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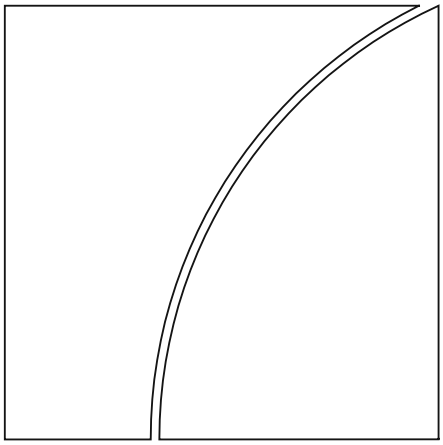

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Bond markets and monetary policy dilemmas for the emerging markets

by Jhuvesh Sobrun and Philip Turner

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JEL classification: E43, E52, E58

Keywords: Exit from QE, long-term interest rate, emerging market economies, bond markets

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Bond markets and monetary policy dilemmas for the emerging markets

Jhuvesh Sobrun and Philip Turner[1]

Abstract

Financial conditions in the emerging markets (EMs) have become more dependent on the 'world' long-term interest rate, which has been driven down by monetary policies in the advanced economies – notably Quantitative Easing (QE) – and by several non-monetary factors. This paper analyses some new mechanisms that link global long-term rates to monetary policy and to domestic bank lending in the EMs. Understanding these mechanisms could help EM central banks prepare for the exit from QE and higher (and perhaps divergent) policy rates in advanced economies. Although monetary policy in the EMs has continued to be guided by domestic objectives, it has nevertheless lost some traction. Difficult trade-offs now confront central banks.

JEL Classification: E43, E52, E58

Keywords: Exit from QE, long-term interest rate, emerging market economies, bond markets

[1] Views expressed are our own, not necessarily those of the BIS. Emails: jhuvesh.sobrun@bis.org and philip.turner@bis.org. This paper is an extended version of a presentation at the 20th Dubrovnik Economic Conference, June 2014. The paper for this conference is being published in *Comparative Economic Studies*. We are grateful for very helpful comments by Christian Kopf at this conference and for constructive and insightful suggestions from Paul Wachtel. An earlier version was also presented at the Central Bank of Guatemala's XXIII Cycle of Economic Lectures. Several BIS colleagues offered helpful suggestions: Michael Chui, Emanuel Kohlscheen, Robert McCauley, Ken Miyajima, M S Mohanty, Hyun Song Shin and Előd Takáts. We are indebted to Sonja Fritz, Pablo Garcia, Branimir Gruic and Mario Morelli for helping to prepare this paper.

Contents

Introduction

Monetary policy dilemmas facing emerging market (EM) central banks have been made harder by years of expansionary monetary policy in the advanced economies. Once their policy rates had been cut to almost zero, the major central banks in the advanced economies bought domestic long-term assets (or extended longer-term loans) in order to reduce interest rates at longer maturities. This has reinforced a more durable and puzzling trend: the secular decline in real long-term rates that began years ahead of Quantitative Easing (QE) by the Federal Reserve. Because globalisation has linked EM financial markets more closely to long-term interest rates in the major centres, monetary and other policy choices in the EMs have faced new constraints.

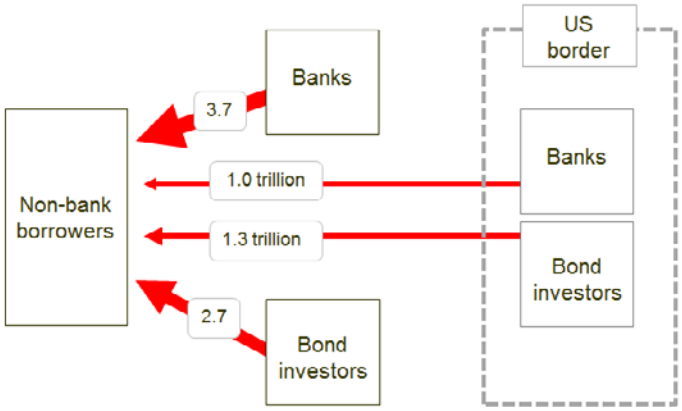
The first section of this paper shows how long-term rates in the EMs have become more sensitive to yields in the major bond markets. Perhaps because of sizable capital inflows into local EM bond markets, even short-term rates in EMs now seem to respond to changes in the term premium in US dollar markets.

A major development is increased borrowing in international bond markets by EM non-financial companies. The financial system effects of this go deep because such borrowing has enabled these companies to increase wholesale bank deposits. This has contributed to an expansion in the balance sheets of EM banks, which had already been inflated by large-scale forex intervention. These linkages are key because the rapid rise in bank credit/GDP ratios is a source of vulnerability in many EMs (as discussed in the section 'Expanding Bank Balance Sheets').

The natural place to start an analysis of dilemmas facing EM central banks is therefore dollar bond markets. Aggregate borrowing in US dollar bond markets by non-banks outside the United States by the first quarter of 2015 had reached almost $4 ½ trillion – up from $1 trillion at the start of 2000 (McCauley et al., 2015). Deeper integration into such debt markets has transformed how emerging economies are affected by changes in the stance of monetary policy in advanced economies and by non-monetary forces acting on global real long-term interest rates. In the days when international bank lending dominated financial flows to the EMs, movements in short-term dollar interest rates (notably 3-month Libor) – under the close control of the Federal Reserve – shaped financial conditions. As debt markets have grown and become more integrated globally, however, a market-determined 'world' real long-term interest rate has assumed greater importance.

