

# Capital inflows into EMEs since the millennium: risks and the potential impact of a reversal

By Guillermo Felices, Glenn Hoggarth and Vasileios Madouros of the Bank's International Finance Division.

Capital inflows into emerging market economies (EMEs) were at a record level in 2007 and higher than prior to the East Asian and Russian crises a decade earlier. These inflows largely reflect improvements in EMEs' economic and financial strength in recent years. But some EMEs, especially in Central and Eastern Europe, may be vulnerable to a reversal of capital flows if the global credit squeeze is prolonged or global GDP growth falls sharply. This could adversely affect both EMEs and foreign investors.

## Introduction

Notwithstanding the turmoil in developed financial markets since last July, capital flows into EMEs in 2007 were at a record level and larger than prior to the East Asian crisis a decade ago. And at end-February 2008, sovereign bond spreads remained well below, and equity price/earnings ratios above, their historical averages in many EMEs. Following the strengthening in EMEs' economic and financial position in recent years, foreign investors currently appear to be treating EME assets as a relatively safe haven. However, some EME borrowers may be vulnerable to a reversal of capital flows if global financial market conditions remain fragile or world GDP growth slows sharply. Moreover, previous experience, such as in East Asia and subsequently in Russia a decade ago, shows how EME crises can cause losses and/or funding difficulties for global financial institutions, including UK-owned firms, either directly or indirectly through disrupting global financial markets.

The first section of this article assesses whether the strong capital inflows into EMEs in recent years are likely to be sustained. It looks at the size and composition of inflows, and whether they have been attracted mainly by domestic ('pull') or global ('push') factors. The second section then assesses some of the channels through which a withdrawal of capital from EMEs could feed back to affect global financial institutions, either directly, or indirectly through affecting financial asset prices in developed countries.

## The sustainability of capital inflows into EMEs

### Trends in capital inflows into EMEs

The current wave of globalisation is characterised by a substantial increase in international trade flows and an even

more rapid expansion of capital flows<sup>(1)</sup> to and from EMEs.<sup>(2)</sup> Trade openness in EMEs has almost doubled since the early 1980s, while *de facto* financial openness — measured as the sum of the stock of foreign liabilities and assets as a percentage of GDP — has almost trebled over the same period.

There have been two waves of particularly rapid capital inflows<sup>(3)</sup> to EMEs over the past 20 years. The first was in the mid-1990s prior to the East Asian crisis and the second has been over the past five years (**Chart 1**). In the current wave, inflows reached a record high in 2007 and have been particularly strong from private sector investors.

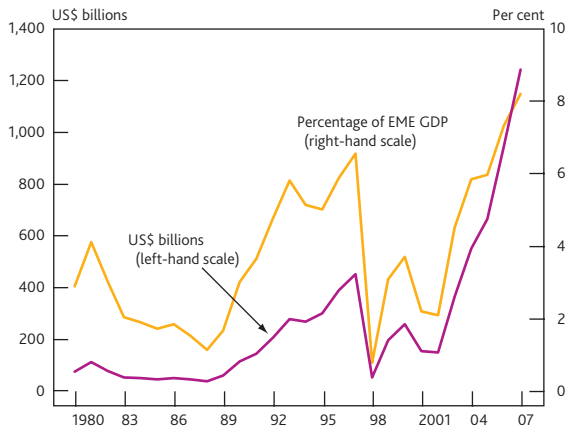
In contrast to the mid-1990s, capital inflows have not, in aggregate, been required to finance current account deficits (domestic investment in excess of domestic savings). Overall, EME domestic savings have exceeded domestic investment in recent years, so that the large inflows have contributed to a marked build-up of foreign exchange reserves and other foreign assets. But, whereas capital inflows have been strong in all EME regions, there have been marked regional differences in current account balances (see the box on page 28).

(1) These trends are evident in developed markets as well.

(2) Unless otherwise stated, the following sample of 44 emerging market countries is used throughout the text. Latin America and Caribbean: Argentina, Brazil, Chile, Colombia, Dominican Republic, Ecuador, Guatemala, Mexico, Peru and Venezuela. Central and Eastern Europe (CEE) and the Commonwealth of Independent States (CIS): Croatia, Czech Republic, Hungary, Kazakhstan, Poland, Romania, Russia, Slovak Republic, Turkey and Ukraine. Emerging Asia and newly industrialised countries (NIC): Bangladesh, China, Hong Kong, India, Indonesia, Malaysia, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Taiwan Province of China, Thailand and Vietnam. Middle East and Africa: Algeria, Egypt, Iran, Kuwait, Libya, Morocco, Nigeria, Saudi Arabia, South Africa and the United Arab Emirates. Data for the CIS countries in the sample (Kazakhstan, Russia and Ukraine) are only available from 1992.

(3) Capital inflows consist of debt, portfolio equity and foreign direct investment (FDI). The vast majority of these inflows into EMEs are from private sector investors, but also include flows from governments and international financial institutions.

**Chart 1** Gross capital inflows into EMEs, 1980–2007<sup>(a)</sup>



Sources: IMF *World Economic Outlook*, October 2007 and Bank calculations.

(a) 2007 numbers are an IMF estimate.

Capital inflows should bring benefits to EMEs over the longer term. The increasing ability of EME companies to borrow from abroad should reduce their cost of capital and thus boost their investment and GDP growth. Capital inflows also offer the prospect to both domestic borrowers and foreign investors of more efficient risk-sharing. In theory, through borrowing from abroad, EME companies and households should be better able to smooth consumption against temporary losses of income. And through buying EME assets, foreign investors have the opportunity of holding financial assets with a broader combination of risk and return than may be available in their domestic, or other developed, markets.<sup>(1)</sup>

But very rapid capital inflows can be difficult to absorb and in the past have been at times associated with rapid increases in asset prices and domestic credit booms.<sup>(2)</sup> The recent large build-up of foreigners' holdings of EME assets also has potential implications for lenders because their income and wealth is more exposed than previously to changes in EME asset prices and the risk that EME borrowers will default. For example, the value of UK investors' holdings of securities issued by EMEs doubled from 7% to 14% of UK GDP between end-2001 and end-2006, while the value of UK-owned banks' claims on EMEs increased from 19% to 25% of UK GDP over the same period. Moreover, faced with losses in one or more EMEs, investors may reduce their lending in other markets thus transmitting the shock across countries. The potential for contagion is discussed further below.

