest rate to a foreign interest rate shock can be large. Hence, we would expect a significantly positive link between domestic and foreign interest rates.

More precisely, in order to answer these questions, I use two techniques. I estimate the following regression as well as the impulse response functions:[4]

$$\Delta r_{it} = \alpha + \beta_1 \Delta r_t^* + \beta_2 Capmob_{it} + \beta_3 \Delta r_t^* Capmob_{it} + \beta_4 Float_{it} + \beta_5 \Delta r_t^* Float_{it} + u_{it}$$ [5]

If coefficient $\beta_1 > 0$ (significantly greater than zero), domestic short-term interest rates are correlated with foreign interest rates. The correlation may arise because of common shocks that require a common interest rate response, because of high capital mobility that imposes an interest parity condition, or because of attempts to fix the exchange rate. For countries with floating exchange rate regimes, any linkage may also provide evidence that the country does not allow the exchange rate flexibility that it claims to (fear of floating) or intentionally follows the foreign country.

A1: If higher capital mobility increases the impact of foreign interest rates on domestic interest rates, the interaction of foreign interest rates and capital flows should be high and significant ($\beta_3 > 0$). So, I test:

H0: $\beta_3 = 0$ against H1: $\beta_3 > 0$

A2: If exchange rate flexibility has reduced the impact of foreign interest rates on domestic interest rates, then the relationship between local interest rates and foreign interest rates should be weaker than for countries that continue to fix their exchange rates ($\beta_5 < 0$). Therefore, I test the following hypothesis:

H0: $\beta_5 = 0$ against H1: $\beta_5 < 0$

In the light of the recent tightening of monetary policy in the United States, I also examine the asymmetry of the interest rate linkage when US monetary policy is tight.

In addition, I estimate impulse response functions from the following regression:[6]

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[4] Following Frankel et al (2004) and Shambaugh (2004), r = ln(1 + i), where i of 10% is represented as 0.10. Also, the regression in changes is estimated as a pooled OLS (Shambaugh (2004) Obstfeld et al (2005)), unlike the regression in levels with fixed effects as done in Frankel et al (2004).

[5] While other factors can influence domestic interest rates, Shambaugh (2004) controls for time, trade shares, debt exposure, capital controls and level of industrialisation, and finds that, during the post-Bretton Woods era, with the exception of capital controls, the exchange rate regime tends to be the major determinant of how closely domestic interest rates follow foreign interest rates.

[6] This work is in the same spirit as Romer and Romer (1989), who identify the impact of monetary shocks on US output in the postwar period.

$$\Delta r_{it} = \alpha_i + \sum_{j=1}^{4} \beta_j \Delta r_{i,t-j} + \sum_{s=0}^{4} \Delta r^*_{t-s} + \varepsilon_{it}$$

The impulse response functions are shown with one standard error bands drawn from 1,000 Monte Carlo simulations.[7]

Results[8, 9, 10]

The regressions show a mostly significantly positive β_1 coefficient (Tables 1 and A1–A3), implying that changes in domestic interest rates in these emerging markets do move in line with the interest rate changes in the United States. This could be because of fear of floating (for flexible exchange rate regimes) or because of the interest rate parity condition (for fixed exchange rate regimes) or due to common shocks. The inclusion of world oil or food prices in these regressions does not change the sign or the significance on the change in US interest rates, implying that these common global shocks cannot be the reason for the positive sign. But this linkage with the United States is stronger for the entire sample and early part (1975–89) when the Fed tightens its monetary policy than when it eases it (Table 1). However, the relationship between domestic and US interest rates is stronger in the recent period when there is global tightening rather than easing[11] (Tables A1 and 2), ie interest rates in these emerging markets move with the US interest rates when there is a general global tightening which could occur due to common shocks requiring a common response. Perhaps the recent oil shock is one example.

For countries with high capital mobility, the coefficient β_3 is normally positive (when significant), which implies that higher capital mobility reduces these countries' ability to change their interest rates independently (Tables 2, A2 and A4).[12] Countries with more flexible exchange rates see a downward trend in their interest rates relative to countries with fixed exchange rates (Tables 2, A3 and A4). But the coefficient on β_5 is positive (when significant), implying that flexibility in the exchange rate has apparently not bought these countries any independence in setting their own domestic interest rates. Tables 2 and A4 show that β_1 is negative during the 2000–06 period, but β_3 and β_5 are positive, implying some delinking between the domestic and the US interest rate in general in recent times, except for countries with high capital mobility and a flexible exchange rate regime. This result is, however, counterintuitive as a flexible exchange rate regime in principle gives a central bank greater room to manoeuvre and so makes monetary policy more independent. But as discussed above, countries with flexible exchange rates can still have their domestic interest rates move with the foreign interest rate under a higher level of capital mobility. This point is brought out in Table 3.

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[7] I use four lags for domestic and US interest rates as the lags beyond that were mostly insignificant and the DW stat shows no sign of serial correlation.

[8] Data construction and some tables and graphs are provided in the Annex.

[9] When I exclude periods of high inflation in Argentina, Brazil and Chile, capital mobility for the entire period (1975–2006) becomes insignificant. All other results hold.

[10] The results remain qualitatively unchanged even when a variable is introduced to capture the business cycle.

[11] Global tightening refers to the periods when interest rates increase in the United States, the United Kingdom and Japan simultaneously.

[12] The results from interest rate liberalisation equations (not reported here) are similar. Countries with fully market-determined interest rates have their interest rates move with US interest rates during 1975–2006 and 2000–06.

Table 1

Impact of US monetary policy tightening[1]

	1975–2006	1975–1989	1990–99	2000–06
Δr*	**0.04**	0.02	**0.40**	**0.17**
	0.04	0.24	0.01	0.00
US tight MP * Δr*	**0.10**	**0.07**	0.06	0.01
	0.01	0.06	0.82	0.81
Rsq	0.00	0.00	0.00	0.03
DW statistic	1.80	1.87	1.73	1.51
Total observations	6,902	2,360	2,671	1,871
Cross sections	24	18	24	24

[1] P-values are below the coefficients.

Table 2

Impact of capital mobility, exchange rate regime and global tightening

	1975–2006	1975–1989	1990–99	2000–06
Δr*	–0.01	–0.01	0.10	**–0.36**
	0.82	0.61	0.81	0.08
Capmob	0.00	0.00	0.00	0.00
	0.56	0.74	0.90	0.19
Capmob * Δr*	**0.04**	0.03	0.12	**0.16**
	0.05	0.15	0.39	0.02
Float	**–0.0004**	0.00	**–0.001**	0.00
	0.03	0.36	0.01	0.30
Float * Δr*	0.00	0.01	0.12	**0.17**
	0.95	0.78	0.60	0.00
Global Tight * Δr*	0.04	0.05	–0.38	**0.24**
	0.52	0.42	0.31	0.02
Rsq	0.00	0.00	0.01	0.07
DW statistic	1.72	1.84	1.67	1.37
Total observations	5,398	2,069	2,003	1,326
Cross sections	17	16	17	17

[1] P-values are below the coefficients.