The yield of 10-year US Treasuries is the global benchmark. But it is driven by developments worldwide, not only by US growth or monetary policy. The huge volume of transactions between non-US residents in dollar bond markets – that is, not borrowing from US residents and so often not closely linked with US economic developments – have made dollar bond markets global. By way of illustration, Graph 1 shows the origin of dollar-denominated credit to non-bank borrowers outside the United States. $1.3 trillion comes from bond investors in the United States, but $2.7 trillion comes from bond investors outside the United States. Many such investors come from the EMs – which have built up large asset portfolios of foreign bonds.

Graph 1
US dollar-denominated credit to borrowers outside US
$ trillion



Source: McCauley, McGuire and Sushko (2015); data as of December 2013.

There is of course no unique way of measuring the 'world' interest rate. But the estimate prepared by Mervyn King and David Low (based on advanced economy bond market data) is a good starting point (left-hand, panel A, Graph 2). Movements in the yield on 10-year US Treasuries dominate this 'world' interest rate. A principal components computation based on the real yield on French, UK and US 10-year inflation-linked bonds supplements the King-Low estimate for the past five years (right-hand, panel A). The world real long-term interest rate has been falling for more than a decade and has been hovering around zero since mid-2011.

The lower panels in this graph, based on calculations from Hördahl and Tristani (2014) for the United States and for France (as a proxy for the euro area), show that this has been largely driven by a compression of the term premium – the reward for holding long-dated rather than short-dated bonds. The long-term interest rate, therefore, has moved for reasons other than changes in expected future short rates.[2] Massive central bank purchases of bonds have driven long-term rates down. But monetary policy alone cannot explain a persistent trend in real long-term rates. The section 'What is the 'normal' long-term interest rate?' therefore summarises the non-monetary factors that may have depressed the new 'normal' level of the real long-term rate.

As a direct response to the crisis, both the Federal Reserve and the Bank of England bought bonds on an exceptional scale with the explicit aim of lowering long-term rates in their currencies (QE). When these central banks normalise monetary policy, both by raising policy rates and by reducing their balance sheets,

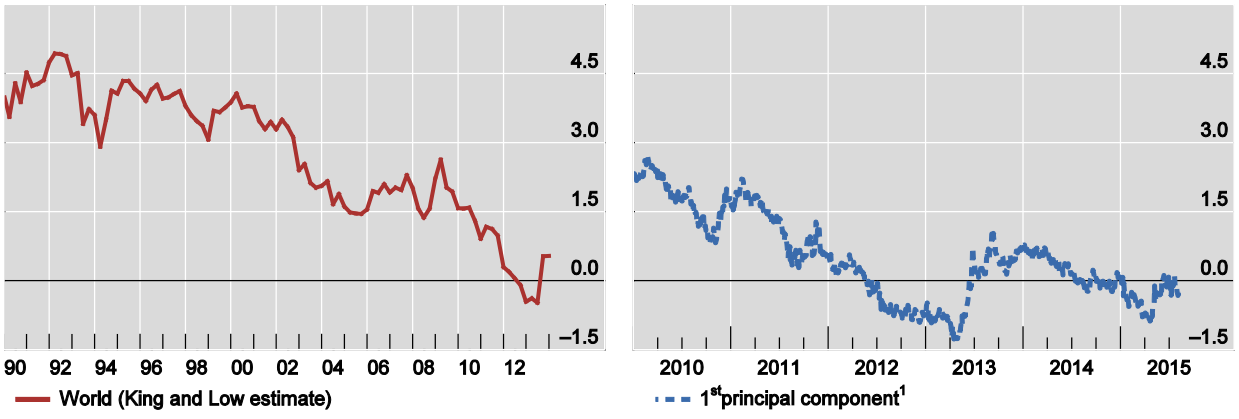
[2] The expectations theory of the interest rate assumes that bonds of different maturities are perfectly substitutable. If so, arbitrage would ensure that (a) the interest rate on a n-period bond equals (b) the (geometric) average of the interest rates on n consecutive one-period bonds. The term premium, which is the difference between (a) and (b) and rewards the investor for holding longer-dated bonds, would be zero assuming no risk aversion. Note that the term premium is not the same as the term spread (shown in Graph 6), which is the yield on a 10-year bonds minus the 3-month interest rate.

long-term rates in their currencies would be expected to rise. The fourth section 'Central bank balance sheets and the bong-term rate' explains that it is difficult to foresee how central banks will adjust their balance sheets in the years ahead, adding to uncertainty about the future long-term interest rate.

