

# Weathering financial crisis: domestic bond markets in EMEs

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## Abstract

Currency mismatches in the major EMEs have been much reduced over the past decade. The development of deeper domestic bond markets has contributed greatly to this. Stresses in international markets after the failure of Lehman severely tested these new markets. There was a flight of foreign investors largely because of the limited international “collateral capacity” of this new asset class. But those markets with a substantial domestic investor base withstood this intense pressure well. The wider development of exchange-traded interest rate derivative contracts in EME currencies would be helpful.

JEL classification: E43, E44, E58, G12

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## 1. Introduction

The question of the resilience of domestic debt markets in emerging market economies (EMEs) to financial crises of the advanced economies remains very topical. It was much debated during 2009 when EME debt markets were shaken by the Lehman débâcle.<sup>1</sup> EME debt markets quickly recovered, however, and developments during the past two years have confirmed the resilience of these markets – despite all the turbulence generated by the euro area bond markets crisis.

This suggests that the 2007–20xx – which still drags on – financial crisis showed how far local currency bond markets could immunise emerging markets from international financial crises. The argument for this optimistic view (the pessimistic case will be considered below) goes like this. One of the great reforms in developing Asia and Latin America during the past decade has been the diminished reliance on foreign currency and increased borrowing by governments in local currency and at long maturities. The development of local bond markets has in many ways been the foundation stone of this progress.

As a BIS report a few years ago argued, balance sheet weaknesses due to currency mismatches had played a key role in virtually every major financial crisis affecting EMEs

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<sup>1</sup> These developments in the year post-Lehman were reviewed in Turner (2009). This paper brings Turner (2009) up-to-date.

since the early 1980s (CGFS, 2007). A heavy dependence on foreign currency debt made it impossible to use macroeconomic policies as countercyclical tools. As government interest payments on foreign currency debt rose when the exchange rate fell, governments were forced to raise taxes (or cut other spending) in the face of recession. And monetary policy had to focus not on stabilising the domestic economy but on propping up the exchange rate.

Matters were often made worse by the short duration of much foreign currency debt. Sharp increases in international interest rates, coming on top of currency depreciation, further increased debt servicing costs, worsening creditworthiness. Difficulties in rolling over maturing debt on sustainable terms were compounded. As many EMEs shared similar balance sheet vulnerabilities, crises could reach globally systemic dimensions.

The development of local currency bond markets would reduce such vulnerabilities by eliminating currency mismatches and lengthening the duration of debt. Such markets would also improve economic efficiency by generating market-determined interest rates that reflect the opportunity cost of funds at different maturities (see CGFS (2007) for a fuller development of these arguments). The shift in a decade from foreign currency debt to local currency debt in the emerging markets, especially in Latin America, has been impressive (Table 1).<sup>2</sup>

Table 1 **Currency denomination in bond markets by broad area**

	2000		2005		2010		2011 <sup>1</sup>	
	Local currency	Foreign currencies	Local currency	Foreign currencies	Local currency	Foreign currencies	Local currency	Foreign currencies
Euro area	90.0	10.0	89.9	10.1	89.8	10.2	90.3	9.7
Japan	98.5	1.5	99.1	0.9	99.4	0.6	99.4	0.6
Latin America	46.0	54.0	59.9	40.1	71.2	28.8	70.8	29.2
Emerging Asia	88.4	11.6	91.2	8.8	94.2	5.8	94.3	5.7

<sup>1</sup> End-September 2011.

Source: BIS.

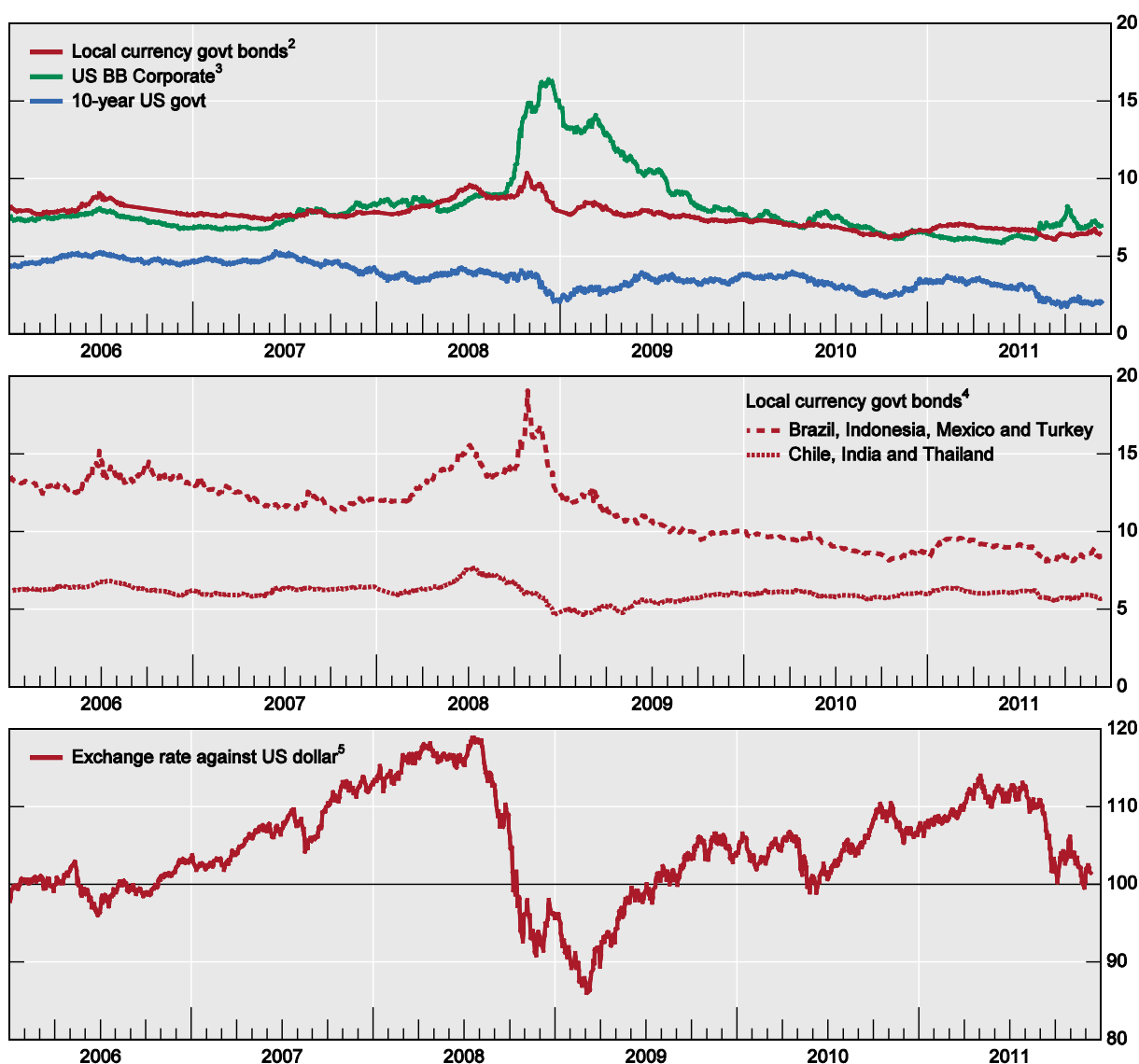
Because currency mismatches had been reduced, most Asian and Latin American economies did indeed prove to be resilient during the crisis. This was true even when faced with very steep drops in the exchange rate. Many countries now have foreign currency assets in excess of foreign currency liabilities. Brazil is an excellent example – currency depreciation now improves the country's net worth. Because of this, policymakers can be more relaxed about currency depreciations – and can use monetary policy to stabilise their economies when faced with a decline in world demand. And many countries did so in the aftermath of this crisis.