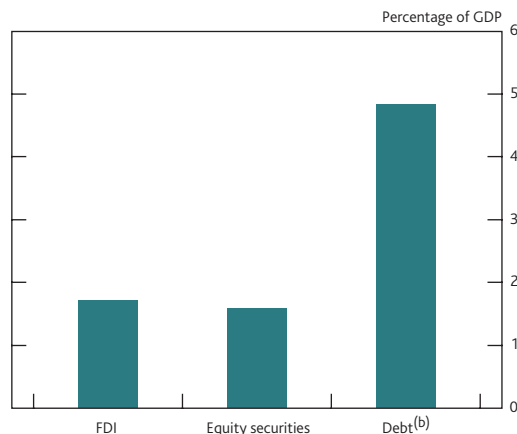
### Composition of capital inflows into EMEs: causes and effects

The vulnerability of EMEs currently to such a capital reversal partly depends, *inter alia*, on the composition of gross capital inflows. Research emphasises that equity flows are likely to provide the most benefits and least potential costs to EMEs. FDI, in particular, may bring the direct benefit of transferring technology from abroad. Recent evidence also emphasises the potential indirect 'catalytic' benefits to GDP growth, for

example, through foreign ownership promoting the development of the domestic financial sector, increasing competition and acting as a discipline device to improve macroeconomic policies and corporate governance.<sup>(3)</sup>

Debt flows have in the past generally been more volatile than equity (Chart 2), especially in the wake of EME crises. Perhaps reflecting this, Kose *et al* (2007) find that over the 1987–2004 period, debt inflows increased the volatility of EME consumption growth rather than reduced it as suggested by theory. As highlighted by the empirical early warning literature on financial crises, in times of stress high short-term foreign currency debt in relation to foreign currency reserves and a high share of non-FDI liabilities in total external liabilities increase a country's susceptibility to a currency crisis (on the former see Berg *et al* (2005) and on the latter see Frankel and Wei (2005)).

**Chart 2** Volatility<sup>(a)</sup> of gross capital inflows to EMEs, 1980–2006



Sources: IMF *World Economic Outlook*, October 2007, *International Financial Statistics*, national central banks and Bank calculations.

- (a) Measured by the standard deviation of capital flows (in percentage of GDP) averaged across 44 EMEs.
- (b) Debt consists mainly of debt securities and bank loans, but also includes trade credits, currency and deposits and loans by multilateral institutions.

However, the composition — and size — of capital inflows may be partly a reflection rather than a cause of vulnerability. For example, foreigners will be more willing to invest long term and in local currency debt, the less risky their perception is of the borrower. They will also be more willing to invest in FDI if there is good governance and macroeconomic policy making (Wei (2006)). This points to the possibility of a virtuous circle, whereby an improvement in domestic policies may not only reduce directly the likelihood that EMEs are hit by an adverse shock and thus a marked capital outflow but also allow them to improve the composition of their external financing which, in turn, reduces further their external vulnerability

(1) For more discussion on risk-sharing see Kubelec *et al* (2007).  
 (2) See, for example, IMF (2004) and (2007a).  
 (3) Kose *et al* (2006).

## Balance of payments in EMEs

A country's real and financial transactions with the rest of the world are recorded in its external balance. The balance of payments identity between residents and non-residents shows that a current account surplus, that is the excess of domestic savings over investment, is invested either by the central bank in foreign exchange reserves and/or by other sectors of the economy in foreign debt, equity or FDI.<sup>(1)</sup> Conversely, a current account deficit, domestic investment in excess of domestic savings, is financed through an increase in net liabilities — net capital inflows — and/or through a run down in the central bank's foreign exchange reserves. This is shown in equation (1) below.<sup>(2)</sup>

$$CAD = NKI - \Delta R = (KI - KO) - \Delta R \quad (1)$$

where:

*CAD* = current account deficit.

*NKI* = gross capital inflows (*KI*) less outflows (*KO*) of debt, equity and FDI.

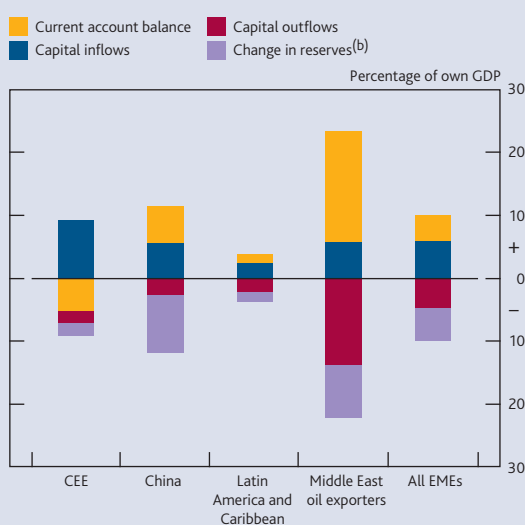
$\Delta R$  = increase in the central bank's foreign exchange reserves.

Capital inflows into EMEs as a whole were at a record level in 2007. But, in aggregate, domestic savings in EMEs were more than sufficient to fund domestic investment, resulting in a current account surplus (around 1% of world GDP). That meant that these strong trade and financial foreign exchange inflows have been reflected in a very large build-up in foreign exchange reserves.

Gross capital inflows into EMEs — the focus of this article — have been strong in all regions in recent years. But there has been a marked divergence across EMEs in the other main components of the balance of payments (**Chart A**). In Central and Eastern Europe, strong capital inflows have financed large current account deficits, while capital outflows and reserve accumulation have been smaller. In contrast, capital inflows in China and oil-exporting countries have combined with very

large current account surpluses. This has been reflected in a rapid accumulation of foreign assets, mainly by central banks in the form of foreign exchange reserves (especially in China), and by sovereign wealth funds (especially in the Middle East). And in Latin America, large capital inflows have coincided with positive, albeit small, current account surpluses. This has been reflected both in a large accumulation of foreign exchange reserves by central banks as well as foreign investments by the private sector.

**Chart A** Balance of payments for selected EMEs,<sup>(a)</sup> average 2003–06



Sources: IMF *World Economic Outlook*, October 2007, *International Financial Statistics* and Bank calculations.

- (a) Individual components may not sum to zero because the capital account and errors and omissions are excluded.  
 (b) An increase in reserves is shown as a negative change in the chart.

- (1) Note that in the balance of payments framework the accumulation of foreign assets by sovereign wealth funds could be potentially included under a number of subcategories — 'central government', 'financial corporations' or 'other sectors' — depending on each country's institutional framework. As these funds have grown in recent years, especially in oil-exporting countries and East Asia, the IMF intends to provide clearer guidance to help national statisticians determine the appropriate sectoral classification.  
 (2) For simplicity, and given the focus of the article on transactions in financial assets, equation (1) assumes that another component of the balance of payments, the capital account, which records capital transfers and transactions in non-produced, non-financial assets, is zero.