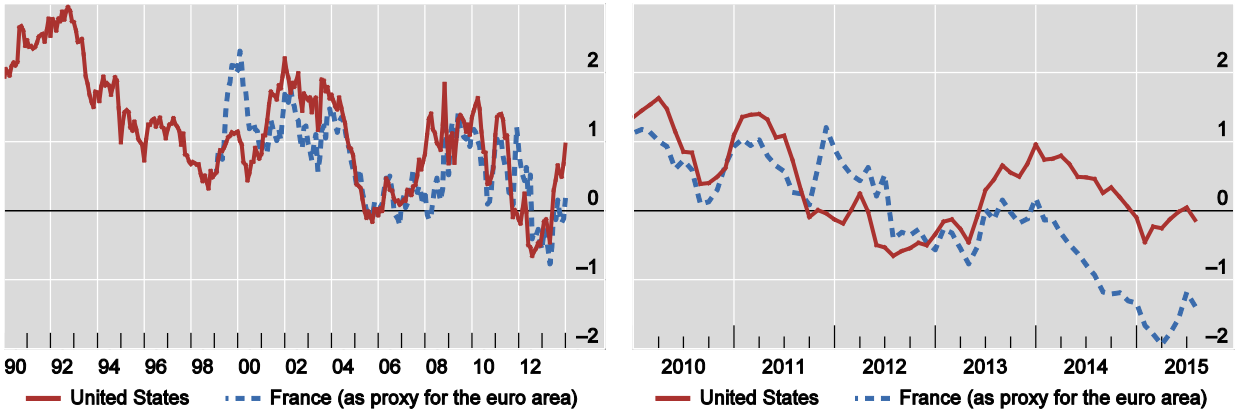
The long-term interest rate

In per cent — Graph 2

A. World real long-term interest rate



B. 10-year bond term premia



[1] Across the euro area, the United Kingdom and the United States; BIS computations of the real interest rates are based on index-linked 10-year bonds. This calculation serves to extract what is common in these three markets. [2] Sum of inflation and real yield risk premia in the 10-year government bond yield. These are calculated using the BIS term structure model.

Sources: King and Low (©February 2014); Bloomberg; national data; BIS calculations.

In any event, US dollar long-term rates are susceptible to global shocks – including those of a non-monetary nature. Long-term interest rates in EM currencies are likely to move in the same direction. An EM central bank could of course try to counter this by altering its short-term rate. But exchange rate considerations that are discussed in the 'The exchange rate and dollar debt' section have probably become more constraining in the setting of short-term rates in EMs during the recent period of near-zero policy rates in the advanced economies.

The prospect at the time of writing is that US monetary policy will become less accommodating while the Bank of Japan and the European Central Bank will be extremely expansionary. The Bank of Japan's massive purchase of longer-term Japanese government bonds began under a new governor in 2013, and is continuing. The European Central Bank (ECB) announced in January 2015 its plans to

buy securities on a large scale. The prospect of such policy divergence – to be sustained on present plans at least to late-2016 – seems to have fuelled a strong rise in the dollar. This is significant because the dollar remains the currency of denomination of most EM international debt.

1. Heightened EM sensitivity to long-term rates

The 'taper tantrum' of 2013 demonstrated the heightened sensitivity of EMs to a shock to global long rates even when US short rates remain constant. It was provoked when the Federal Reserve Board indicated that it would, at some point in the future, reduce the pace of its asset purchases. There was a large and sustained rise in global bond yields. By late 2013, the yield on 10-year US Treasuries had risen by almost 100 basis points. This happened without any change in the policy rate in the United States and in the face of assurances by the Federal Reserve of no near-term rise. The 2-year yield barely moved. What happened was that a change in expectations about future Federal Reserve bond purchases pushed up the term premium (as seen in the lower panels of Graph 2).

This pattern was almost exactly the opposite of the 2004–06 tightening phase when the policy rate rose by 425 basis points but 10-year yields hardly moved and the term premium actually fell. Greenspan famously called this a 'conundrum'. It was also unlike the 1994 tightening when the bond market sell-off was driven by changes in expectations about future policy rates (Adrian and Fleming, 2013). Two important changes have made the EMs more sensitive to movements in global long-term rates than they were a decade or so ago.

Foreign holdings of EM government bonds

The first change is that, during the 2000s, many EM governments – thanks to better macroeconomic policies – became able to issue, in their home markets, long-term debt denominated in their own currency rather than in dollars (BIS, 2009). Many relaxed capital controls to allow non-residents to invest in such bonds and strove to make their bond markets work better. Hence markets for long-term interest rates in EM currencies expanded, grew longer in maturity and became more closely integrated with global bond markets. The World Bank estimates that non-residents now hold almost 30% of local currency bonds, compared with 13% in 2008. In many countries, it is non-resident investors who dominate the longer end of the government yield curve. A recent BIS paper reports that non-residents now hold 20% or more of the government bond markets of Hungary, Malaysia, Mexico, Peru, Poland, South Africa and Turkey (Mohanty, 2014).

There is abundant evidence that yields in major European bond markets, which are integrated into the global financial system, tend to rise whenever US yields jump. Even when the country has a flexible exchange rate, it can influence but cannot fully determine its own long-term rate.

Such linkages, which had barely existed before the mid-2000s for most EM economies, have now become crucial. From 2005, for example, a simple cross-section of quarterly data from eight major EMs suggests that a 100 basis

point rise in the US 10-year yield is associated with a 50 basis points increase in long rates in EMs.[3] Over the period 2000–04, the coefficient on the US 10-year yield was also positive but not statistically significant. In addition, the impact in the post-2005 period is about double the impact of a rise in the domestic short-term rate (Turner, 2013). Taken at face value, this estimate suggests that the central bank could 'resist' a foreign-induced change in its long-term rate only by moving its own policy rate twice as much as the foreign interest rate. Additional evidence of the greater importance of the long-term rate in recent years is provided by Filardo et al. (2014) and Miyajima et al. (2012). Takáts and Vela (2014), reporting separate estimates for nine countries, also find a stronger link after 2008 than before, with a one-to-one pass-through for many countries in the more recent period.