Conversely, those countries that had moved to the top of the currency mismatch list – that is, Hungary, Romania, Estonia, Latvia and Lithuania – were hard hit (on this, see Goldstein and Xie (2009), especially pp 25–30). The lack of domestic debt markets and an overdependence of foreign currency debt magnified their crisis, and they were forced to take deflationary measures as demand was falling.

<sup>2</sup> Likewise there has been an impressive lengthening in the duration of domestic government debt (Table A1 in the Annex), although there was some reversal in 2009.

This optimistic reading has much to recommend it. But there is a more pessimistic qualification. This is that, in the wake of the Lehman débâcle, many of these local currency bond markets collapsed. This had not at all been the expected consequence of a crisis that had originated in the major financial centres, not the EMEs. Not all EMEs were affected equally. But Brazil, Indonesia, Mexico, Russia and Turkey suffered badly (Graph 1). And yields might have risen even more had not governments taken the special measures outlined in Section 6 below. The developments in individual countries are shown in Graph A1 in the Annex. At the same time, a flight to quality and liquidity drove yields on US government bonds down to very low levels – so an enormous yield differential opened up.

Graph 1  
Bond yields<sup>1</sup> and dollar exchange rates

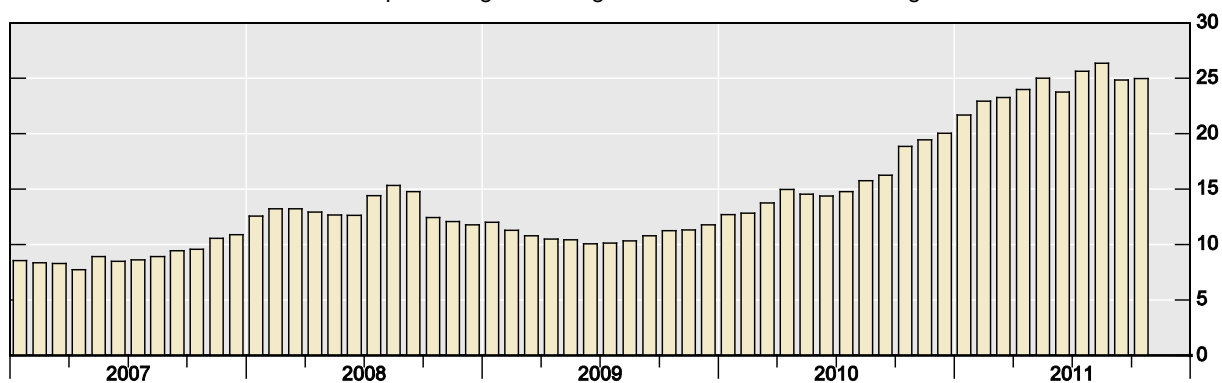


<sup>1</sup> Ten-year generic Bloomberg interest rates; for Brazil, three-year; for Chile and South Africa, nine-year; for Turkey, two-year. <sup>2</sup> Simple averages of Brazil, Chile, Colombia, the Czech Republic, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, South Africa, Thailand and Turkey. <sup>3</sup> Yields on BB-rated Merrill Lynch US corporate bonds. <sup>4</sup> Simple averages. <sup>5</sup> 2007 = 100; a rise indicates an appreciation. Simple averages of Brazil, Chile, Colombia, the Czech Republic, Hungary, India, Indonesia, Korea, Malaysia, Mexico, Peru, the Philippines, Poland, Russia, South Africa, Thailand and Turkey.

Sources: Bloomberg; Datastream.

The collapse had, as its proximate cause, the flight of foreign investors – who had, in calmer times, been credited with bringing liquidity to these nascent markets. In addition, the local subsidiaries of major foreign-owned international banks reduced their holdings of local government bonds and scaled back their market-making activity. Graph 2 illustrates the sharp fall in non-resident holdings in Mexican government bonds in 2008 Q4. But note that more than half of foreign holdings remained. And from mid-2009 foreign investors began to return: by late-2011, the share of bonds held by non-residents had risen above pre-crisis levels. Many other EMEs have reported a similar rise.

Graph 2  
**Foreign holdings of Mexican government bonds**  
 As a percentage of total government bonds outstanding



Source: Bank of Mexico.

The thread of the argument in this paper is as follows. Cross-country differences in the scale of the EM bond crisis in 2008 Q4 did not reflect differences in macroeconomic performance; but they were closely related to credit ratings which are crucial for foreign investors (Section 2). The past four years since 2007 have been mixed for foreign investors in EM bonds. But because growth-induced interest rate differentials tend to favour dynamic EMEs over the medium-term, foreign investors started to come back after the Lehman crisis (Section 3). The crisis nevertheless should prompt more careful thinking about the different dimensions of liquidity – the macroeconomic dimension is key even if the concept is very elusive. The “collateral capacity” of new assets is often not resilient to crises – and this matters for leveraged investors (Section 4). It is clear that the domestic investor base needs to be diversified away from banks and that forcing pension funds to put too high a proportion of their assets in local bonds is a mistake (Section 5). Strong balance sheets and (in most cases) credible policy frameworks enabled the authorities to take unorthodox and interventionist policies that worked well during the crisis (Section 6).

## 2. Local macroeconomic factors not the main cause

The scale and simultaneity of reversals across different markets after Lehman, and their subsequent bounceback, does suggest that the cause was probably not the underlying macroeconomics – which differ across countries and in any case normally change slowly.<sup>3</sup>

<sup>3</sup> Perhaps the collapse of international trade was the common macro shock – but should this drive bond yields up? In any case, bond prices recovered during 2009 while trade was still very depressed.

A comprehensive examination of the underlying macroeconomics is beyond the scope of this paper. But one simple exploration is to examine whether the cross-country pattern of the rise in bond yields during the crisis is related to any of the obvious macroeconomic factors: the rate of inflation; the current account; fiscal deficits; debt/GDP ratios; and the policy rate in real terms. None of these macroeconomic variables turned out to be significant either in levels or in term of changes from 2007.<sup>4</sup> Therefore the sharp drop in bond prices does not appear to be due to poor domestic macroeconomic performance.