Table 3 illustrates the impact of foreign interest rates on domestic interest rates classified by exchange rate regime and level of capital mobility.[13] When capital mobility is low, there is no link between domestic and US interest rates, irrespective of the exchange rate regime. But, as expected, the link between domestic and US interest rates is significantly positive for countries with a fixed exchange rate and mobile capital. In addition, countries with flexible exchange rate regimes have their domestic interest rate linked to the US interest rate only when capital is mobile. Of the 6,273 observations on exchange rates and capital mobility between 1975 and 2006, 40% represent a flexible exchange rate and high capital mobility against 21% with a fixed exchange rate and high capital mobility. During 2000–06, the proportion of observations with floating exchange rates and mobile capital is 72% against 23% with a fixed regime and mobile capital. The implication is that the proportion of economies influenced by high capital mobility has risen sharply in recent years. Moreover, this has coincided with a greater reliance on floating and intervention in the foreign exchange markets.

Table 3

Impact of capital mobility and exchange rate regime

	1975–2006	**1975–1989**	**1990–99**	**2000–06**
Fix*No Capmob	0.0002	0.0002	0.0005	0.0021
	0.2954	0.3815	0.6640	0.8782
Fix*No Capmob* Δr*	0.0002	0.0002	0.0076	0.0190
	0.1794	0.2236	0.1529	0.3090
Fix*Capmob	0.0001	0.0003	0.0004	**–0.0001**
	0.5580	0.4248	0.1314	0.0137
Fix*Capmob * Δr*	**0.0017**	0.0012	**0.0028**	**0.0013**
	0.0220	0.1705	0.0756	0.0041
Float*No Capmob	0.0002	–0.0001	0.0011	–0.0049
	0.5320	0.8474	0.2391	0.5727
Float*No Capmob* Δr*	0.0003	0.0003	0.0043	0.0897
	0.3442	0.4696	0.4327	0.1037
Float*Capmob	–**0.0004**	0.0001	–**0.0008**	**–0.0002**
	0.0191	0.7162	0.0204	0.0002
Float*Capmob* Δr*	**0.0014**	**0.0012**	**0.0041**	**0.0029**
	0.0057	0.0173	0.0212	0.0000
Rsq	0.004	0.001	0.003	0.077
DW statistic	1.71	1.84	1.68	1.36
Total observations	5,414	2,069	2,003	1,342
Cross sections	17	16	17	17

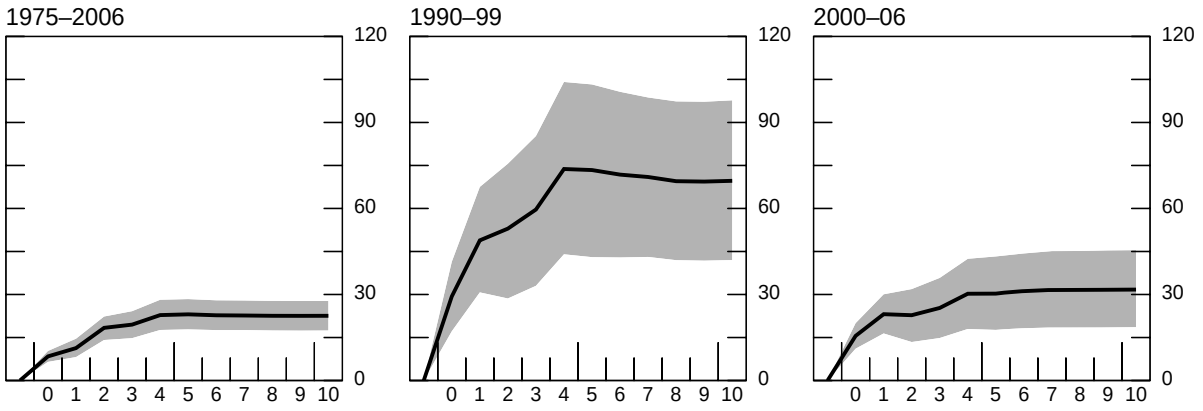
[1] P-values are below the coefficients.

[13] Here I distinguish between countries with low capital mobility (values 0 and 1) and those with high capital mobility (values 2 and 3).

The results from the impulse response functions support the regression results.[14] During the period 1975–2006, a 1% change in US interest rates leads to a 22.5 basis point change in domestic interest rates in the next 10 months (Graph 1).[15] Here again, we would expect the link between domestic and US interest rates to be higher during periods of fixed exchange rates and/or high capital mobility. Graph 1 shows that the interest rate pass-through from the US to emerging markets was about 70 basis points during 1990–99, a period characterised by a de facto pegged regime. But as flexibility in exchange rates has increased, the response rate has decreased to 30 basis points. The higher pass-through during the 1990s reflects the fixed exchange rate regime in most of these economies and/or higher capital mobility. Domestic interest rates also respond positively to global tightening (Graph A1). However, the response during 2000–06 is half of that during 1990–99. The link can decline either because of a greater willingness to let the exchange rate move or recourse to some other means than monetary policy (ie foreign exchange intervention) to stabilise it or because some other factors (exogenous to capital flows) are helping the exchange rate from falling. This may reflect the recent phenomenon where, despite interest rate hikes in the United States, capital still flowed to the emerging markets. Hence, these economies did not need to raise their interest rates to the same extent to prevent capital outflows and depreciations. Rather, they have been engaged in foreign exchange intervention to stabilise their exchange rates and prevent them from appreciating. Bank of Thailand (2008) notes that, despite a stable interest rate differential with the United States, the Thai baht has appreciated since 2004 because of deterioration in market sentiment over the US twin deficit and hence of the dollar. Consequently, large inflows into the region led to trend appreciation.

Graph 1

Impulse response of domestic interest rate to US interest rate



Capital mobility diminishes the ability of these economies to conduct an independent monetary policy.[16] Countries with intermediate or no capital mobility have very little or an insignificant link between the US interest rate and the domestic interest rate (Graphs A2 and A3). For

[14] Here again, to check for robustness, I exclude the high-inflation periods for Argentina, Brazil and Chile, and the results remain largely unchanged, except that the impulse responses for countries with low capital mobility (Graph A2, 1975–2006) and with floating exchange rates and mobile capital (Graph 7, 1990–99) become insignificant.