Matching countries with their most natural base currencies (not necessarily the US dollar), Obstfeld (2015) finds that a 100 basis point change in the foreign long-term rate typically leads to a rise of about 40 basis points in the local long-term rate. His crucial finding is that long rates remain significantly correlated with those of base-currency countries even in the absence of any exchange rate peg. A flexible exchange rate does not insulate the local long rate from foreign influences. The impact of the foreign short-term rate on domestic short-term rates is much smaller. Miyajima et al. (2014) find that the policy rate in larger EMs has, in recent years, reacted more to changes in the dollar term premium (set in global capital markets) than to changes in the US short-term rates.[4] This is consistent with a lower term premia in core bond markets stimulating capital flows to EMs (perhaps into local bonds), causing the exchange rate to appreciate and inducing the local central bank to cut short-term rates.

International bond issuance by EM companies

The second, more recent change is that EM corporations – many of which could not easily issue in their home markets – have issued in international bond markets on an unprecedented scale. The lower-term premium in global bond markets has been a significant driver of such issuance (see Lo Duca et al. (2014) and McCauley et al. (2015)).

Table 1 shows international bond issuance based on the nationality of the company and not the location of the entity that formally issued the bonds. This definition includes issuance by overseas subsidiaries of the corporation – including its financing vehicles established in financial centres offshore. Note that this is different from the bond flows in the balance of payments statistics (or bond debt in the external debt statistics), which are compiled on a residence basis. It is also a better measure of the risk exposures of the borrower: the consolidated balance sheet of an international firm best measures its vulnerabilities.

[3] The countries were Brazil, Korea, Malaysia, Mexico, Poland, South Africa, Thailand and Turkey. Note that a 100 basis point change in the domestic short rate is estimated to increase the long rate by 20–25 basis points in both sub-periods. In addition, the evidence for EMs as a whole is that the short rate does react to domestic variables such as inflation and the output gap. Hence EMs still have monetary policy independence – but the constraints on monetary policy coming from long rates have increased.

[4] Or to the "shadow" Federal funds rate constructed by Lombardi and Zhu (2013) for the period when the funds rate has been at zero.

Net issuance of international bonds by EM companies[1]

By nationality of issuer, in billions of US dollars — Table 1

	2010	2011	2012	2013	2014	Total	2015 First Half[2]
Total emerging markets[3,4]	**151**	**169**	**292**	**313**	**304**	**1,229**	***115***
Banks	57	53	140	110	127	486	*12*
Non-banks	95	117	152	202	178	743	*103*
By country							
China	24	43	49	98	163	377	*58*
India	1	6	5	16	16	44	*4*
Korea	8	19	14	21	10	72	*1*
Other emerging Asia[3]	15	3	28	21	15	82	*15*
Brazil	34	34	55	26	30	179	*-8*
Mexico	8	17	22	23	20	89	*13*
Other Latin America	12	16	13	27	18	86	*9*
Russia	23	7	59	28	-5	113	*-8*
South Africa	5	6	4	3	-1	17	*5*
Turkey	3	2	6	11	13	35	*2*
Other emerging Europe[4]	6	2	9	12	3	31	*3*
Memorandum							
HK and Singapore	12	10	41	23	17	102	*1*

[1] Net issues of international debt securities, financial and non-financial corporations, in all maturities, by nationality of issuer. [2] At actual rate. [3] Excluding major international banking centres. [4] Including euro area member states Latvia, Lithuania, Slovenia, Slovakia and Estonia.

Source: Dealogic; Euroclear; Thomson Reuters; Xtrakter Ltd; BIS calculations

The cumulative flows have been very large: about $1.2 trillion debt issuance on international markets over the 5-year period from 2010 to 2014. Such issuance has been consistently dominated by Chinese companies ($377 billion). Net issuance by Brazilian companies has also been large ($179 billion), but has fallen since 2012.

Turner (2014) argues that there is no evidence that bond issuance has just filled the gap left by reduced foreign currency borrowing from international banks. Moreover, some borrowers have increased foreign currency borrowing to finance local currency investments (notably in local property markets). Currency mismatches have increased. In less developed currency or bond markets, such mismatches will often be unhedged (because of the absence of a suitable market product) or only imperfectly hedged. During times of market stress, such hedges can have unintended consequences.

Other borrowing was to finance increased production of oil and other primary commodities – with projects often predicated on commodity prices remaining very high. In addition, the balance sheets of many EM corporations have become more

leveraged (Chui et al. (2014)). Declining earnings and a stronger dollar make it harder to service international bond debt.

Wider recognition of such vulnerabilities, and a drop in dollar commodity prices, contributed to a fall in EM corporate bond issuance in the first half of 2015. Note that this happened at a time when many advanced economy borrowers had increased issuance to take advantage of unusually depressed long-term interest rates (especially on euro-denominated paper – in which the term premium, as shown in Graph 2, was unusually negative).