But what was highly significant was the country's sovereign credit rating on *foreign currency debt* (see the first equation below): countries with a credit rating of A or better (Chile, Czech Republic and Korea) were hardly affected. On average, countries in the BBB– to BB range faced a rise of between 200 and 350 basis points during October 2008, which was the most acute phase of this crisis. This finding is puzzling. The risk of default of local currency government debt is not the same as that of foreign currency debt (on which the ratings are based). This could suggest that the decisions of foreign institutional investors – for whom ratings may matter – played a strong role. In the months that followed, however, these spreads fell back. The resulting cross-country pattern of changes in yields in the second quarter of 2009 (when the heaviest pressures had subsided) shows no relation to the countries' ratings (see the second equation shown below).

$$\text{CHYIELD}_{\text{Oct08}} = -3.27 + 0.54(\text{RATING}); R^2 = 0.58$$

(4.5)

$$\text{CHYIELD}_{\text{Q209}} = 1.79 - 0.17(\text{RATING}); R^2 = 0.03$$

(0.7)

where:

CHYIELD = Change in bond yields from 2008 Q1 (ie pre-crisis) to the dates shown in the subscripts (ie October 2008 and 2009 Q2);

RATING = S&P's long-term foreign currency debt rating;

t-Statistics shown in parentheses; and the number of observations is 17.

The conclusion of the comparative unimportance of the usual macroeconomic indicators also echoes Braasch's (2009) analysis that it was various financial market channels, not the usual elements of macroeconomic vulnerability, that explain why the financial crisis in the major financial centres had such a disproportionate effect on some local bond markets in the EMEs. The next two sections therefore look at the role of foreign investors more closely.

### 3. Attractions of EM bonds for foreign investors receive a knock?

Before analysing this particular event, it is useful to examine some history of intellectual fashions with respect to EMEs' ability to borrow in their own currencies and the feasibility of local bond markets. A view that became fashionable in the 1990s was that emerging markets borrowers were indelibly tainted by "original sin". The idea was that it was impossible for developing countries to borrow abroad in their own currencies. This made currency mismatches almost endemic.

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<sup>4</sup> The rate of inflation had the correct sign but fell below the significance level.

This view was increasingly challenged during the 2000s. During this decade, both international bonds issued in EME currencies<sup>5</sup> and bonds issued domestically rose substantially. Careful analysis of investment in local currency bonds by global investors clearly demonstrated that such bonds were, contrary to “original sin” theorists, actually extremely attractive for international investors. Their mean return was high, the variance of returns was comparatively low, and the low limited covariance of such returns with other bond classes in a global portfolio made them attractive for diversification purposes.<sup>6</sup>

Table 2 – which is updated from CGFS (2007) – summarises what had become the consensus by the mid-2000s: see the results shown under January 2002 to December 2006. *The average annual return* of an unhedged portfolio modelled on JPMorgan Chase’s Government Bond Index of emerging market bonds (GBI EM) was 17.2% in dollar terms. Hedging the exchange rate risk, however, would have produced a much lower average return – only 6.2%. This unhedged return is still higher than a global government bond benchmark of developed countries (GBI Global).

Table 2 **Risk return characteristics and diversification benefit versus other fixed income assets**

	Annual return	Annual volatility	Sharpe ratio <sup>1</sup>	Correlation vs GBI G <sup>2, 3</sup>	Correlation vs US HY <sup>2, 4</sup>	Correlation vs EMBI+ <sup>2, 5</sup>
<b>January 2002 to December 2006</b>						
GBI EM	17.2	8.8	1.75	0.23	0.18	0.33
Hedged into USD	6.2	2.4	1.87	0.28	0.17	0.33
GBI Global, unhedged	8.3	7.2	0.90	0.65	0.05	0.23
<b>January 2007 to October 2009</b>						
GBI EM	9.6	14.3	0.56	-0.33	0.45	0.67
Hedged into USD	4.5	3.3	0.84	-0.15	0.39	0.67
GBI Global, unhedged	9.4	8.1	0.95	0.62	-0.10	-0.02

<sup>1</sup> Ratio of the daily excess returns of the index to the risk free return in US dollars and the index return volatility. <sup>2</sup> Using daily percentage changes. <sup>3</sup> Total return correlation versus global government benchmark of developed countries hedged into US dollars. <sup>4</sup> Total return correlation versus US high-yield benchmark. <sup>5</sup> EMBI+ comprises US dollar-denominated bonds and traded loans issued by sovereign entities rated BBB+ or lower.

Sources: JPMorgan Chase; Barclays Capital; BIS calculations

The size of this hedged/unhedged difference shows that exchange rate movements have played a crucial role. The interest rate parity condition has been violated – that is, the rate of

<sup>5</sup> International bonds outstanding in EME currencies (not counting the Hong Kong and Singapore dollars) rose from about \$20 billion at the end of 2000 to over \$300 billion by end-September 2011.

<sup>6</sup> Note, however, that return distributions are typically both skewed and have “fat tails”, which cannot be identified simply by the mean and variance of returns. Hence a “rare event” shock – and the 2008 shock was that – could well overturn this comfortable conclusion.

nominal depreciation of EM currencies proved to be less than the initial interest rate differential vis-à-vis US dollar rates. This may be partly because of the risk premium earned from holding a currency with a long history of volatility (ie greater than the actual volatility observed over the period used to calculate the Sharpe ratio). Or it could be a “peso problem” effect – investors are deterred by the risk of very costly tail events that do not materialise in the sample period.

This finding of a persistent positive return to speculation in emerging market currencies and local bonds has been supported in many studies.<sup>7</sup> It may itself have policy implications. Mohan and Kapur (2009) argue that the interest rate differentials in favour of dynamic EMEs over the industrial world reflect more rapid growth in developing countries. Because such growth differentials are likely to persist, the interest rate differential is likely to continue for decades. In order to avoid excessive appreciation, they argue, foreign investments in local currency government bonds should be subject to ceilings to avoid excessive arbitrage-led flows. Several major EMEs (eg China and India) do indeed maintain such restrictions. Others in effect force local financial institutions to buy all government issuances – so that genuine market prices do not develop and there is no arbitrage with international markets. This perspective raises important if controversial issues related to monetary independence but not directly relevant to this paper.

A second important dimension is the *variance of the returns*. The volatility of EM bonds is significantly higher than that of portfolios of bonds of the major industrial countries. Nevertheless, calculations show that the Sharpe ratio – the mean return divided by the standard deviation – of portfolios of emerging market bonds has in recent years been well above that for classical dollar, euro and yen government benchmarks – which are generally well below 0.5.