(Diagram 1). Of course, the circle can also work in reverse. EME governments or companies that have weak financial positions may only be able to borrow at short maturity and in foreign currency. Their vulnerability to adverse shocks will be compounded by the structure of their external financing.

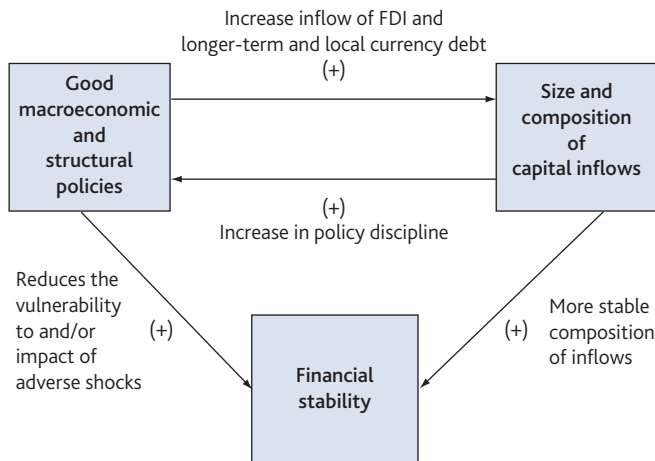
### EMEs' recent economic performance

The virtuous, rather than vicious, circle has been evident for most EMEs over the past five to ten years. This partly reflects the efforts by EME governments to improve macroeconomic policies and the frameworks under which they are applied. A number of EME central banks have adopted inflation targets since the late 1990s while inflation

rates were on a steady downward trend until 2006. Government debt levels have also been reduced, particularly debt owed to foreigners.

The susceptibility of EMEs to exchange rate crises has also fallen. In most regions (with the clear exception of Central and Eastern Europe (CEE)) current account balances have moved into surplus or surpluses have got bigger. This, in combination with the large net capital inflows, has meant that foreign exchange reserves have increased markedly and in most EMEs are now several multiples higher than short-term debt (on average a multiple of six). GDP growth has also been strong in all EME regions for the past five years. Therefore, the average

**Diagram 1** Virtuous circle of capital inflows into EMEs

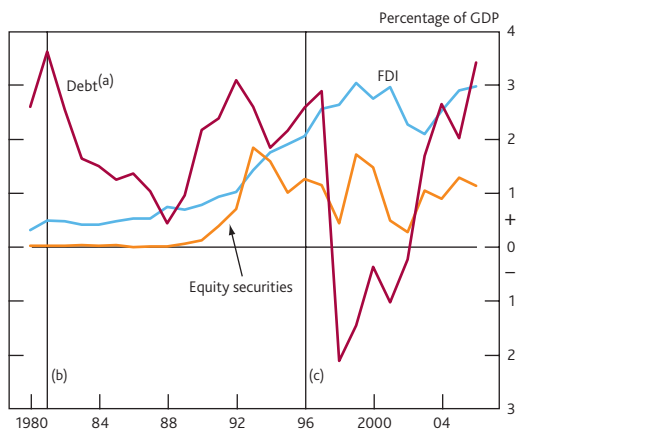


Note: Signs in brackets signify the direction of the expected impact.

credit rating of EMEs in the emerging market sovereign bond index (global), the EMBIG, has increased by around three notches over the past decade and by two notches over the past five years alone and is now only marginally below investment grade.

Consequently, EMEs have attracted a large inflow of FDI over the past decade (Chart 3) which has resulted in a marked increase in the share of FDI within their total outstanding external liabilities (Chart 4). Many EME governments have also been able to reduce the vulnerability of their debt profile through financing more in local rather than foreign currency and through extending the maturity of their (non-sterilisation related) domestic debt. For example, the original maturity of EME central government debt increased from 5.3 years at end-1995 to 8.3 years at end-2005 (BIS (2007)).<sup>(1)</sup>

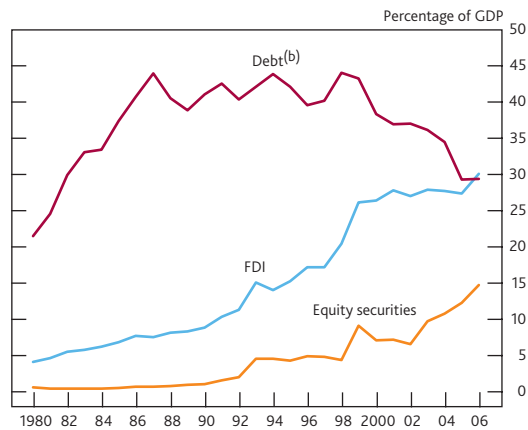
**Chart 3** Gross capital inflows to EMEs, 1980–2006



Sources: IMF World Economic Outlook, October 2007, International Financial Statistics, national central banks and Bank calculations.

- (a) Debt consists mainly of debt securities and bank loans, but also includes trade credits, currency and deposits and loans by multilateral institutions.
- (b) Year before the start of the early 1980s Latin American debt crisis.
- (c) Year before the start of the 1997–98 Asian crisis.

**Chart 4** Composition of EMEs' gross outstanding external liabilities,<sup>(a)</sup> 1980–2006



Sources: IMF World Economic Outlook, October 2007, International Financial Statistics, Lane and Milesi-Ferretti (2007), updated with data provided by the authors, national central banks and Bank calculations.

- (a) The stock of external liabilities can change either due to the accumulation of new liabilities (capital inflows) or due to changes in the valuation of the existing stock.
- (b) Debt consists mainly of debt securities and bank loans, but also includes trade credits, currency and deposits and loans by multilateral institutions.

However, there has also been a rapid increase in debt inflows into the private sector in recent years, especially in CEE. These flows may reflect expectations of higher future income as these countries 'catch up' with income levels in developed countries.<sup>(2)</sup> But they may also partly reflect a 'search for yield' by foreign investors. Debt inflows have been used mainly to finance growth in domestic credit particularly to the household sector and are contributing to domestic and external imbalances in the region. Real domestic demand growth has been strong, house price inflation very high and current accounts are in deficit — in the Baltic and Balkan countries particularly so. Also, much of the domestic credit to households is denominated in foreign currency. This has some parallels with the rapid build-up of debt in Latin America in the early 1980s and in East Asia in the mid-1990s prior to their respective crises.