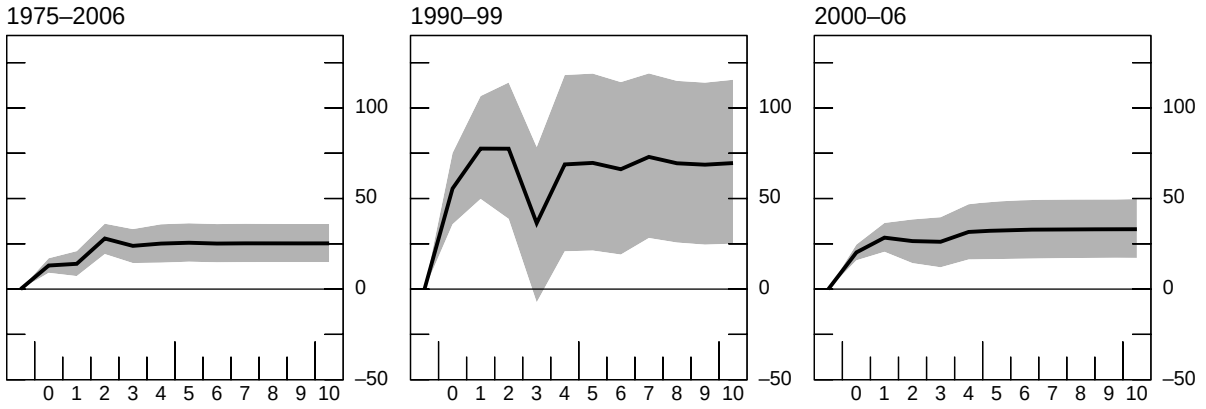
[15] The response increases to 50 basis points during 1983–2006 (since the Fed officially started targeting interest rates).

[16] I create dummies for no, middle and high capital mobility. No capital mobility means that the value of the capital mobility variable is 0; medium capital mobility is represented when capital mobility takes on the values 1 and 2. Full capital mobility means that the variable value is 3.

countries with full capital mobility, the interest rate pass-through was 70 basis points in 1990–99, but it declined to about 30 basis points in 2000–06 (Graph 2). Similarly, the results from countries with fully liberalised interest rates show that the response of domestic interest rates to US interest rates halved between 1990–99 (87 basis points) and 2000–06 (42 basis points) (Graph A4).

Graph 2

Impulse response of domestic interest rate to US interest rate for countries with full capital mobility



The impulse response functions in Graphs 3 and 4 indicate that pegged regimes show a greater interest rate pass-through (27 basis points) than flexible regimes (20 basis points) for the entire sample (1975–2006). However, during the recent periods (1990–99 and 2000–06), flexible regimes tend to exhibit greater co-movement with US interest rates (77 basis points and 34 basis points respectively) than the pegged ones (60 basis points and 25 basis points). This may reflect a "fear of floating". While the classification of a country as a floater in this paper is based on the actual behaviour of the exchange rate, central banks that float still intervene in response to exchange rate movements that are perceived as excessive or to accumulate foreign reserves (see BIS Papers no 24). If the exchange rate is not allowed to adjust fully, domestic interest rates can still be affected. For example, if the foreign interest rate falls and the exchange rate appreciates less than required to achieve equilibrium, domestic interest rates can still fall even under a (de facto) floating regime. Although domestic interest rates have responded less to US interest rates since 2000, they still exhibit a high co-movement, implying that central bankers in emerging markets have still not gained full autonomy over their monetary policies, despite adopting inflation targeting and moving to exchange rate regimes that can be classified as flexible but not necessarily a free float.

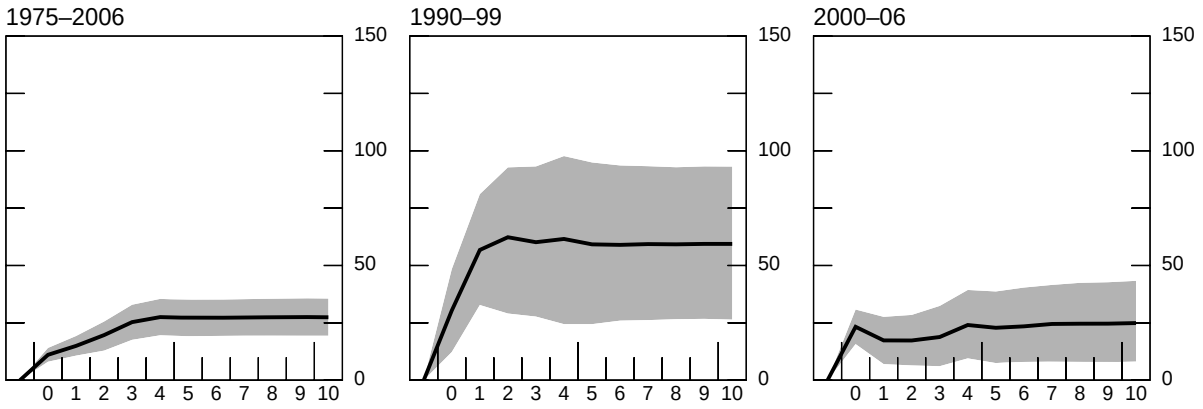
The impulse responses in Graphs 5–8 shed light on what constrains monetary policy.[17, 18] For pegged regimes, the response of domestic interest rates to US interest rates is significant during all periods for countries with high capital mobility (Graph 5) and only significant during 1990–99 for those with low capital mobility (Graph 6). The high response during 1990–99 may reflect the absolutely higher volume of capital flows, even for economies with relatively low capital mobility, that may have required significant changes in domestic interest rates to match the changes in US interest rates to maintain the exchange rate pegs. In addition, most of these emerging markets experienced currency crises during this period, which may have exaggerated the response.

[17] Here I distinguish between countries with low capital mobility (values 0 and 1) and those with high capital mobility (values 2 and 3).

[18] There were insufficient data to estimate the impulse responses during 2000–06 for exchange rate regimes and immobile capital.

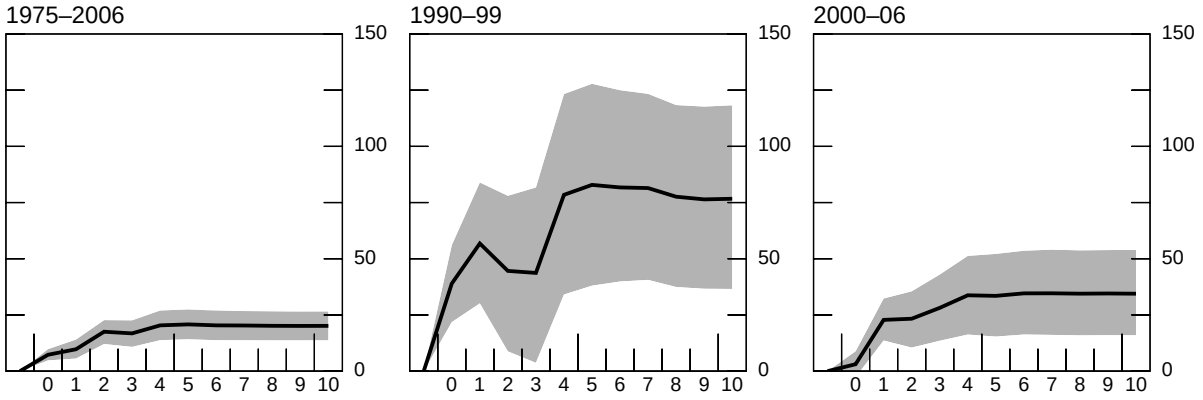
Graph 3

Impulse response of domestic interest rate to US interest rate when exchange rates are fixed