How did the crisis affect these calculations? To see this, an identical exercise was carried out for the period January 2007 to October 2009 (Table 2). The returns from investing in EME bonds (9.6% a year) and industrial country bonds (9.4% a year) are almost identical. Investing in industrial country bonds would have yielded a better Sharpe ratio thanks to their lower volatility than EM local bonds. Of course, the very good performance of EM local bonds from February to October 2009 influenced this result. But the general conclusion still stands: over a two- to three-year period that includes both the crisis and some subsequent recovery, foreign investors in these bonds did not do badly.<sup>8</sup> Extending this risk-return analysis to October 2011, which is not shown here, reduces the unhedged return on industrial country bonds below that on EME bonds but the Sharpe ratio is still higher.

Graph 3 charts measures of volatility over time. There are two points to note:

- (a) It is true that the spike in volatility in EM local bonds was much more brutal in late 2008 than for industrial country bonds; but
- (b) This was mainly because of the rise in exchange rate volatility. A portfolio of local bonds hedged into dollars proved to be much less volatile than the EMBI+ portfolio of dollar bonds. In this sense, international bonds were harder hit than local bonds.

The rise in EME exchange rate volatility since early 2011 – fallout from the euro crisis – has again made returns more volatile. Again, an exchange rate-hedged portfolio was more stable.

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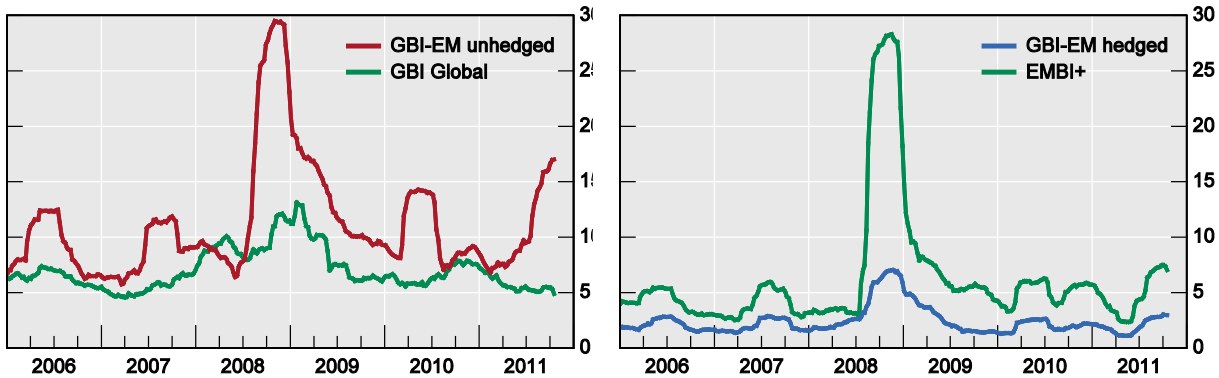
<sup>7</sup> For instance, Burnside et al (2009) find that including emerging market currencies in carry trade strategies substantially increases the Sharpe ratio of such strategies.

<sup>8</sup> Note, however, that the correlation with the EMBI+ (ie US dollar-denominated bonds) did rise sharply – so EM local bonds became less attractive as diversification.

Graph 3

**Comparisons of volatility of returns<sup>1</sup>**

In US dollar terms; weekly averages



Note: GBI = Government bond index.

<sup>1</sup> Standard deviation of daily percentage changes over a centred 90-day moving window, annualised.

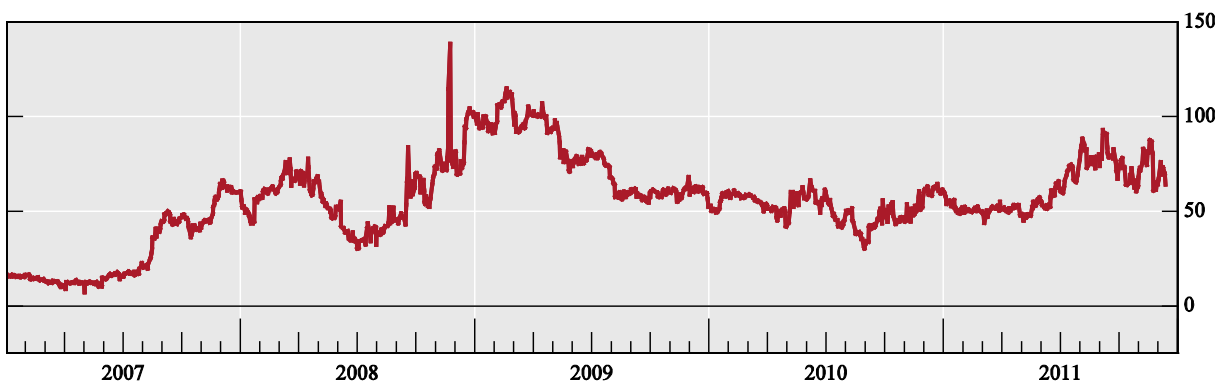
Source: JPMorgan Chase.

**4. Liquidity and the flight of foreign investors**

The flight of investors from even high-credit quality markets that were illiquid has been well documented in the major financial centres. One excellent German example is the spread that arose between German government bonds and yields on bonds issued by KfW. Because this bank is owned by the German government and its debt enjoys a government guarantee, there is no additional credit risk – but KfW bonds are less liquid and a sizable liquidity premium arose during the crisis (Graph 4). During the months around the Lehman crisis, this liquidity premium hovered around 100 basis points. It fell subsequently but never returned to its pre-2007 spread of 10–15 basis points. It has again risen significantly during the euro crisis.

Graph 4

**The KfW spread over German government bonds<sup>1</sup>**



<sup>1</sup> Ten-year zero-coupon spread between yields on bonds issued by KfW (a bank owned by the Federal Republic of Germany and the federal states and whose debt is guaranteed by the Federal Republic of Germany) and German government bonds; in basis points.

Sources: Bloomberg; BIS calculations.

The influence of foreign investors on the liquidity of EM local currency bond markets deserves a closer look. Before the crisis, a common observation was that it was foreign

rather than domestic investors who made many of these markets liquid. They traded frequently and often in sizeable lots – their arbitrage operations between different bond vintages were seen as enhancing liquidity. During the crisis it was their actions that led to the evaporation of liquidity in many markets. Why this apparently dominant influence?

To answer this, it is necessary to analyse carefully what exactly is meant by “liquidity”. This is not easy as this word is used in many different ways. A first observation is the characteristics of “liquid” assets encompass both microeconomic and macroeconomic dimensions. The microeconomic dimension has been most explored empirically – usually covering depth, tightness and resilience.<sup>9</sup> Several microeconomic indicators suggest that EM local currency bonds are not yet regarded as liquid enough for regular inclusion in the portfolios of international investors.