**Measuring the importance of 'pull' and 'push' factors**

Econometric evidence can help to distinguish whether the marked increase in EME capital inflows and rise in asset prices in recent years is due mainly to improvements in economic and financial positions and stronger institutional frameworks ('pull' factors) or an increase in global liquidity and investors' risk appetite ('push' factors).

Updated estimates based on the model reported in the *Bank of England Quarterly Bulletin* (2006) suggest that an improvement in domestic 'fundamentals' — at least to the

- (1) Some EME governments are also issuing inflation-link debt as a signal of their commitment to an anti-inflation monetary policy. In the past, inflation-linked debt was seen as a sign of weakness of EMEs with a track record of high inflation since it was the only debt that foreigners were willing to buy.
- (2) For CEE countries, this catch up is in the context of further integration with Western Europe through joining the EU and/or adopting the euro.

extent that these are captured accurately by changes in sovereign credit ratings<sup>(1)</sup> — can account for more than four fifths of the narrowing in the aggregate EME sovereign foreign currency bond spreads (the EMBIG) between mid-1998 and mid-2007 (first column in **Table A**). A number of IMF authors also find that better credit ratings have been an important factor contributing to a narrowing in spreads.<sup>(2)</sup> And IMF (2007b) finds that (lagged) domestic GDP growth has also been an important determinant of capital inflows into EMEs over the 1998–2006 period.

**Table A** Accounting for changes in EME sovereign bond spreads<sup>(a)</sup>

Contribution to changes in spreads (basis points)	End-June 1998 to end-June 2007	End-Dec. 2002 to end-June 2007	Mid-July 2007 to mid-Jan. 2008 <sup>(b)</sup>
<b>Pull factors</b>			
Credit ratings	-371	-367	-13
<b>Push factors</b>			
Risk appetite (VIX)	-41	-165	124
Residual	-17	-11	18
Actual change in spreads (basis points)	-429	-544	128

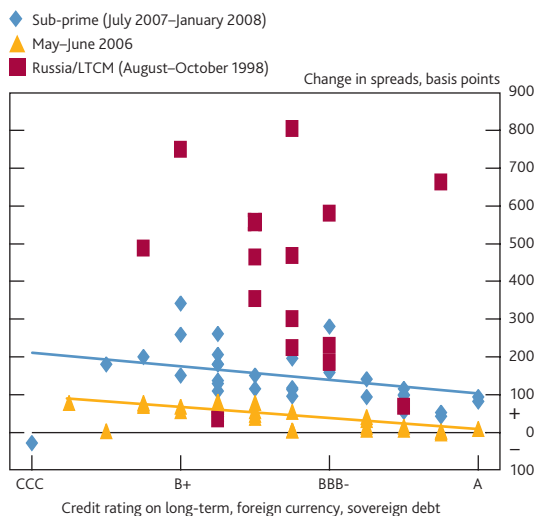
Source: Bank of England calculations.

(a) The model has been estimated using monthly data from June 1998 to January 2008.  
 (b) From the trough to the most recent peak of risk aversion — as proxied by the VIX — during the sub-prime market turmoil (17 July 2007 to 22 January 2008). The VIX also reached similar levels in August and November 2007.

This strengthening in fundamentals in recent years seems to have been an important factor helping to insulate EME capital markets from the turmoil in developed financial markets since the summer of 2007. There has been only a relatively modest rise in EME sovereign bond spreads during the financial market disruption — much less than the increase in spreads on risky bonds in developed markets. Moreover, the widening in EME spreads in the current global market turmoil can be almost fully accounted for by the fall in global risk appetite over the period (proxied by the rise in the VIX),<sup>(3)</sup> whereas most EME sovereign credit ratings have been unaffected so far by the current market turmoil (third column in **Table A**).<sup>(4)</sup> Also, within the EME asset class, sovereign bond spreads rose less for EMEs with higher credit ratings and exchange rates fell more for countries with larger current account deficits. A similar pattern occurred during the temporary market correction in May–June 2006 although it was less apparent during the Russian crisis in 1998 (**Chart 5**). This highlights the financial stability benefits to EMEs from improving policy frameworks and outturns.

All the studies mentioned above, however, also suggest that an increase in global liquidity and/or in risk appetite have contributed to the rise in EME capital flows and reduction in bond spreads in recent years (second column in **Table A**). Foreign investors, particularly those involved in carry trades such as banks and hedge funds, have been attracted to emerging markets by high domestic yields relative to the low yields witnessed in recent years in developed economies. Consequently, and notwithstanding the increase in

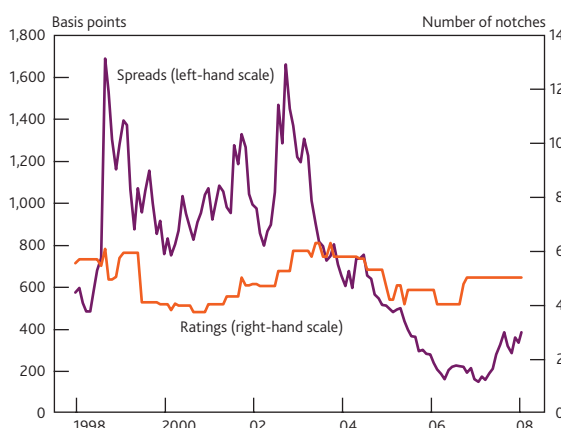
**Chart 5** Corrections in sovereign foreign currency denominated bond spreads by credit rating



Sources: Bloomberg, JPMorgan Chase & Co., Standard and Poor's and Bank calculations.

discrimination in favour of EMEs with stronger credit ratings during the financial market turbulence since the summer of 2007, the search for yield has meant that investors have differentiated less in recent years between EMEs of different credit quality. In other words, the dispersion of sovereign bond spreads across EMEs has fallen by much more than that of sovereign credit ratings (**Chart 6**).

**Chart 6** Dispersion<sup>(a)</sup> in EME sovereign foreign currency bond spreads and credit ratings<sup>(b)</sup>



Sources: Bloomberg, JPMorgan Chase & Co., Standard and Poor's and Bank calculations.

(a) Difference between the 25th and the 75th percentiles for sovereigns in the EMBIG.  
 (b) For countries in the EMBIG.

- (1) Increases in sovereign credit ratings also reflect potential temporary improvements in economic performance including those brought about by the particular benign external environment witnessed in recent years.
- (2) See IMF (2007c), Remolona *et al* (2007) and Hartelius *et al* (2008).
- (3) The VIX (Chicago Board Options Exchange Volatility index) is an index of volatility in the Standard and Poor's 500 equity index implied from options prices and is widely used as a measure of global risk aversion.
- (4) There were one notch downgrades by Fitch in Latvia in August 2007 and by Standard and Poor's in Kazakhstan in October 2007 and in Lithuania in January 2008. Fitch also put several Central and Eastern European countries (Bulgaria, Estonia, Latvia and Romania) on negative outlook in January 2008.