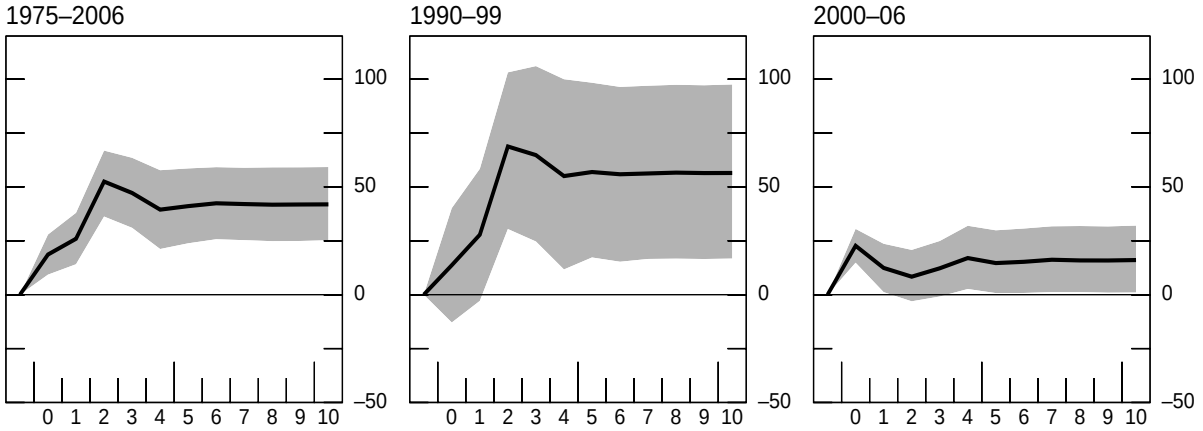
Graph 4

Impulse response of domestic interest rate to US interest rate when exchange rates are floating



Graph 5

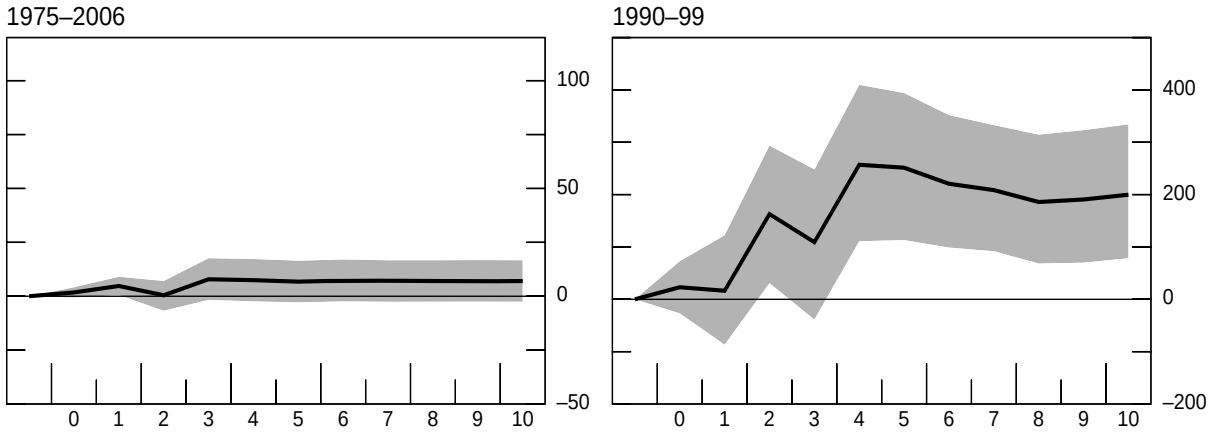
Impulse response of domestic interest rate to US interest rate when exchange rates are fixed and capital is mobile



We expect interest rates in countries with flexible exchange rates to be more independent of US interest rates and this is the case, especially since 1990 (Graph 8) for countries with low capital mobility. However, the link between the US interest rate and the domestic interest rate is significantly higher in countries with high capital mobility (Graph 7), implying that capital mobility may increase exchange rate fluctuations and induce central banks in these emerging markets to move their interest rates with foreign interest rates to cushion these movements.

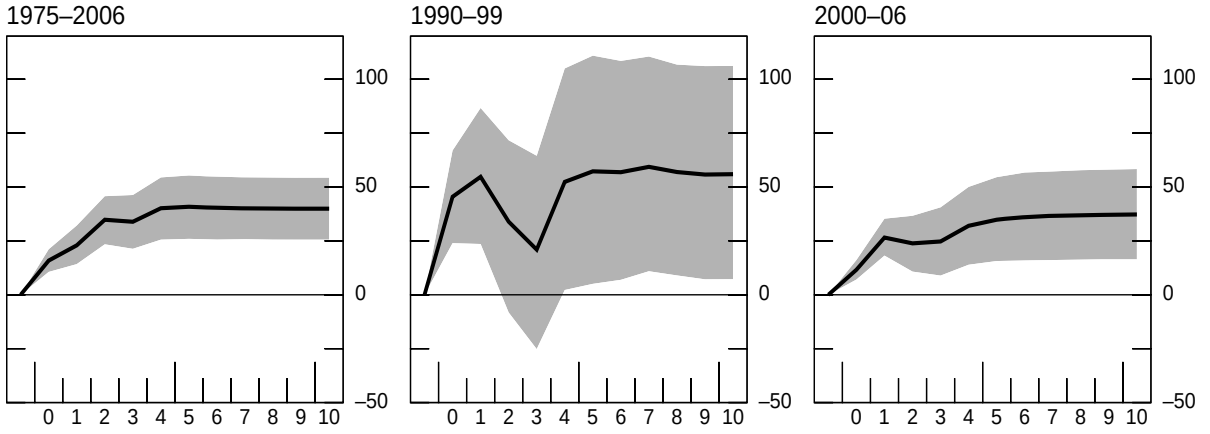
Graph 6

Impulse response of domestic interest rate to US interest rate when exchange rates are fixed and capital is immobile



Graph 7

Impulse response of domestic interest rate to US interest rate when exchange rates are floating and capital is mobile