- Bid-ask spreads tend to be wide. We discovered during the crisis that they are also highly dependent on the willingness of the big market-makers to assume the warehousing risk of two-way quotes. Under intense pressure from the financial crisis, the major banks widened their bid-ask spreads for trading local currency bonds.
- A second aspect is the limited scale of arbitrage activity. The correlation of month-to-month yields on the bonds of most EMEs with the international benchmark (US Treasury) is still much lower than that for bonds of any large industrial country (including countries facing quite diverse macroeconomic shocks – such as Australia, the euro area and the United Kingdom).
- A third aspect is the ease of hedging. As Saxena and Villar (2008) have noted, trading of interest rate risk in many EM currencies is still very thin. The BIS’s Triennial Central Bank Survey, for instance, finds that the development of interest rate derivatives in EMEs has lagged well behind the development of forex derivatives in EMEs (see Mihaljek and Packer (2010)). In recent years, however, the volume of OTC derivatives has increased sharply in Korea and South Africa (Table 3).
- A fourth aspect is fragmentation. National differences in bond market practices (taxation, infrastructure, regulation, etc) can deter international investors. As noted by several speakers in this seminar, the Asian Bond Fund 2 seeks to reduce impediments to broad non-resident investment in Asia’s bond markets (Chan et al (2012) in this volume).

The macroeconomic dimensions are much harder to define empirically. The basic idea is that an asset is more liquid when it keeps its value in those circumstances when its holder wants to liquidate it for cash (Tirole (2008)). Liquidity thus defined depends *both* on the nature of the macroeconomic shock prompting the need to sell assets *and* on the identity of the asset holder. Taking the example of a corporation that needs to sell its financial assets in a recession, Tirole (2008) argues that a US Treasury security, which typically does not fall in

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<sup>9</sup> The elements of microeconomic liquidity are usually defined as follows:

Depth: the market’s ability to absorb large transaction volumes with small changes in price (measured by average turnover)

Tightness: cost efficiency (measured by low bid-ask spreads and by the differential between on-the-run and off-the-run bid-ask spreads)

Resilience: ability to absorb random shocks (day-to-day price volatility)

The Asian Bonds Online website of the Asian Development Bank monitors bond market liquidity in Asia in an authoritative way (see, for example, ADB (2011)).

value in a recession, is in this macroeconomic sense more liquid than an equity index, which tends to fall in a recession – exactly when a firm or a household has greater need of liquidity.

Table 3 **OTC single currency interest rate derivatives turnover<sup>1</sup>**

Daily averages, notional amounts in billions of US dollars

Currencies	April 2001	April 2004	April 2007	April 2010
<b>Asia</b>				
Indian rupee	0.0	0.4	3.1	1.5
South Korean won	0.0	0.4	4.1	9.8
New Taiwan dollar	0.0	0.4	1.1	0.8
Malaysian ringgit	0.0	0.0	0.1	0.7
<b>Latin America</b>				
Brazil real	0.2	0.8	0.1	1.0
Mexican peso	0.4	1.2	2.8	1.3
<b>Other</b>				
Czech koruna	0.1	0.3	0.6	0.2
Hungarian forint	0.0	0.2	0.8	0.2
Polish zloty	0.4	0.8	2.1	1.5
South African rand	0.5	1.8	4.0	5.8
Turkish lira	...	...	0.1	0.0

<sup>1</sup> Local turnover. Net of local inter-dealer double-counting. Including forward rate agreements, interest rate swaps, interest rate options and other interest rate products.

Sources: BIS Triennial Central Bank Survey on Foreign Exchange and Derivatives Market Activity (for 2001 to 2007) and Table 2 of Interest rate market turnover activity in 2010.

This macroeconomic dimension has several implications. One is that different economic agents will be subject to quite different economic shocks. This will mean that various agents face different “needs” to sell their assets: the scale and the timing of sales will in general vary across agents.<sup>10</sup> So one simple explanation of the sharp reaction of foreign investors is that financial firms in the major financial centres were hardest hit by the extreme rise in risk aversion. Wholesale markets that had been very liquid before the crisis just dried up. Deepening uncertainties about counterparty risks in the interbank markets in the major financial centres (because the value of their exposures to subprime debt, CDOs, etc was unknown) led to an evaporation in liquidity in the (large) interbank cash markets. This forced banks to attempt to raise liquidity (or curb lending) in FX swap markets – which, faced with these large demands, became dysfunctional. This forced the liquidation of portfolios of EME assets.<sup>11</sup>

<sup>10</sup> This is why a diversified investor base makes financial markets more liquid. Indeed an ADB survey of market-makers found that developing a more diversified investor base was the single most needed element in improving liquidity in Asian local bond markets (See page 52 of CGFS (2007)).

<sup>11</sup> See Baba et al (2008) for an explanation of this mechanism.

Another implication is that the impact of a macroeconomic shock depends on the investor's balance sheet as a whole. The distinction between non-leveraged and leveraged investors is key. How leveraged investors respond to a macroeconomic shock depends not only on the nature of their assets, but also on the impact of the shock on their liabilities. Mismatches on the balance sheet of a leveraged investor (eg long-dated assets financed by short-term debt) can magnify the impact of a macroeconomic shock on its net worth and thus on its creditworthiness.

An additional link arises because leveraged investors will post their assets as collateral for funding. In some cases, leveraged investors will be reliant on short-term financing from banks that will not be easily rolled over in adverse circumstances. For all these reasons, an adverse shock (or even the imminent prospect of such a shock) can force leveraged investors to rapidly deleverage and liquidate their positions. As this happens, assets widely regarded as liquid by the standard microeconomic measures can suddenly become illiquid.

An influential paper by Fostel and Geanakoplos (2008) on the pricing of new asset classes has shown just how important is the impact of collateral. The "collateral capacity" of an asset depends on expectations about the distribution of future asset prices. As the volatility of an asset's price rises (or is expected to increase), its value as collateral falls much more than its market price because lenders demand larger haircuts of more volatile assets. Leveraged investors will therefore become more inclined to buy assets which they can pledge as collateral with minimum "haircuts" (ie the discount applied to the asset's current market value) to their bankers – and may have to forego buying some assets regarded as underpriced (because their price has become too volatile).

During the crisis, there was indeed a dramatic narrowing in the quality of collateral international banks would accept – and this hit disproportionately hard new asset classes such as local currency bonds. I am not aware of evidence of whether local banks in emerging markets also demanded larger haircuts when their local bonds were pledged as collateral – presumably the ready acceptance by central banks of their own government's local currency bonds limited any ratcheting up of collateral requirements.

A more stable foreign investor base should develop over time. Several years ago, cross-border local currency investment in EMEs was dominated by leveraged investors such as hedge funds and the proprietary trading desks of major international banks. In the early 2000s, it was often asserted that the ability of hedge funds to use leverage and their capacity to manufacture exposures (even in markets hampered by extensive controls) through derivative structures meant that they were the major foreign players in local currency bond markets. By the mid-2000s, however, non-leveraged foreign investors were becoming more important. Dedicated emerging market bond funds grew. Foreign pension funds were increasing their investments in emerging markets, and this is being reflected in the mandates being given to fund managers. As benchmark global bond indices gradually incorporate EME local bonds into their indices, the interest of "index-aware" institutional investors in these markets is likely to increase. This broadening of the foreign investor base to take in more "real money" investors should in time improve macroeconomic liquidity in these markets.