The relative resilience of EMEs as a whole to the credit turmoil since mid-2007 does not imply necessarily that vulnerabilities in specific EMEs cannot crystallise. Since the start of the turmoil, some EME borrowers in CEE and the CIS, especially banks, have faced a sharp rise in the cost of external finance and reduction in capital inflows. This could be a precursor to a much larger turnaround in the future. Moreover, the strengthening in economic and financial conditions of EMEs discussed above also partly reflect the unusually favourable external environment in recent years — strong growth in world GDP, low world real interest rates and consumer price inflation and high commodity prices. None of these factors can be relied upon to continue over the medium term.

Therefore, although capital flows into EMEs were at a record level in 2007, this raises the question of how a capital reversal might play out across EMEs and onto developed markets should global liquidity conditions remain tight or world GDP growth fall sharply.

### Potential spillovers from a reversal of capital flows to EMEs

There is now a vast theoretical and empirical literature on potential contagion channels across countries.<sup>(1)</sup> This section looks at some of the ways to quantify spillovers from EMEs to developed financial markets. The first part looks at the direct exposures that foreign investors currently have with EME borrowers. Then the potential indirect risks that investors may face are highlighted due to contagion between EME asset markets and mature markets. The third part looks at recent evidence of the interaction between changes in asset prices in EMEs, on the one hand, and the United States and the United Kingdom on the other.

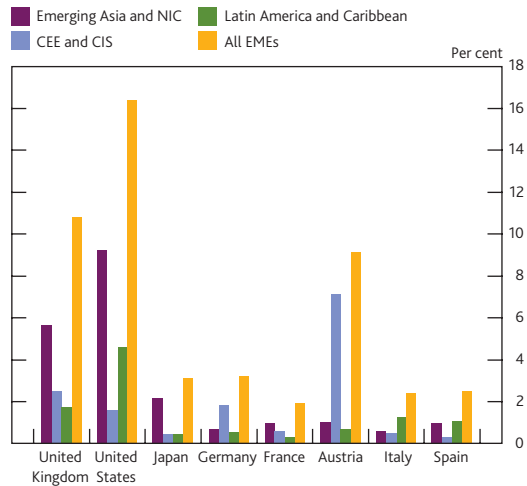
#### Foreign investors' direct exposures to shocks in EMEs

A measure of the *ex-ante* exposure of foreigners through investing in individual EMEs can be derived from information on the current pattern of debt and equity financing between creditor and debtor countries.

**Chart 7** shows the concentration of (long-term debt plus equities) portfolio investment by investors resident in major developed countries in EME regions at end-2006, according to the latest IMF annual *Co-ordinated Portfolio Investment Survey*.<sup>(2)</sup> Also shown is the concentration of foreign exposures in EME regions of developed (BIS) country banking systems (**Chart 8**). These show that for most investing countries, portfolios are reasonably dispersed across EME regions, with any one region not constituting a large share of most lending countries' total global portfolio.<sup>(3)</sup> The main exceptions are Austrian-owned banks in emerging Europe and Spanish-owned banks in Latin America. But even here exposures are somewhat less concentrated than those of Japanese and US-owned banks prior respectively to the East Asian crisis in

1997–98 and the Latin American debt crisis in the early 1980s. At first sight then, this suggests that the risk faced by foreigners investing in EMEs is in most cases quite diversified.<sup>(4)</sup>

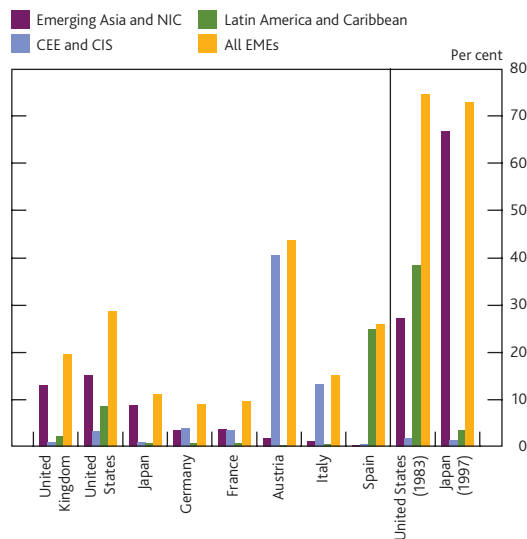
**Chart 7** Regional dispersion of holdings of EME securities<sup>(a)(b)</sup> (percentage of creditor country's total holdings of foreign securities), end-2006



Source: IMF *Co-ordinated Portfolio Investment Survey* (2007).

(a) Long-term debt (original maturity greater than one year) and equity securities.  
 (b) The data show cross-border holdings on a residency basis.

**Chart 8** Regional dispersion of consolidated bank exposures<sup>(a)</sup> to EMEs (percentage of banking sectors' total foreign exposures), end-June 2007



Sources: Bank of England and BIS.

(a) These include local exposures of foreign-owned subsidiaries and branches as well as cross-border claims. Exposures include holdings of foreign securities.

(1) See, for example, the collection of papers in Classens and Forbes (2001).  
 (2) The data consist of both domestic private and public sector securities held by the foreign private and public sectors (excluding holdings of foreign exchange reserves). The data also exclude derivatives. For more details on limitations to these data see De Alessi Gracio *et al* (2005).  
 (3) Disaggregating the portfolio investment into long-term debt and equity shows a similar picture.  
 (4) An important caveat is that these data show only the aggregate position of creditor countries and so mask the potential concentration of EME exposures at individual banks or other large financial institutions.

But the concentration risk faced by foreign investors might be higher than suggested by their direct exposures to individual EMEs. This is because a shock to one or more EMEs could affect all EME asset markets. Investors might face balance sheet constraints<sup>(1)</sup> forcing them to unwind positions in unrelated markets or there might be a generalised reassessment of risky asset markets. After the Russian crisis, for example, highly leveraged institutions cut back their positions from as far afield as Brazil, Hong Kong and Mexico.