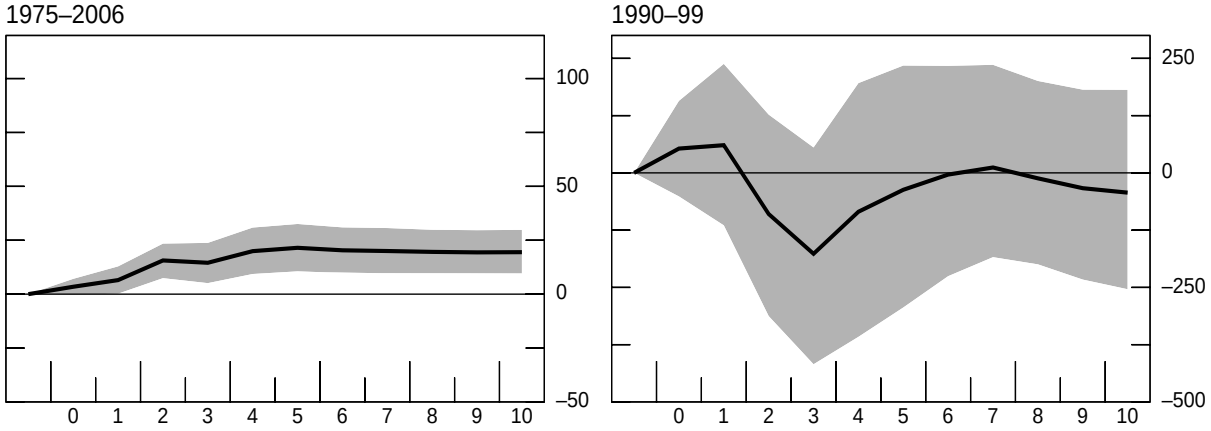


To summarise, unlike Frankel et al (2004), Shambaugh (2005) and Obstfeld et al (2005), the results in this paper suggest that domestic interest rates in countries with flexible exchange rate regimes exhibit a higher co-movement with US interest rates than in countries with pegged exchange rate regimes. This conundrum is resolved from Table 3 and Graphs 5–8, which show the link between domestic and foreign interest rates under different exchange rate regimes and levels of capital mobility. The response of domestic interest rates to changes in US interest rates is higher for countries with *flexible exchange rates and higher capital mobility*. Although exchange rates should undertake part of the burden of adjustment to a foreign interest rate shock and hence we should observe a lower link between domestic and foreign interest rates in case of floating regimes, this mechanism may be hampered

when central banks intervene. The intervention may not necessarily reduce the volatility in the exchange rate to less than 2%, so that the exchange rate regime would still be considered a de facto float according to the classification used in the paper. Indeed, the probability that central banks intervene in a floating regime is about 40% in the period 2000-06 against 50% for 1975–2006. Another explanation is that the regimes classified as "floats" also have better developed financial markets, where the pass-through from foreign interest rates to domestic interest rates would be higher. These two factors could explain why the floating exchange rate regimes have been associated with a bigger link between domestic and foreign interest rates. Lastly, the estimation does not account for the possibility that central banks might *choose* to move their domestic interest rates in line with foreign interest rates due to fear of excessive volatility in foreign exchange markets or for business cycle reasons.

Graph 8

Impulse response of domestic interest rate to US interest rate when exchange rates are floating and capital is immobile



3. Financial globalisation and its (dis)content

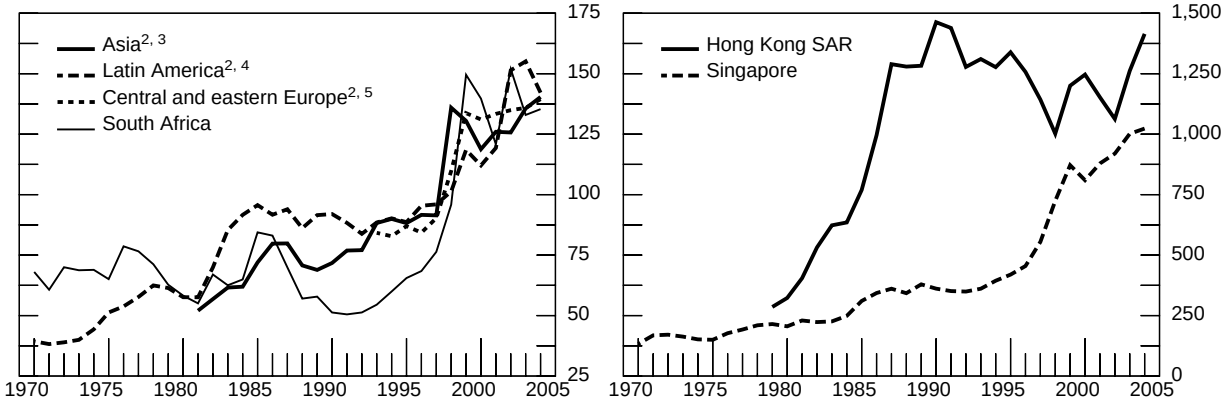
Since 2000, there has been an increasing trend towards flexibility in exchange rates and the opening of capital accounts. For example, the proportion of observations with floating exchange rates and mobile capital is 72% during 2000–06 against 23% with fixed regime and mobile capital. These economies are also becoming financially globalised. Graph 9 shows foreign assets and liabilities as a percentage of GDP for various regions. This variable has grown at an unprecedented rate for all the regions. Ball (2006) argues that this form of globalisation has implications for monetary policy because it affects the behaviour of both interest rates and asset prices. Graph 10 shows that the five-year rolling correlations between regional and G7 stock markets fell after the Asian crisis of 1997–98, but began to rise again after the technology bubble burst in 2001. In fact, the correlations have ranged between 0.8 and 0.95 in recent times.

This financial integration can be a boon or a bane, depending on the circumstances and the kind of external positions these countries hold. Such internationalisation of portfolios is desirable as it increases international risk-sharing, but at the same time shocks in one country can be immediately transferred to foreign holders of financial instruments issued by that country. Hence international events can have stronger domestic repercussions (Lane

and Milesi-Ferretti (2006b)). The recent May–June 2006 sell-off is a testimony to the vagaries of such shocks.[19] In the face of a slowdown of capital inflows, emerging markets can also be more vulnerable to a crisis if they have debt liabilities denominated in foreign currency (servicing costs rise with a depreciation) than if they rely on FDI (where returns are linked to the performance of the domestic economy).

Graph 9

Financial globalisation[1]

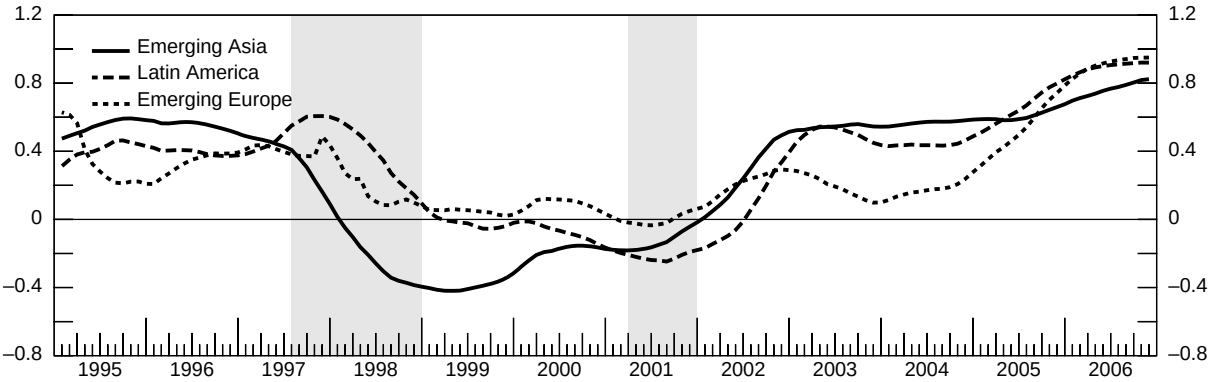


[1] Foreign assets plus foreign liabilities, as a percentage of GDP. [2] Simple average of the economies listed or cited. [3] China, India, Indonesia, Korea, Malaysia, the Philippines, Taiwan (China) and Thailand. [4] Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. [5] The Czech Republic, Hungary, Poland, Russia and Turkey.