Nevertheless, the crisis clearly showed that the foreign investor base has not yet reached the stage of providing reliable, *macroeconomic* liquidity after a massive shock. In some sense, foreign investors provide a great deal of liquidity in normal times; but there are reasons for thinking much of this can evaporate in a crisis. Because of that, policymakers need to pay special attention to the domestic investor base.

## 5. The domestic investor base and local markets for interest rate derivatives

Did the domestic investor base serve to stabilise bond markets? In principle, the flight of foreign investors and the fall in bond prices should have given domestic investors a golden opportunity to snap up bargains. This would have mitigated the price decline: the very sharpness of the price decline suggests that domestic players did not play this stabilising role very well – at least in the short run. What could have constrained them?

One factor might have been that large crisis-related losses on other parts of their portfolio limited their room to manoeuvre. In several countries, the crisis brought to light unsuspected forex exposures of local firms. There is some evidence that currency risk may have been shifted onto the domestic private sector in a non-transparent manner (it could also have been shifted to other foreigners of course). Conversely, foreign investors in local currency bonds tend to hedge their currency exposure (equity investors do not) and this may have added to the currency risk borne by the local private sector and financial system. If so, local investors as a group will end up holding short forex positions that could prove quite expensive in the event of market turbulence. Much more needs to be known about the net effects of such hedging strategies and about the role of banks in facilitating excess currency exposures.

### *Domestic investor base*

The following paragraphs consider how far the different classes of domestic investor could be expected to stabilise those markets. Broadly speaking, there are three classes of investor: local banks, pension funds and mutual funds.

#### *Local banks*

The first striking fact about the ownership of local currency bonds in the EMEs is that the share held by banks is much larger, and that of other financial institutions is much smaller, in the EMEs than in the industrial countries. Large holdings of long-term government bonds on the asset side of their balance sheet combined with shorter duration liabilities exposes them to sizeable interest rate risk exposures. In addition, the short duration of their borrowed funds exposed some banks to the risk that funding in money markets would become more difficult. In the years before the crisis, there was a trend decline in long-term interest rates on local currency bonds. This gave banks holding these bonds significant capital gains. When the advanced country crisis broke, however, banks in EMEs probably became more aware of the latent risks they faced. The combination of interest rate and liquidity risk exposures could have forced the domestic banks to attempt to simultaneously sell their holdings of local currency bonds, aggravating the loss of liquidity in bond markets. In order to forestall this, several countries relaxed regulations on the valuation of bond portfolios to ease the plight of banks (see Section 6). Because of this, the heavy concentration of government bond holdings on local banks may not be very conducive to macroeconomic liquidity.

#### *Pension funds*

Pension funds are usually not leveraged and do not have a large stock of short duration liabilities. Hence they are less likely to be induced to sell bonds in periods of a market stress. In this sense, they can provide more robust liquidity to the market. In most EMEs, however, local pension fund assets are still small (even if growing rapidly). Because pension funds need to hold long-dated paper in order to match annuity streams, they can be seen as quintessential providers of liquidity in the macroeconomic sense. So the continued expansion of pension funds in EMEs is probably important for the development of liquid long-term local currency debt markets.

It is, however, very short-sighted for the government to create an artificial institutional investor demand for local bonds by prohibiting pension funds in their jurisdiction from buying

foreign bonds. As Kotlikoff (1999) pointed out more than a decade ago, a high proportion of institutional investor assets held abroad (denominated in foreign currency) provides a buffer not only against local or regional shocks but also against sharp currency depreciation. The experience of Chile during this crisis illustrates this very well indeed. The international financial crisis and the sharp decline in the exchange rate led Chilean pension funds to repatriate some of their foreign assets and put the proceeds into Chilean bonds, driving down yields dramatically.

#### *Local mutual funds*

Mutual funds are also comparatively underdeveloped in EMEs. Mutual funds allow households, in effect, to hold local currency bonds in more liquid and easily tradable (“indirect” debt securities) units. Because mutual funds tend to trade their “primary” securities actively in response to changes in market conditions, they bring additional (microeconomic) liquidity to local currency bond markets. This can be particularly important in those markets that would otherwise be dominated by local buy-and-hold investors.

The main conclusion from all this is familiar – continued efforts are needed to deepen and to diversify the local investor base. The development of local interest rate derivatives markets is essential to help local investors manage risks.

#### **Markets for interest rate derivatives**

How did interest rate derivatives markets hold up in the crisis? It is worth recalling that one of the major rationales for nurturing local currency debt markets is to develop a yield curve as far out as possible to help banks and other investors hedge local currency interest rate risk.

As noted in Table 3 above, the volume of transactions in OTC interest rate derivatives in most EME currencies is rather limited. Before the financial crisis, a number of large countries – notably Brazil, Korea and Mexico – had fostered the development of some key exchange-traded derivative contracts. The development of standardised products traded on exchanges should help financial stability – the crisis clearly demonstrated the vulnerability of OTC products to the creditworthiness of key counterparties. Annual data on OTC interest rate derivatives in EME currencies are not available.<sup>12</sup> It was, however, widely reported that many OTC markets dried up but exchange-traded products proved more resilient. Table 4 shows that, although volumes were reduced as the crisis led to sharp reductions in risk positions, trading continued effectively on a number of exchanges. And exchange-traded interest rate futures in the Brazilian real and the Korean won have since risen strongly.

Mexico’s experience during the crisis, discussed in Banco de Mexico (2009), is of wider interest. The growth of a liquid government bond market in Mexico helped the development of key derivatives markets, which in turn helped the liquidity of cash markets (see CGFS (2007), pp 54–56). The volume of transactions and the size of open interest in the 10-year bond future contract rose sharply during the crisis. The failure of Lehman undermined confidence in counterparties in OTC markets, leading to a sharp contraction in transactions and made many hedging operations much more expensive.

The Banco de Mexico (2009) noted that “... *at that point, the standardised markets became a preferred refuge for investors. The availability of mechanisms like margins, daily valuation and clearinghouses with a rock-solid capital structure was tremendously helpful during the moments of most intense uncertainty. The clearinghouse [of the Mexican Derivatives Exchange maintained] a robust capital structure and even strengthened it, making intraday margin calls on 28 occasions during 2008*”.

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<sup>12</sup> The BIS’s semi-annual survey on OTC Derivatives Market activity covers only G10 countries.

One important lesson, therefore, is that more EMEs should consider the development of one (or only very few) exchange-traded interest rate derivative contracts, on long-term debt.

	2004	2007	2008	2009	2010	2011
<b>Short-term</b>						
Brazil	505.7	1,211.1	1,306.8	761.1	1,880.5	2,069.3
Korea	0.2	-	-	-	-	-
Mexico	91.2	93.5	48.1	23.5	7.4	18.9
<b>Long-term</b>						
Brazil	0.4	0.6	1.9	0.1	0.1	0.2
Korea	53.9	129.6	91.4	117.6	184.5	246.0
Mexico	1.8	2.4	7.6	4.0	4.3	4.8

Sources: FOW Tradedata; Futures Industry Association.