2. Expanding bank balance sheets

Of crucial relevance for monetary policy is that increased borrowing abroad by EM companies, taking advantage of very easy financial conditions in international capital markets, has influenced the domestic banking systems in an expansionary direction. Three links merit reflection:

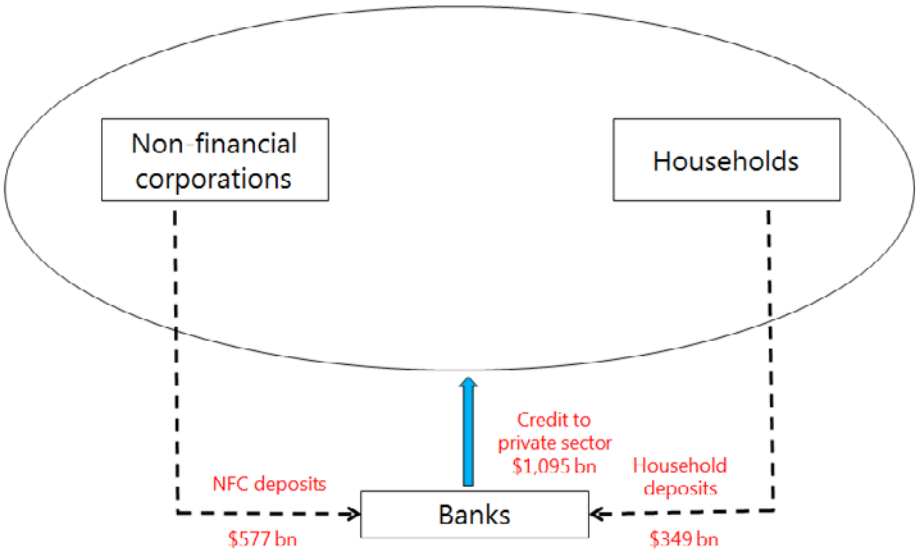
1. **The first arises because EM corporations had in the past borrowed from local banks.** When extremely easy external financing conditions allow large firms to borrow cheaply from abroad, local banks have to look for other customers – so that domestic lending conditions facing most local borrowers (that is, small firms and households) actually ease more than the expansion in total domestic bank credit aggregates suggest. A tightening in external financing conditions would reverse this … small firms might then find it harder to get finance even if total domestic bank credit continues to rise.

2. **A second channel works through wholesale funding** markets for banks. When EM corporations are awash with cash thanks to easy external financing conditions, they will increase their wholesale deposits with local banks.[5] This is presumably why several researchers have found that the issuance of overseas debt and domestic bank credit are positively correlated (eg Lane and McQuade, 2014). A rise in such deposits will allow bank credit to expand. The problem is that such deposits are flighty – so that a worsening of external financing conditions for corporations can make it more difficult for domestic banks to fund themselves at home. There is extensive evidence, drawn from many different contexts, that the deposits of non-financial corporations are indeed more procyclical than other bank deposits.[6] Because changes in global non-financial deposits predict growth and trade, Shin (2013) argues that they deserve special attention in the construction of global monetary or liquidity aggregates. Graph 3, taken from IDB (2014), shows the orders of magnitude in Latin America: deposits from non-financial corporations with local banks ($577 billion) exceed by far the deposits of households ($349 billion). Similarly, Filardo et al. (2014) show that firms in emerging Asia awash with cash thanks to easy external financing conditions have increased their wholesale deposits with local banks.

[5] Perhaps via short-term instruments in the shadow banking system.

[6] See, for instance, Chung et al. (2014) for evidence from emerging market economies and Hattori et al. (2009) for evidence from Japan.

Graph 3
Change in bank deposits and domestic credit, 2009-13
An example from Latin America*



* Sum of Brazil, Chile, Colombia and Mexico. In billions of US dollars.

Source: IDB (2014)

3. **The third link is through the hedging activities of EM corporations' forex or maturity exposures**, often via derivative contracts with local banks. Many EM banks have been able to expand their investment banking business. Even if the local banks hedge their forex exposures with banks overseas, they still face the risk that local corporations will not be able to meet their side of the contract. The upshot is that the domestic bank that thinks it has managed its risks, will find itself, if a local corporate client were to fail, with unhedged exposures vis-à-vis foreign banks.

Such domestic bank/global capital market links seem to be stronger for large EM banks than for small ones. Kohlscheen and Miyajima (2015), examining a sample of about 1,500 EM banks, find that increased risk appetite in global capital markets (proxied by changes in the VIX) stimulates lending by large banks, but not by small banks. Lending by small banks, in contrast, is much more responsive to changes in the domestic policy rate.

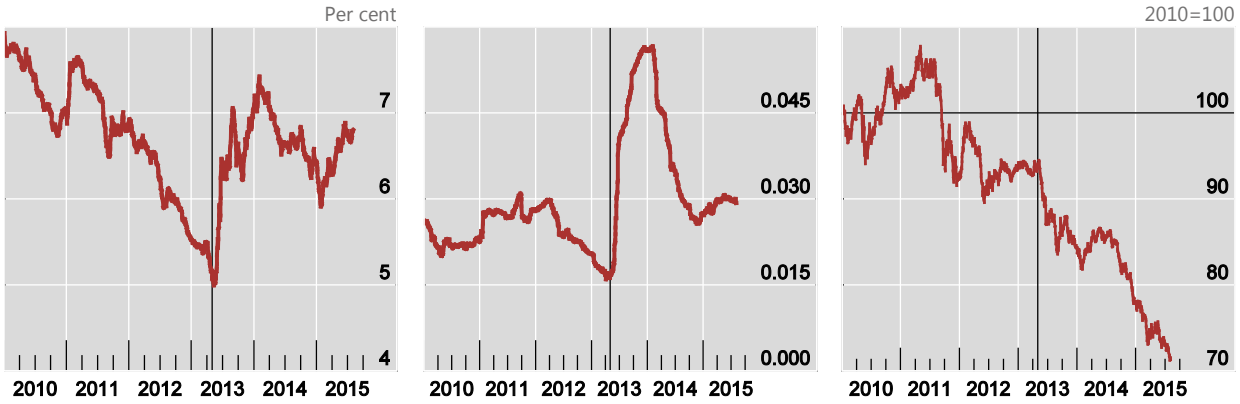
These linkages with global capital markets mean that the central bank may face greater instability in its domestic interbank market whenever large corporations find it harder to finance themselves abroad. It may also have to confront latent banking weaknesses revealed if the exchange rate falls (or the local policy rate rises) suddenly or if over-extended domestic banking systems have to contract.