Source: Lane and Milesi-Ferretti (2006).

Graph 10

Emerging stock markets' co-movement with the G7[1]



[1] Five-year rolling correlations of equity prices between the G7 and the regions. The shaded areas refer to the Asian crisis and the bursting of the technology bubble, respectively.

Sources: Datastream; MSCI; BIS calculations.

[19] Basci et al (2008) show that the bond holdings of foreigners exhibited an upward trend after the 2001 Turkish crisis. In the recent May–June 2006 turbulence, the bond holdings of foreign investors declined sharply, while stock portfolios remained unaffected. As a result, both interest rates and exchange rates increased sharply in a very short time period.

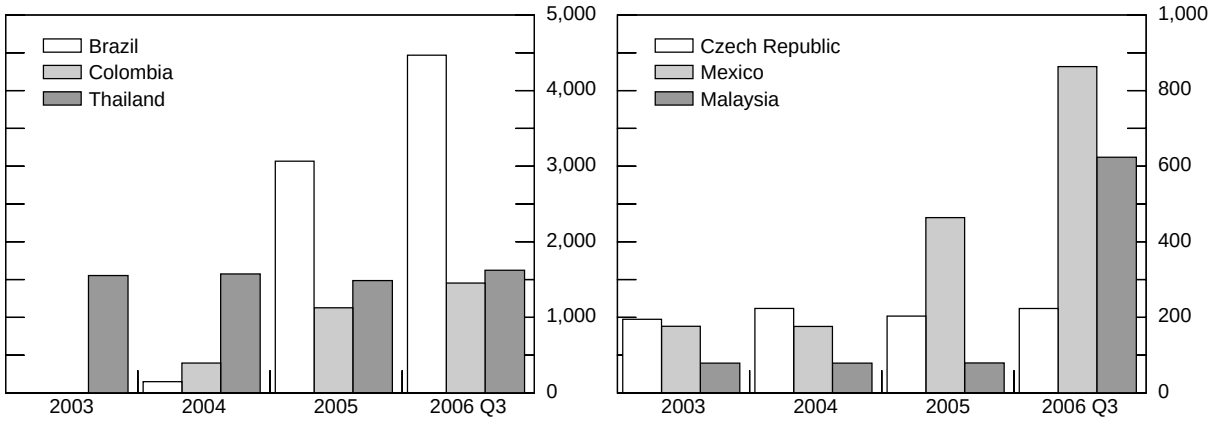
Although not a problem for developed countries whose liabilities are denominated in domestic currencies, but for emerging markets that are net debtors and whose external liabilities are primarily denominated in foreign currency, an exchange rate depreciation raises the domestic currency burden of foreign liabilities. The adverse effect of depreciation on the valuation of the external position can outweigh the gains in trade accruing from such depreciation. This is one reason why emerging markets are concerned about exchange rate volatility (Lane and Milesi-Ferretti (2006b)).[20] And this may perhaps explain why they intervene so frequently (40% of the time during 2000–06) even when the exchange rate is in fact floating.

Can they borrow in their own currency?

In order to shield themselves from the vagaries of exchange rates, Lane and Milesi-Ferretti (2006b) argue that emerging markets should promote local currency debt markets and increase the role of FDI and portfolio equity inflows. In fact, some of these countries (Brazil, Colombia, Thailand, the Czech Republic, Mexico and Malaysia) have been successful in issuing domestic currency denominated bonds in the international market (Graph 11).[21]

Graph 11

Local currency bonds and notes outstanding issued in international markets[1]



[1] By nationality of issuers, in millions of US dollars; end of period.

Source: BIS.

[20] Lane and Milesi-Ferretti (2006a) maintain that, with the increase in gross assets and liabilities, the valuation effects induced by changes in exchange rates and asset prices have become an important source of fluctuations in countries' external portfolios, often swamping the effects of the underlying capital flows.

[21] The reasons for issuing global bonds vary. Tovar (2005) considers the issuance of global bonds in three Latin American economies (Brazil, Colombia and Uruguay) and finds that the financial crises of the 1990s and early 2000s forced the governments to search for alternative financing to reduce their vulnerabilities. The crises also gave impetus to structural reforms that attracted investors. Global factors have also aided the issuance of bonds in domestic currency. For example, the success of emerging markets in reducing inflation in line with the global trend and their growing integration with developed financial markets has broadened the range of investors investing in emerging market securities.

Should exchange rate stability receive any attention? Issues in a dollarised economy?

As most emerging markets have moved towards floating exchange rates, monetary policy requires an anchor. Hence, there has been a shift towards inflation targeting.[22] How far such an approach can work in a dollarised economy is unclear; some have argued that, in such circumstances, the exchange rate should enter the central bank's objective function. Calvo (2006) argues in favour of aiming at exchange rate stabilisation (to the extent of outright pegging) *during sudden stops and when there is liability dollarisation*.[23] There is fairly good evidence suggesting that dollarised countries have more fragile corporate sectors; are more exposed to contractionary devaluations, devastating sudden stops and banking crises; and exhibit more output volatility (see Ize and Levy-Yeyati (2006) for references). Hence, the contractionary impact of real exchange rate depreciations limits the effectiveness of countercyclical monetary policy under large shocks.

In fact, dollarisation of the Peruvian economy has made monetary policy under inflation targeting less effective whenever there are stronger balance sheet effects (Rossini and Vega (2008)). Exchange rate volatility can also create a problem for countries where contracts are indexed in foreign currency. For example, rental contracts in Israel are indexed to the dollar (a tradition from the days of hyperinflation that still exists), hence the exchange rate pass-through into inflation of non-tradable goods is high and can lead to high costs in the event of a sharp depreciation of the shekel (Eckstein and Soffer (2008)). Morón and Winkelried (2003) argue that inflation targeting may be useful in guiding inflation expectations but, *a priori*, not to solve liability dollarisation issues, and hence suggest that it might be optimal to follow a non-linear policy rule that defends the real exchange rate in extreme circumstances in a financially vulnerable economy.