## 6. Policy responses in the crisis

The shock hitting local currency bond markets was, for many countries, systemic in its dimensions evoking, to quote Dornbusch, “a world of pure contagion, [where] innocent bystanders are caught up and trampled by events not of their making and when consequences go far beyond ordinary international shocks”.<sup>13</sup> This systemic dimension can justify an extraordinary policy response that is more interventionist than desirable in normal times.

Governments and central banks have a wide array of instruments and policies at their disposal to deal with a government bond market collapse. Ideally such emergency measures should aim to “block” those feedback effects that could destabilise the financial system. But they should not stabilise markets too much or for too long – otherwise they would impair the price discovery and capital allocation functions of asset markets. Balancing these two conflicting objectives is an old and difficult choice.

Measures adopted by EMEs over the past year or so include:

- (a) *Relaxing conditions for accepting bonds as collateral for loans.* The problem, identified above, is that their collateral value in a crisis is hit first by the decline in the market value of the bonds and secondly by the sharp increase in volatility which leads to larger “haircuts”. Such destabilising feedback effects can raise systemic issues that justify a public policy response.
- (b) *Ease mark-to-market rules on banks and other financial institution holding these bonds.* Several developing countries (eg Indonesia, Malaysia and the Philippines) followed this approach – especially after the IASB and the accounting rulemakers in the United States had relaxed mark-to-market rules for illiquid assets (see BIS (2010) and CGFS (2009)). The justification of such moves is that they can forestall distress selling which could destabilise the whole system (see Shim and von Peter (2007)).

<sup>13</sup> From Claessens and Forbes (2001).

- (c) *Change government debt issuance policies.* The medium-term strategic objective that government borrowing should largely take the form of long-dated, local currency issuance should not always determine short-term, tactical policy decisions. Mexico's response is a good illustration of this. This country successfully pursued for many years a strategy of financing its government debt in local currency and at lengthening maturities. But faced with the flight from long-term peso paper after the Lehman collapse, the government announced an increase in the share of borrowing in foreign currency. It also shortened the duration of its new debt issuance in order to meet the strong demand for short-dated government paper (Table 5). Nevertheless, the country continued to announce in advance an issuance calendar which included significant amounts of long-term debt. Markets at all durations remained open with regular quotations of benchmark interest rates for peso-denominated debt. By 2011 Q4, long-term issuance had returned to its pre-crisis level.
- (d) *Remove tail risk.* In a financial panic, fears of disaster often paralyse investors and lead to an unwarranted flight to liquidity/safety. In such circumstances, the selective public sector purchase of "bargains" bonds can help markets stabilise. The announcement that the authorities intend to follow such a policy may well provide reassurance to the market. In effect, it removes the tail risk fear of extreme price movements, and allows price movement within a "normal" range. This can have an impact on market prices even before transactions commence. As Mehrling (2009) has argued, the use by the government of options and derivative contracts can be the cheapest and most efficient way of taking out tail risk.<sup>14</sup>

Table 5 **Pre-announced quarterly issuance of Mexican government bonds**

In billions of Mexican pesos

	2008 Q3	2008 Q4	2009 Q4	2011 Q4
Short duration <sup>1</sup>	22.8	28.5	34.3	31.5
3 to 5 years <sup>2</sup>	7.8	7.8	10.0	10.5
10 to 30 years <sup>2</sup>	16.3	3.0	9.0	15.0
Index-linked <sup>3</sup>	1.5	1.0	1.4	1.6

<sup>1</sup> Cetes plus Bondes D 5y <sup>2</sup> Bonos <sup>3</sup> Udibonos 3 years to 30 years

Source: Mexican Public Debt Office

Such non-orthodox policies were credible in large part because earlier policy frameworks (on regulation, debt issuance, currency flexibility, etc) had made balance sheets less vulnerable to shocks in market prices. Markets remained confident that these exceptional measures would be reversed.

<sup>14</sup> Mexico's interest rate swap programme may have worked in part through this reassurance channel. The Bank of Mexico introduced an interest rate swap programme of 50 billion pesos. The facility allowed market participants to exchange their exposure to long-term fixed interest rates for short-term variable interest rates, thus reducing their interest rate sensitivity (Sidaoui et al (2010)). Because the first of these swap operations was conducted only on 14 November 2008, when the bond market had already begun to stabilise, not many intermediaries participated: only 4.4 billion Mexican pesos of nominal 10-year swaps were assigned.

## 7. Conclusion

The development of domestic bond markets promoting borrowing in local currency has been one of the great policy successes in the emerging markets during the past decade (Caruana (2009)). Currency mismatches have been reduced so that exchange rate depreciation no longer destabilises these economies. The longer maturity of government debt not only reduced refinancing and rollover risks but also helped to insulate fiscal positions from a sharp rise in market interest rates.

Did such markets provide a resilient source of finance when international financial markets froze in the wake of Lehman? The post-Lehman crisis was a stress test of altogether extreme dimensions. The fragility of these instruments was underestimated, and the crisis taught us a lot about the complexity of liquidity. International banks reduced their activities in many EM bond markets. The flight of foreign investors from some markets became almost a stampede. (In several countries, instability in bond and forex markets was aggravated by some large and unsuspected forex exposures of residents – in future better information is needed about this). This crisis showed that the foreign investor base has not yet reached the stage of providing liquidity that holds up well during a major financial crisis (“macroeconomic liquidity”). The reality in international financial markets is that the “collateral capacity” of any new asset class – such as emerging market debt paper – is hit hard during a crisis.

But these observations should not be overstated. The volatility in domestic bond returns (in local currency) after the Lehman failure was less than for comparable international bonds. Yields and volatility returned to pre-crisis levels in a matter of months. In general, then, these comparatively new local currency bond markets held up well against an altogether exceptional shock.

As for derivatives, it is noteworthy that it was the new exchange-traded interest rate derivative contracts – not comparable OTC products which were hit by counterparty worries – that proved their worth in helping market participants hedge and manage risk more effectively. This lesson was of course reinforced by the AIG debacle – there are clear advantages in standardising derivatives contracts and shifting settlement and trading to exchanges.<sup>15</sup>

In addition, the exceptional policy responses of governments and central banks did succeed in containing potentially destabilising dynamics while allowing markets to function. Many of these policy responses were made feasible by the strength of balance sheet positions of governments in the emerging markets at the start of this crisis. And markets remained confident that such interventionist policies would be reversed as conditions normalise. The crisis demonstrated the importance of developing a diversified and resilient domestic investor base. Domestic holdings are still too concentrated with local banks and pension funds. Some local financial institutions were too exposed to interest rate risks from holding local bonds.