There are no reliable summary measures of the aggregate interest rate and exchange rate exposures of local banks in the EMs. But sharp rises in bond yields and increased market volatility in 2013 and again in 2015 must have led some banks to reduce such exposures. It is clear that the interest rate exposures of foreign investors in EM currencies had risen substantially before the turbulence that began in May 2013. For instance, the IMF estimated that the stock of EM bonds in portfolio investment from the advanced economies was $480 billion above the extrapolated 2002–07 trend (IMF, 2014).

The unexpectedly virulent and persistent turbulence in EM bond markets in 2013 (Graph 4) surprised many investors. The simultaneity in the fall in local bond prices and currencies suggests strong links between these two markets. On the debtor side, EM corporates that have large net dollar liabilities react to shocks by buying dollars. And the subsequent strong appreciation of the dollar puts corporations under further pressure. On the creditor side, market participants abroad react strongly because of the size of interest rate and exchange rate exposures in EM currencies. Because the foreign exchange market is usually much more liquid in EMs than the local government bond market, sudden selling or hedging may be concentrated in the forex market. Foreign investors with large (but illiquid) exposures in EM bond markets would often use out-of-the-money forex options to hedge these positions, counting on a strong correlation between bond prices and the exchange rate. As in Dornbusch's classic model, prices in the more liquid forex market may overshoot.

The size and spread of this market adjustment suggest that many investors and financial intermediaries had leveraged positions. In addition, investment strategies may have induced leverage-like behaviour. Some investors had invested in intermediary instruments (bond funds, ETFs and so on) that promised daily liquidity even though the underlying markets were illiquid. Once this liquidity illusion is shattered, sales can be very heavy. Shek et al (2015) show that investor flows into and out of EM funds tend to cluster much more than for advanced economy bond funds. Capital outflows will usually be more concentrated in time than capital inflows, and may generate run-like flight out of EM assets (Ramos-Francia and Garcia-Verdu (2015)).

Yields of local EM government bonds and the exchange rates[1] Graph 4



The black vertical lines correspond to 1 May 2013 (FOMC statement changing the wording on asset purchases).

[1] All 3 graphs show the simple average of Brazil, India, Indonesia, Malaysia, Mexico, the Philippines, Poland, South Africa and Turkey. [2] Yields on 5-year local currency bonds. [3] 180-day moving standard deviation of daily changes in yields. [4] In dollars per unit of local currency.

Sources: Bloomberg; national data; BIS calculations.

It is true that the markets for EM bonds stabilised in 2014, and market volatility declined. The growing domestic investor base in many EMs may have provided some ballast (Booth, 2014). Nevertheless this episode showed how a shock to long-term rates at the centre could destabilize yields in many large EM markets, which rose even more sharply (Fong et al, (2015)). And yields again rose sharply in the first half of 2015.

EM currencies did not recoup what they had lost in the taper tantrum, and continued to fall sharply – often fuelled by lower commodity prices. Such sharp depreciations combined with sudden steepening in the local currency yield curve could, if sustained, hit local corporations hard. Faced with only imperfect information about the underlying strength of individual corporations, foreign investors may react to turbulence by pulling back in an indiscriminate way. Local banks may become more risk averse. If all this leads to slower growth, inflicting further damage on firms, the risk of a 'distress loop' increases (Shin, 2013).

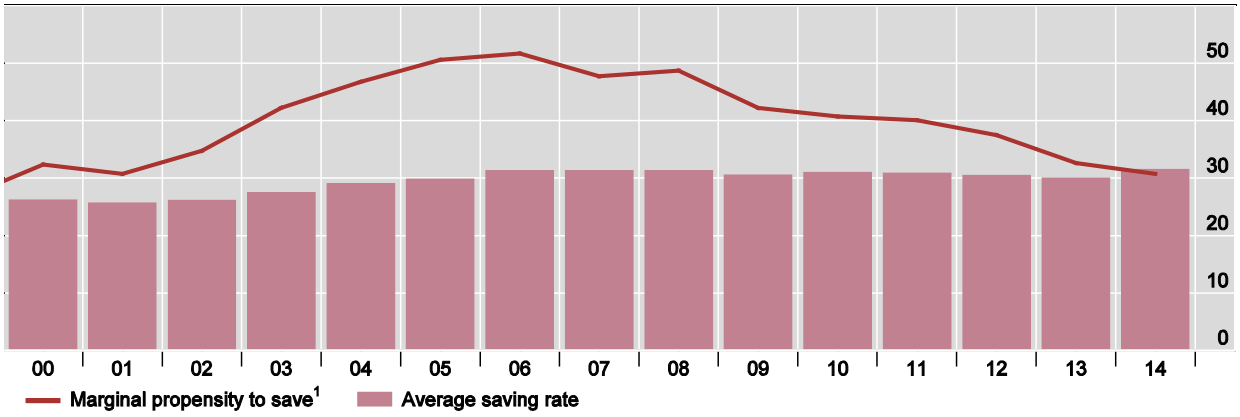
3. What is the 'normal' long-term interest rate?