4. Conclusions

This paper presents the challenges faced by central banks in the face of highly mobile capital flows. The trilemma states that in such circumstances countries cannot simultaneously control their exchange rates and their interest rates. In order to gain monetary independence, countries either have to adopt a free float or impose full capital controls. Since emerging markets are moving towards higher capital mobility, they need to adopt a free floating exchange rate regime in order to gain any monetary independence. The econometric results from the paper indicate that although exchange rates have become more flexible in these economies, they are nonetheless not free floats and accordingly the interest rates of these economies do still respond to foreign rates to some degree. Nevertheless, the impulse response functions show a decreased response of domestic interest rates to changes in US interest rates since 2000, which might suggest that as these emerging economies gain credibility with their newer forms of monetary policies (a move away from fixed to flexible exchange rate regimes with inflation targeting), there may be further delinking between these

[22] Under inflation targeting, central banks may be tempted to stabilise exchange rates even. For example, the central bank of the Philippines intervenes to dampen sharp fluctuations in the exchange rate, which tend to feed into domestic prices and hence affect both actual inflation and inflation expectations (Guinigundo (2008)).

[23] According to Bernanke (2005), the combination of an inflation target, central bank independence and a market-determined exchange rate tends to reduce variability in both inflation and output even in small open economies like Finland and New Zealand. However, these economies are financially robust and not dollarised like some emerging markets. Ball (1998) argues that, even for developed small open economies, if the policymakers minimise a weighted sum of output and inflation variance, then the optimal policy instrument is a Monetary Conditions Index based on both the interest rate and the exchange rate, while "long-run inflation" (an inflation variable purged of the transitory effects of exchange rate fluctuations) should be the target variable.

interest rates. Indeed, several central banks have stated that inflation targeting has helped bring expectations of inflation down and the expectation channel is becoming stronger, whereby stronger anticipated effects of monetary policy require less aggressive interest rate changes.[24] Such credibility will help monetary policy become more independent of external influences.

In addition, these economies have significantly increased their financial integration with the global economy. Such changes can impact the transmission mechanism of monetary policy. Most central banks have given up their exchange rates and moved towards formal/informal inflation targeting. In such a scenario, central banks need to reassess the importance to be assigned to exchange rate stability vis-à-vis price stability. Exchange rates may still play an important role in these economies if they are dollarised or have a substantial part of their debt denominated in foreign currencies. In order to increase the effectiveness of monetary policy in such economies, de-dollarisation should be encouraged by developing local currency debt markets and encouraging prices to be set in local currency (as in Peru).

[24] See Sidaoui and Ramos Francia (2008) for Mexico, where the authors show that the expectations channel helps monetary policy reduce inflation pressures with a reduced output cost.

Annex

Data construction: Monthly data on short-term interest rates are from IMF International Financial Statistics. They cover 24 emerging markets from 1975 to 2006.[25] The variable on capital mobility and interest rate liberalisation is from Omori (2005). These variables are coded on a scale of 0–3. For capital mobility, 0 signifies a completely closed capital account and 3 the most open. For interest rate liberalisation, 0 means completely controlled interest rates, while 3 means market-determined. Since this dataset goes up to 2002, I extrapolate the 2002 observation for the following years, assuming that capital account liberalisation and interest rate liberalisation have neither progressed nor regressed from the 2002 level. The dummy variable for the float was constructed in the same spirit as Obstfeld and Rogoff (1995) and Shambaugh (2004). The idea is to see if the exchange rate remained within a ±2% band in a given year. Hence, the dummy variable for the float takes the value of 1 if the exchange rate is outside the ±2% band over the last 12 months, otherwise it is 0. The US interest rate (r*) is taken to represent the foreign or world interest rate.[26] The dummy for tight US monetary policy takes the value of 1 when the US interest rate rises, otherwise it is 0. The dummy for global tightness assumes the value of 1 if interest rates in the United States, the United Kingdom and Japan rise at the same time, otherwise it is 0.

Table A1

Impact of global tightening[1]

	1975–2006	**1975–1989**	**1990–99**	**2000–06**
Δr*	**0.08**	**0.05**	**0.43**	**0.18**
	0.00	0.00	0.00	0.00
Global Tight * Δr*	0.03	0.03	–0.01	**0.20**
	0.53	0.54	0.96	0.01
Rsq	0.00	0.00	0.00	0.04
DW statistic	1.80	1.87	1.73	1.52
Total observations	6,882	2,360	2,671	1,851
Cross sections	24	18	24	24

[1] P-values are below the coefficients.

[25] **Asia:** CN = China; HK = Hong Kong SAR; ID = Indonesia; IN = India; KR = Korea; MY = Malaysia; PH = Philippines; SG = Singapore; TH = Thailand; TW = Taiwan, China. **Latin America:** AR = Argentina; BR = Brazil; CL = Chile; CO = Colombia; MX = Mexico; PE = Peru; VE = Venezuela. **Others:** CZ = Czech Republic; HU = Hungary; PL = Poland; RU = Russia; SA = Saudi Arabia; TR = Turkey; ZA = South Africa.

[26] Since eastern European countries may not be so linked with the United States, I re-estimate the regressions without these countries. The results are robust.

Table A2

Impact of capital mobility

	1975–2006	1975–1989	1990–99	2000–06
Δr*	0.00	0.00	0.22	–0.18
	0.95	1.00	0.56	0.33
Capmob	0.00	0.00	0.00	0.00
	0.51	0.93	0.40	0.28
Capmob * Δr*	**0.04**	0.03	0.07	**0.13**
	0.05	0.14	0.62	0.04
Rsq	0.00	0.00	0.00	0.06
DW statistic	1.71	1.86	1.67	1.35
Total observations	5,454	2,109	2,003	1,342
Cross sections	17	16	17	17

[1] P-values are below the coefficients.

Table A3

Impact of exchange rate regime

	1975–2006	1975–1989	1990–99	2000–06
Δr*	**0.11**	**0.03**	**0.36**	**0.21**
	0.00	0.08	0.01	0.00
Float	**–0.0003**	0.00	**–0.001**	**–0.0002**
	0.07	0.51	0.02	0.05
Float * Δr*	–0.05	0.02	0.11	0.04
	0.17	0.39	0.54	0.49
Rsq	0.00	0.00	0.01	0.04
DW statistic	1.80	1.87	1.74	1.52
Total observations	6,862	2,320	2,671	1,871
Cross sections	24	18	24	24

[1] P-values are below the coefficients.