### Foreign investors' indirect exposures to shocks in EMEs

These propagation mechanisms could also affect asset prices in mature markets and, therefore, investors' balance sheets even if they do not have direct exposures to EMEs. In the Russian crisis, for example, investors also unwound their positions in private sector assets in developed economies, especially in lower credit quality bonds. This flight to quality and liquidity resulted in bond spreads rising in all risky asset markets and government bond yields falling a lot in developed countries.<sup>(2)</sup> Trading income of US banks, in aggregate, fell by \$2 billion during 1998 Q3 compared with the previous two quarters, while several large US banks posted trading losses<sup>(3)</sup> and LTCM, a hedge fund, was rescued by a private sector bailout.

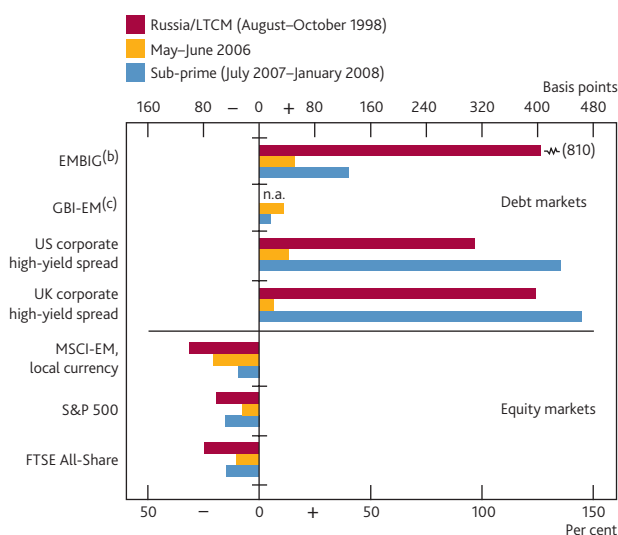
A new development in recent years is that some EME governments have become major creditors of developed countries, including the United Kingdom. For example, deposits in UK-resident banks from Russia and OPEC countries, some of which are likely to be from the governments or central banks, increased from \$80 billion at end-2002 to \$290 billion in 2007 Q3. Faced with private sector capital flight, these governments might react by running down their foreign assets. Although this would reduce the adverse impact of the capital outflows on the domestic economy it could exacerbate the disruption to developed markets, including the liquidity pressures on international banks.

### Relationship between EME and developed country asset prices

To get some idea of how asset prices in EMEs might affect risky asset prices in developed markets during a crisis, it may be helpful to look at the relationship between asset prices during recent periods of adverse shocks. Although there have been no major EME crises over the past five years, there have been periods of abrupt EME asset price corrections. The biggest two were in May–June 2006 and since July 2007. It is difficult to pinpoint the precise trigger for these shocks, but the one in 2006 appears to have been a concern over the possibility of a slowdown in US GDP growth and was reflected in a generalised fall in risk appetite in global financial markets. The more recent one, in contrast, was caused by a deterioration in US sub-prime mortgage assets which resulted in a major disruption to developed financial markets.<sup>(4)</sup>

Chart 9 shows that the correction in emerging market asset prices in these two episodes were nonetheless small compared to the 1998 Russia/LTCM crisis. Since July 2007, the EMBIG has risen by 130 basis points.<sup>(5)</sup> This is around one quarter of the increase in spreads on high-yield corporate debt in mature markets, which increased by more than during the Russia/LTCM crisis. And EME equity prices have fallen somewhat less than in developed markets. These differences, in part, probably reflect the fact that the crisis in 1998 clearly started in an EME credit market, following the Russian government's (unexpected) default on its domestic debt, rather than reflecting simply a generalised decline in risk appetite or even a shock emanating from developed financial markets.<sup>(6)</sup>

Chart 9 Comparison of market corrections<sup>(a)</sup> in EME, US and UK asset prices



Sources: Bloomberg, JPMorgan Chase & Co. and Bank calculations.

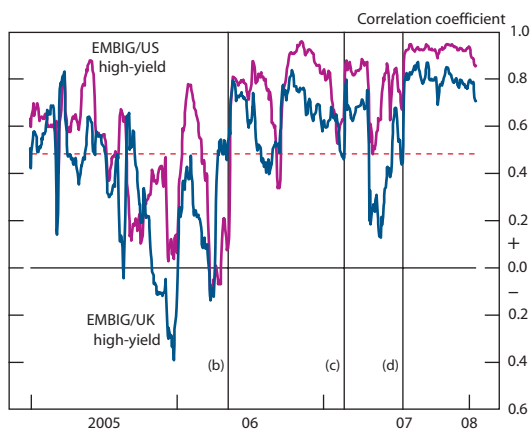
- (a) Changes in asset prices are calculated from the trough to the peak in risk aversion (as proxied by the VIX) in each episode of market turbulence.  
 (b) Spread on dollar-denominated EME sovereign bonds.  
 (c) Yield on local currency-denominated EME sovereign bonds.

Despite these relatively small corrections, however, there was a large jump in the correlation between average EME and US and UK bond and equity prices in these two periods and also during the smaller market turbulence in February–March 2007.<sup>(7)</sup> In fact, correlations in the bond market between the EMBIG and US high-yield spreads rose from levels already well

- (1) It is worth noting, however, that despite the losses from the current sub-prime market turmoil, foreign bank lending to EMEs remained strong in the second half of 2007.  
 (2) There was also a sharp appreciation of the yen and Swiss franc, as now, the main (carry trade) currencies used to borrow in order to invest in emerging market currencies.  
 (3) See Bomfim and Nelson (1999).  
 (4) See the October 2007 *Financial Stability Report*, for a detailed discussion of the recent turmoil in developed financial markets.  
 (5) In fact, because of the fall in US government bond yields, which are used as the reference price for EME spreads, EME sovereign bond yields have remained little changed over the period.  
 (6) Note though there was limited contagion also across (other) EMEs following the default of Argentina in January 2002. This crisis, however, was a slow burn and seen clearly by financial markets as a country-specific problem.  
 (7) There was also a large jump in the average correlation of bond and equity prices across EMEs in these two periods.

above their historical average (Chart 10) and to levels even higher than witnessed in the wake of the Russian/LTCM crisis (measured in the same way the bilateral correlation coefficient reached 0.85 during that crisis). Therefore, although the impact of these recent bouts of market turmoil on EMEs has been relatively modest, EME sovereign bond spreads have nonetheless moved in the same direction as risky bond spreads in mature markets suggesting that any diversification benefits to foreigners investing in EME assets may have fallen during these periods.

**Chart 10** Correlations between weekly changes in the EMBIG and US and UK high-yield spreads<sup>(a)</sup>



Sources: Bloomberg, JPMorgan Chase & Co. and Bank calculations.