To conclude it is important to reiterate one qualification to this positive assessment on the resilience of government debt markets. This is that much more needs to be done to develop the *private* long-term debt markets on top of government debt markets – domestic corporate bond markets, mortgage markets, etc. Credit derivatives and securitisation markets need to support this development (Remolona and Shim (2008)). In Asia, the eventual development of an integrated regional market for local currency bonds could give these markets the critical size needed for the wider use (Goswami and Sharma (2011)). All these issues, explored by Shim (2012) in this volume, are of first order importance.

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<sup>15</sup> Central counterparties (or exchanges), however, need to be well-conceived and very robust if the concentration of risks that they entail is not to make matters worse. See Heller (2010) and Cecchetti et al (2009).

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## Annex

Table A1 **Remaining maturity of domestic central government debt outstanding in years<sup>1</sup>**

	2000	2005	2008	2009	2010
<b>Latin America<sup>2</sup></b>	2.5	3.9	4.8	4.5	4.6
Brazil	2.7	2.3	3.3	3.4	3.4
Chile	...	16.9	16.5	14.0	13.5
Colombia	3.6	3.8	4.4	5.1	5.1
Mexico	1.4	3.4	6.5	6.4	7.2
Peru	6.4 <sup>3</sup>	9.6	16.2	16.0	15.0
<b>Asia, larger economies</b>	5.1	7.0	7.6	7.5	7.6
India	7.1 <sup>3</sup>	10.0	10.6	10.5	9.8
Korea	2.4	4.1	4.5	4.6	5.0
Chinese Taipei	8.8	8.4	7.6	7.2	7.6
<b>Other Asia</b>	5.7	5.5	4.4	4.3	4.3
Malaysia	5.0	5.0	5.3	5.3	4.5
Philippines	5.8	4.1	4.9	5.4	5.4
Thailand	...	5.6	5.8	5.8	6.0
<b>Poland</b>	2.6	3.6	4.2	4.1	4.3
<b>Russia</b>	4.4	7.2	9.4	7.4	5.6
<b>Turkey</b>	1.0	1.8	1.9	1.9	2.5
<b>South Africa</b>	9.2	8.1	9.9	10.6	10.6
<b>Industrial countries<sup>4</sup></b>	6.5	5.9	5.0	5.1	5.3

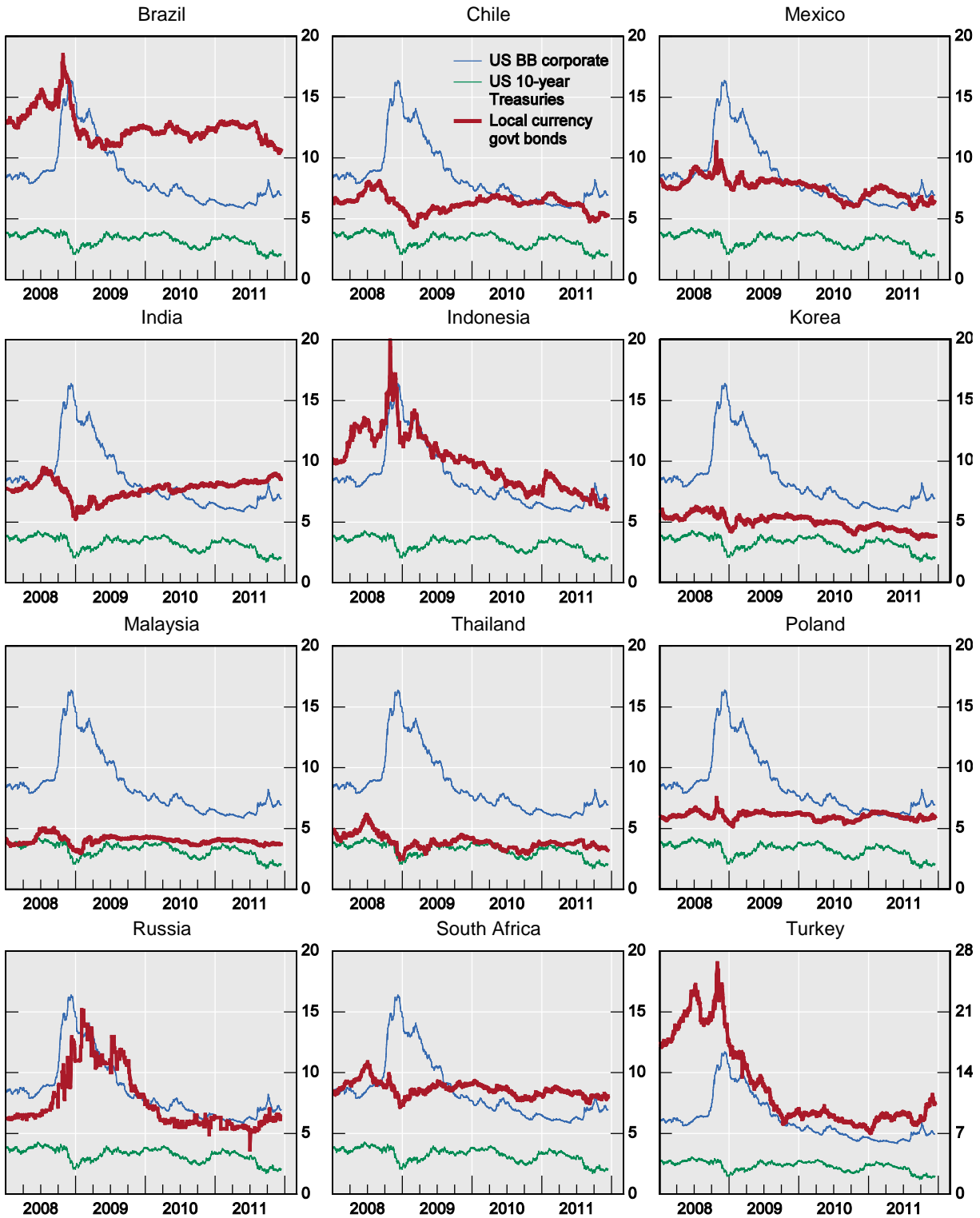
<sup>1</sup> Includes bonds, notes and money market instruments. Regional totals based on the economies listed in the table and weighted by the corresponding amounts outstanding. <sup>2</sup> Latin America includes also Argentina and Venezuela. <sup>3</sup> 2001. <sup>4</sup> Australia, Belgium, Canada, Germany, Spain, the United Kingdom and the United States.

Source: BIS survey updating Table D4 in CGFS (2011). This is reported on the BIS's website.

Graph A1

**Yields on local currency government bonds**

Maturities close to 10 years<sup>1</sup>



<sup>1</sup> Ten-year generic Bloomberg interest rates; for Brazil, three-year; for Chile and South Africa, nine-year; for Turkey, two-year; for US BB corporate bonds, yields on BB rated Merrill Lynch US corporate bonds.

Sources: Bloomberg; Datastream.