Table A4

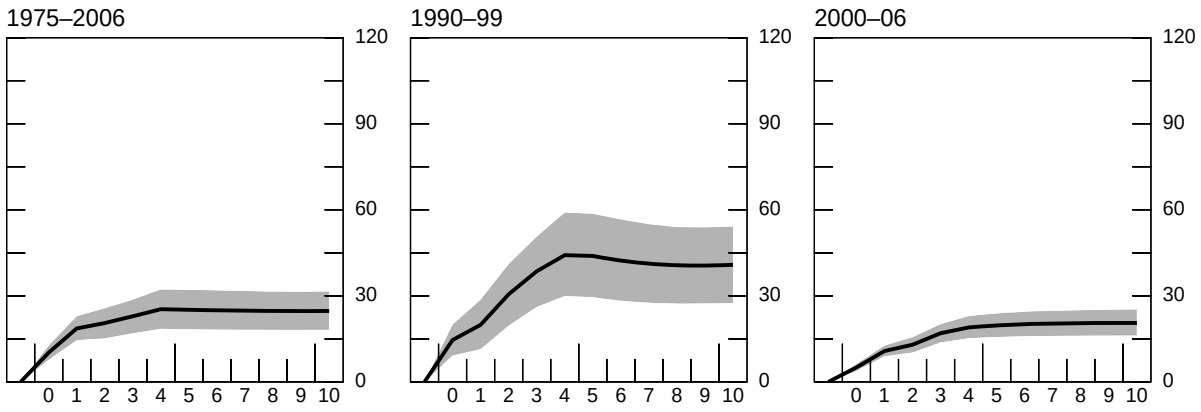
Impact of capital control and exchange rate regime

	1975–2006	1975–1989	1990–99	2000–06
Δr*	0.00	–0.01	0.07	**–0.34**
	0.91	0.71	0.87	0.09
Capmob	0.00	0.00	0.00	0.00
	0.57	0.72	0.86	0.16
Capmob * Δr*	**0.05**	0.04	0.12	**0.15**
	0.05	0.12	0.40	0.02
Float	**–0.0004**	0.00	**–0.001**	0.00
	0.03	0.34	0.01	0.22
Float * Δr*	0.00	0.01	0.13	**0.18**
	0.97	0.89	0.58	0.00
Rsq	0.00	0.00	0.01	0.07
DW statistic	1.72	1.84	1.67	1.38
Total observations	5,414	2,069	2,003	1,342
Cross sections	17	16	17	17

[1] P-values are below the coefficients.

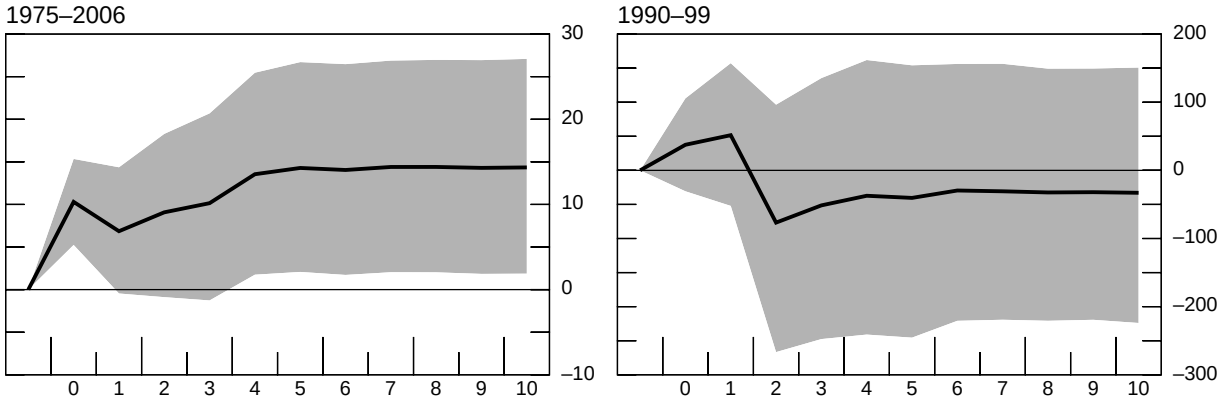
Graph A1

Impulse response of domestic interest rate to global tightening



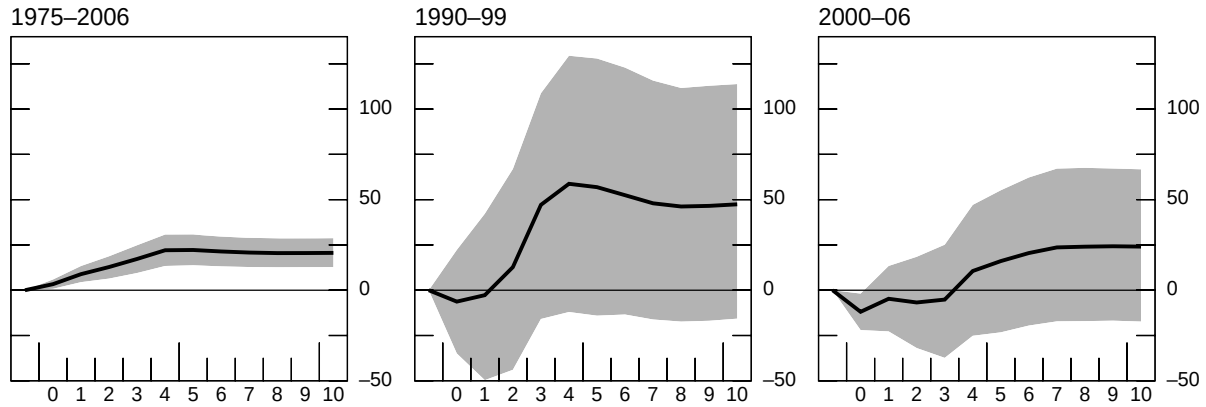
Graph A2

Impulse response of domestic interest rate to US interest rate for countries with no capital mobility



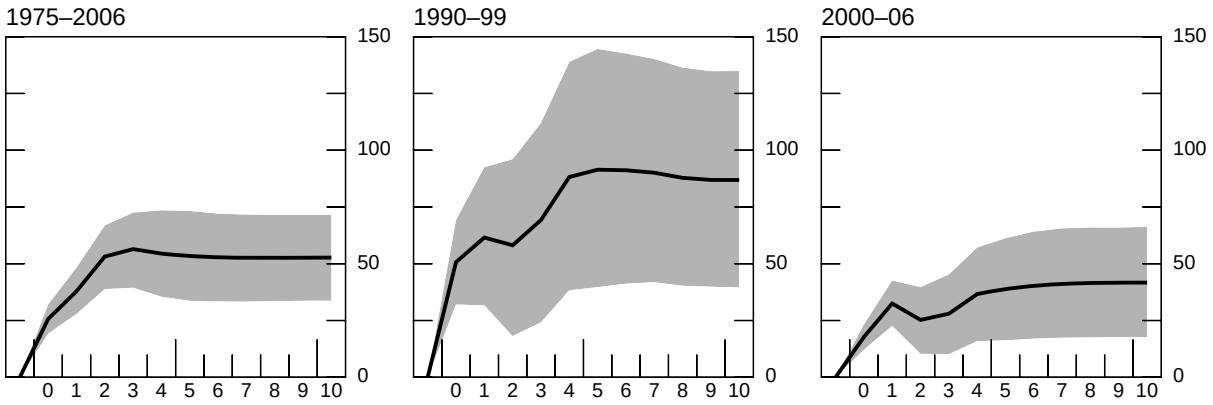
Graph A3

Impulse response of domestic interest rate to US interest rate for countries with intermediate level of capital mobility



Graph A4

Impulse response of domestic interest rate to US interest rate when interest rates are market-determined



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