- (a) Correlations are estimated over a 40-day rolling window. The red line represents the average correlation between EMBIG and the US high-yield spreads over the past ten years (January 1998 to December 2007).  
 (b) Start of May-June 2006 episode.  
 (c) Start of February-March 2007 episode.  
 (d) Start of sub-prime episode (mid-July 2007).

Although the correlations between EME and mature market asset prices suggest a strong degree of comovement in times of financial market stress, they do not provide evidence on the direction of causation. For example, this comovement may reflect the impact of shocks from EMEs to mature markets, those from mature markets to EMEs or a common shock to both markets.

Recent Bank research assesses the relationship between mature and EME bond spreads over the past decade through explicitly taking account of the source of the shock.<sup>(1)</sup> It finds that shocks to EME asset prices affect mature markets as well as the other way around. It also suggests that shocks that emanate from risky developed country debt markets, such as the recent sub-prime problem, should have much less than a one-for-one impact on EME bond spreads. That said, the rise in EME bond spreads since the summer of 2007 has been around 25 basis points less than the model prediction. This is despite the fact that the flight from risky to safe mature assets (reflected in the fall in government bond yields) has been bigger than expected. This undershooting in EME sovereign spreads may reflect improvements in EME fundamentals during the estimation period which have reduced their

vulnerability to shocks in risky mature asset markets and, in turn, the perceived riskiness of EME sovereign bonds. (For more details see the Annex.)

## Conclusions

Capital inflows into EMEs, particularly to the private sector, have risen markedly in recent years and in 2007 were higher than prior to the East Asian and Russian crises in the second half of the 1990s. This should bring benefits to growth over the longer run but, as has been seen in previous EME crises, also has the potential to reverse quickly causing losses to both EMEs and foreign investors.

There are a number of reasons why a generalised reversal in capital inflows is less likely than in the past. To a large extent, the increase in inflows and rise in EME asset prices over the past five years seems to reflect stronger EME fundamentals. This is reflected in EMEs now being able to attract more FDI and to issue government debt in local currency and at longer maturities. It also helps explain why EME asset prices have been less affected by the current turmoil in developed financial markets than might have been expected based on previous financial crises, and that investors have discriminated between EMEs according to their perceived credit risk. And, unlike ahead of previous EME capital reversals, EMEs are currently, in aggregate, net lenders to the rest of the world. A combination of high domestic savings, particularly in Asian economies and the oil-exporting countries, and strong capital inflows, have led to a large accumulation of foreign assets by EME central banks and governments.

But some countries, especially in Central and Eastern Europe, have attracted large foreign-currency debt inflows into their private sectors, including into lower credit-rated borrowers, to finance very large current account deficits associated with strong growth in domestic demand. If the recent fall in global risk appetite persists or world GDP growth slows it could result in a reduction in international investors' demand for these EME assets.

How would an EME shock affect global and UK financial stability? It is not possible, of course, to be sure. Most foreign investors, at least at the country level, do not have a high concentration of exposures in any one emerging market country or region. This does not preclude the possibility that some individual banks or other large financial institutions have concentrated exposures. It also ignores any indirect impact working through financial markets. Econometric evidence reported here suggests that shocks to EME asset markets can affect mature markets as well as the other way round. This is especially likely to be the case against the background of fragile global financial markets.

(1) Felices *et al* (2008 forthcoming).



## Annex

### Relationship between EME and developed asset prices — a vector autoregressive (VAR) model approach

Assessing the causal relationship between asset prices in EMEs and developed countries requires a separate identification of whether a shock originates in an EME, a mature market or is a common shock that affects both markets.

In a series of papers Rigobon (2003) and Rigobon *et al* (2004 and 2005) and Caporale *et al* (2005) use a structural VAR model to assess the relationship between asset markets (such as equities and short-term interest rates) in developed economies. They identify a shock as a period when the volatility in the particular asset price exceeds a certain threshold and is unique to that market.

Felices *et al* (2008 forthcoming) carry out a similar approach and look at the interaction between changes in EME sovereign bond spreads (EMBIG), high-yield corporate bond spreads (USHY) and three-month (US3M) and ten-year (US10Y) interest rates in the United States. The analysis concentrates on US bond markets since they are the biggest and most liquid in the world and are used as the benchmark for EME bond spreads. But using UK data instead gives qualitatively similar results.

The model is estimated using daily changes in the variables from January 1997–April 2007. The threshold used to identify the regimes of high volatility is when the variance of the residual from the particular equation is one standard deviation above its mean.<sup>(1)</sup> The periods of shocks identified in this way for the EMBIG capture all the known EME sovereign crises over the past decade (such as in Argentina, Brazil, Russia and Turkey).

As usual there are caveats to such empirical analysis. Although the technique uses a quantifiable threshold to identify the various shocks to each variable, it does not tell us what caused the shock and this, in practice, may vary from period to period. Also the coefficients in the model are averages over the whole sample period and so it assumes that the sensitivity to a given size of shock is the same in a crisis and a tranquil period.

Bearing these caveats in mind, **Table A1** shows the contemporaneous effects, ie on the same day, of a one unit shock ( $\mu$ ) to each of the variables after allowing for feedback effects. For example, a one unit shock to EME bond spreads ( $\mu$ EMBIG) — say as a result of a currency crisis — usually leads to a flight away from risky to safe assets (ie a ‘flight to quality’). This is reflected in the negative association (-0.11) with US ten-year bond yields in the last column of the table.

Another well-known stylised fact supported by these results is that periods of adverse shocks to EME bond spreads lead to a

contemporaneous increase in US high-yield debt spreads, estimated at close to one tenth the size (0.10). However, shocks in the opposite direction from US high-yield spreads onto EME spreads tend to be about twice as large (0.17).

**Table A1** Results from the structural VAR model

Overall contemporaneous feedback effects				
From shock $\mu$ ...	$\mu$ US3M	$\mu$ US10Y	$\mu$ USHY	$\mu$ EMBIG
...to				
US3M	1.01	0.23	-0.05	-0.07
US10Y	0.04	1.06	-0.09	-0.11
USHY	-0.05	-0.57	1.06	0.10
EMBIG	0.01	-0.11	0.17	1.02

Source: Application of model in Felices *et al* (2008 forthcoming). Bold coefficients are statistically significant at the 95% level.