Because the decline in world long-term interest rates has been going on since the late-1990s, it cannot be attributed solely to monetary policy. Several non-monetary forces have in recent decades depressed the natural rate of interest (eg, Laubach and Williams (2003) and Gavin (2015)). But there is no consensus among economists about the nature or size of such drivers. A further complication is that non-monetary elements (for example, the preference for debt rather than equity) can be reinforced by cheap money and easy credit (Hannoun, 2014), making it hard to disentangle the non-monetary from the monetary.

One factor is the **higher global saving rate**, Bernanke's 'global saving glut' thesis being the best known expression of this view. There has indeed been a rise in the global propensity to save since the early 2000s. This rise was almost entirely due to a higher saving rate in the developing world as the saving rate in the advanced economies remained constant. When the saving rate is rising, the marginal propensity to save exceeds the average propensity to save. According to a calculation shown in Graph 5, the marginal propensity to save out of GDP in the developing world rose from about 30% in the start of the 2000s to a range of 40%–50% in the years before the sub-prime crisis. This is unprecedented for such a large area, and put downward pressure on real long-term rates globally. After the crisis, however, the saving rate in the developing world stabilized and the marginal propensity to save declined – and it was balance sheet expansion in the advanced economies that drove long-term rates down in the post-crisis period.

The propensity to save in developing countries

As a percentage of GDP — Graph 5



[1] Calculated from the changes in dollar values of aggregate savings and of GDP over 7 years.

Sources: IMF *World Economic Outlook*; BIS calculations.

A second, related, perspective focuses on the **strong underlying demand for financial assets**, which outruns the supply of real assets. Demographic developments in advanced economies could well drive down the equilibrium (or natural) rate of interest. Von Weizsäcker's (2013) analysis of this is illuminating. His illustrative calculation based on the assumption that society's desired wealth per person is equal to the product of half the period of retirement and annual consumption per person. Increases in the average period of retirement therefore stimulate a strong and persistent demand for financial assets such as bonds. In the absence of a commensurate rise of opportunities to invest in long-lived fixed capital assets yielding satisfactory returns, and no increase in public debt, the long-term real interest rate would have to fall. (A fall in the expected life of capital assets – a consequence of the information technology revolution? – would have the same implication.)

A third factor is the **nature of financial intermediation**. How financial firms stand between investors and the ultimate users of funds naturally affects the pricing of risks. Financial intermediaries can create, sometimes from doubtful sources, assets that appear to investors as safer or more liquid than they really are. Before the financial crisis, a big force was a 'global banking glut' (Shin (2012)) – banks (or other investors) sought yield by maturity transformation. Monetary easing that lowers the policy rate well below market rates prevailing further out the yield curve encourages such behaviour. As banks borrow short to lend long, they in effect take a leveraged position on long rates, and thus flatten the yield curve. Before the crisis, European banks did this by purchasing US mortgage-related asset-backed securities, which were often manufactured to win a triple A rating and yet offered an attractive yield over US Treasuries.

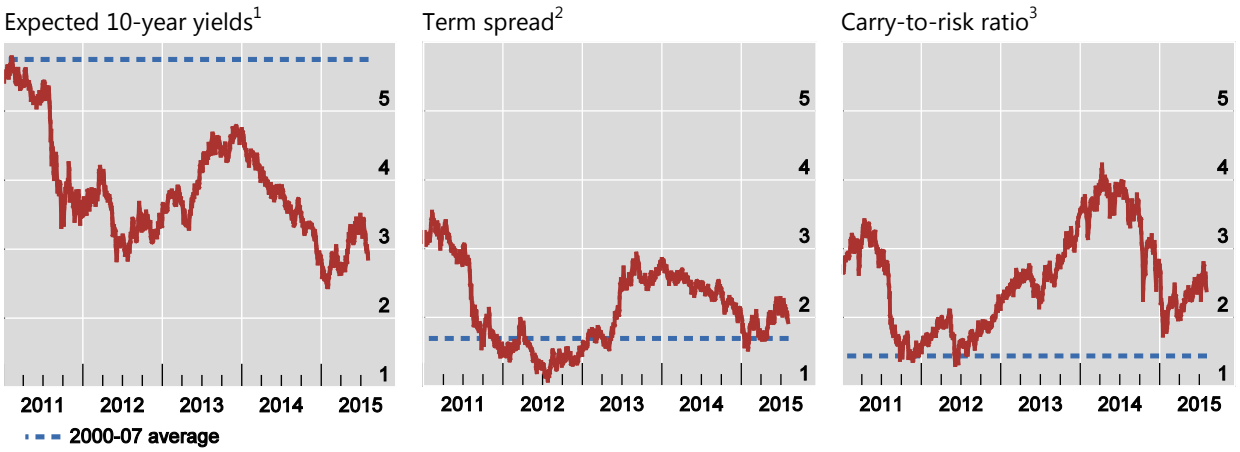
A final, related, perspective puts emphasis on **the 'habitat' choices of investors** – that is, the assets they choose for their portfolios. This can shape the precise impact of fundamental macroeconomic forces on financial markets. The governments, central banks and sovereign wealth funds in emerging economies are typically conservative in their foreign investment strategies. They have a well-known proclivity for highly liquid and 'safe' assets such as government (or quasi-government) bonds issued in the main financial centres – especially those denominated in dollars. As Prasad (2014) has argued, the attraction of assets denominated in dollars has endured, and indeed deepened. Hervé Hannoun has pointed out that there may have been some form of financial repression, albeit 'by accident rather than design' (Hannoun, 2014). Regulators of insurance companies, pension funds and banks have in recent years reinforced the global appetite for highly rated bonds, driving real long-term interest rates on key benchmark bonds below those that would prevail in a free market.