This model allows ‘what if?’ simulation exercises to be carried out. **Table A2** shows the maximum estimated impact on each variable derived from the model if different types of exogenous shocks are applied in mid-2007, just prior to the start of the sub-prime episode. This starting point allows us to assess the model-predicted impact on the different variables if past large shocks were repeated and also to compare the model-predicted impact of the sub-prime shock with the actual level of bond yields or spreads. The simulations here also include the impact of the common shock to risk appetite proxied by the change in the VIX at the time. A large EME shock, of the magnitude of the (unanticipated) Russian/LTCM crisis, would at its peak lead to an estimated 280 basis points widening in US high-yield spreads and a 135 basis points fall in US long yields. However, a more confined EME shock, such as

**Table A2** Impact of a repeat of previous adverse financial market shocks on interest rates and spreads (mid-2007)

	Level of variables on 17 July 2007 <sup>(b)</sup> (basis points)	Model-predicted impact of shocks (basis points) <sup>(a)</sup>				Memo: Actual change during the sub-prime shock period (basis points) <sup>(c)</sup>
		Russia/LTCM (1998)	Argentina (2001)	May–June correction (2006)	Sub-prime (2007)	
US3M	505	-75	-29	-17	-55	-269
US10Y	496	-136	-45	-23	-58	-161
USHY	305	278	93	47	389	434
EMBIG	175	992	228	64	154	128
Memo: Size of shock		$\mu$ EMBIG = 729 basis points VIX = 85%	$\mu$ EMBIG = 151 basis points VIX = 76%	VIX = 105%	$\mu$ USHY = 285 basis points VIX = 99%	

Source: Application of model in Felices *et al* (2008 forthcoming).

(a) Change in spreads/yields from the 17 July 2007 to the maximum impact predicted by the model.

(b) The starting date of the current turmoil in developed financial markets.

(c) From 17 July 2007 to 22 January 2008.

(1) Alternative thresholds used to identify the shocks produce similar results.

the largely anticipated Argentine crisis at end-2001, would have an estimated impact on US asset markets of about one third of this size.

Interestingly, the model predicts that the size of shock to US risky credit markets witnessed during the market turmoil since mid-2007 should have resulted in a widening of EMBIG spreads of about 155 basis points — around 25 basis points more than the actual increase.<sup>(1)</sup> This undershooting in EME sovereign spreads may reflect the impact of the improvements

in EME fundamentals during the estimation period in reducing their vulnerability to shocks in risky mature asset markets. The model also underestimates substantially the impact of the recent market turmoil in reducing interest rates on safe US assets, especially of shorter maturities. This probably reflects both the fact that the recent turmoil was a liquidity problem and not just a solvency one, as well as the sharp reduction in policy rates by the Federal Reserve over the period.

---

(1) The sub-prime turmoil is proxied by the estimated shock to US high-yield spreads from July 2007 through to January 2008 combined with the common rise in risk aversion at the time (proxied by the actual rise in the VIX).

## References

- Bank of England (2006)**, 'Markets and operations', *Bank of England Quarterly Bulletin*, Spring, pages 14–15.
- Bank of England (2007)**, *Financial Stability Report*, October.
- Bank for International Settlements (2007)**, 'Financial stability and local currency bond markets', *CGFS report no. 28*, June.
- Berg, A, Borensztein, E and Pattillo, C (2005)**, 'Assessing early warning systems: how have they worked in practice?', *IMF Staff Paper*, Vol. 52, No. 3.
- Bomfim, A and Nelson, W (1999)**, 'Profits and balance sheet developments at US commercial banks in 1998', *Federal Reserve Bulletin*, Vol. 85, June, pages 369–95.
- Caporale, G, Cipollini, A and Demetriades, P (2005)**, 'Monetary policy and the exchange rate during the Asian crisis: identification through heteroskedasticity', *Journal of International Money and Finance*, Vol. 24, pages 39–53.
- Classens, S and Forbes, S (eds) (2001)**, *International financial contagion*, Kluwer Academia Publishers.
- De Alessi Gracio, C, Hoggarth, G and Yang, J (2005)**, 'Capital flows to emerging markets: recent trends and potential financial stability implications', Bank of England *Financial Stability Review*, December, pages 94–102.
- Felices, G, Grisse, C and Yang, J (2008)**, 'International financial transmission: emerging and mature markets', *Bank of England Working Paper*, forthcoming.
- Frankel, J and Wei, S-J (2005)**, 'Managing macroeconomic crises: policy lessons', in Aizenman, J and Pinto, B (eds), *Managing economic volatility and crisis: a practitioner's guide*.
- Hartelius, K, Kashiwase, K and Kodres, L (2008)**, 'Emerging market spread compression: is it real or is it liquidity?', *IMF Working Paper no. 10*.
- International Monetary Fund (2004)**, 'Are credit booms in emerging markets a concern?', *World Economic Outlook*, April, pages 147–66.
- International Monetary Fund (2007a)**, *Co-ordinated Portfolio Investment Survey (CPIS)*.
- International Monetary Fund (2007b)**, *Global Financial Stability Report*, Chapter III, 'Quality of domestic financial markets and capital inflows', October.
- International Monetary Fund (2007c)**, *Global Financial Stability Report*, Spring.
- Kose, M A, Prasad, E, Rogoff, K and Wei, S-J (2006)**, 'Financial globalisation: a reappraisal', *IMF Working Paper no. 189*.
- Kose, M A, Prasad, E and Terrones, M (2007)**, 'How does financial globalisation affect risk sharing? Patterns and channels', *IMF Working Paper no. 238*.
- Kubelec, C, Orskaug, B and Tanaka, M (2007)**, 'Financial globalisation, external balance sheets and economic adjustment', *Bank of England Quarterly Bulletin*, Vol. 47, No. 2, pages 244–57.
- Lane, P R and Milesi-Ferretti, G M (2007)**, 'The external wealth of nations mark II: revised and extended estimates of foreign assets and liabilities, 1970–2004', *Journal of International Economics*, Vol. 73, pages 223–50.
- Remolona, E, Scatigna, M and Wu, E (2007)**, 'Interpreting sovereign spreads', *BIS Quarterly Review*, March.
- Rigobon, R (2003)**, 'Identification through heteroskedasticity', *The Review of Economics and Statistics*, Vol. 85, pages 777–92.
- Rigobon, R, Ehrmann, M and Fratzscher, M (2005)**, 'Stocks, bonds, money markets and exchange rates: measuring international financial transmission', *ECB Working Paper no. 452*.
- Rigobon, R and Sack, B (2004)**, 'The impact of monetary policy on asset prices', *Journal of Monetary Economics*, Vol. 51, pages 1,553–75.
- Wei, S-J (2006)**, 'Connecting two views on financial globalisation: can we make further progress?', *Journal of the Japanese and International Economies*, Vol. 20(4), pages 459–81.