No one knows what these four non-monetary factors might mean for the 'new normal' for the long-term rate once the current period of extreme monetary ease ends. One indication of uncertainty about the new normal is the wide range of market expectations about the future long rate. The left-hand panel of Graph 6 shows market expectations about where the 10-year yield will be in 5-years' time. This measure is chosen because it should be relatively independent of near-term expectations about the policy rate. In the first half of 2011, this 5-year forward 10-year rate was over 5%, close to the 2000–07 average of 5.8% (shown in the dashed line). At the time of writing (August 2015), it had fallen to below 3%. This is

well below the 5% that the standard US economy-related explanatory factors such as inflation expectations, trend GDP growth, expected future government debt and Federal Reserve purchases would suggest.[7]

Markets and the long-term interest rate

In per cent — Graph 6



[1] Five-year forward expectation on 10-year US treasuries (zero-coupon yields). [2] Ten-year swap rate minus three-month money market rate, in percentage points. [3] Defined as the differential between 10-year swap rate and three-month money market rate divided by the three-month/10-year swaption implied volatility.

Sources: Bloomberg; JPMorgan Chase; national data; BIS calculations.

The US policy rate (the Federal funds rate) as of August 2015 remains stuck close to zero, and this defines the base for the short-term dollar funding cost for international banks (and indeed for all international borrowers). The middle panel of Graph 6 shows the dollar term spread from borrowing at 3 months to invest in 10-year bonds.[8] Since May 2013, this spread has generally remained above the pre-crisis average (shown by the dashed line). As implied bond market volatility (measured by the cost of buying protection in options markets) also declined in this period, the carry-to-risk ratio remains attractive by historical standards (right-hand panel). The carry trade in bonds seems alive and well. But when bond markets become more volatile, this ratio would fall and this particular carry trade would become less attractive.

These conditions could change abruptly once interest rate expectations increase. At present, markets believe short-term rates in both the United States and the United Kingdom are likely to remain close to zero until at least late-2015, and then rise only gradually. But market expectations will change as circumstances evolve. A number of central banks have been making forecasts of their own policy rate for some years. Goodhart and Lim (2011) have shown that even central bank forecasts of their own policy rate are not reliable beyond about 6 months or so. Historically, central banks have under-predicted increases in the policy rate in the early stages of an upturn – because stronger-than-forecast macroeconomic

[7] Such an equation is reported in Chadha et al. (2013).

[8] As noted above, the term spread is simply the current 10-year yield minus the 3-month yield and so differs from the term premium, which depends on expectations of future short rates.

developments led them to move the policy rate sooner than (or, ultimately, by more than) expected.

4. Central bank balance sheets and the long-term rate

From the mid-1980s to the outbreak of the crisis, central banks did not view the long-term rate as a policy variable. The virtually unique policy focus of major central banks was the short-term interest rate, usually an overnight interbank interest rate. The intellectual foundation of this was the new Keynesian model. The point of departure of this model was that rational intertemporal decisions for each future state of nature are made by a single representative agent who has perfect foresight (or who could trade in complete markets). The central bank has only to set the short-term rate and markets would determine the shape of the yield curve according to expectations of future short rates. In such a model, central bank open market operations (which changed the relative supply of short-dated and long-dated bonds) had no influence on the term structure of interest rates – a Ricardian equivalence perspective applied to the central bank's balance sheet (Turner, 2015b).

The great financial crisis shook this new Keynesian mind-set, and led central banks to look beyond the policy rate. Initially they bought short-dated assets (or extended short-term loans) to restore some liquidity to markets that had virtually ceased to function. In subsequent stages, central banks bought long-term assets outright. They used their balance sheets aggressively in order to force relative financial prices to change as private sector portfolios have to adapt to what assets central banks left available on the market. The evidence is that large-scale central bank purchases of bonds lowered long-term interest rates. And this effect, which went beyond merely changing expectations of future short rates (the forward guidance effect) that the new Keynesian model favoured, seems to have worked via portfolio rebalancing effects as the reduced supply of long-dated debt compressed the term premium. In a study covering the period from 1976 to 2006, Chadha et al (2013) demonstrated that such supply effects mattered even before the massive expansion of central bank balance sheets. Lowering the average maturity of US Treasuries held outside the Federal Reserve – whether by central bank purchases or by Treasury issuance policies – reduces the yield of long-term US Treasuries.

Economists have therefore begun to take a much closer look at Tobin's classic work on portfolio rebalancing mechanisms in the transmission of monetary policy. And recent research has revived the old preferred-habitat models of the 1950s and the 1960s (Vayanos and Vila, 2009). The impact of central bank balance sheet policies in shaping the term premium can be crucial. Tobin's work has also found a recent echo in the finding of Gertler and Karadi (2013) that the changes in the term premium have come to play a significant role in monetary policy transmission in the United States. The dependence of aggregate demand on the long rate (not just the short rate), which was once standard in macroeconomic models (Reifschneider et al., 1999), is getting renewed attention.

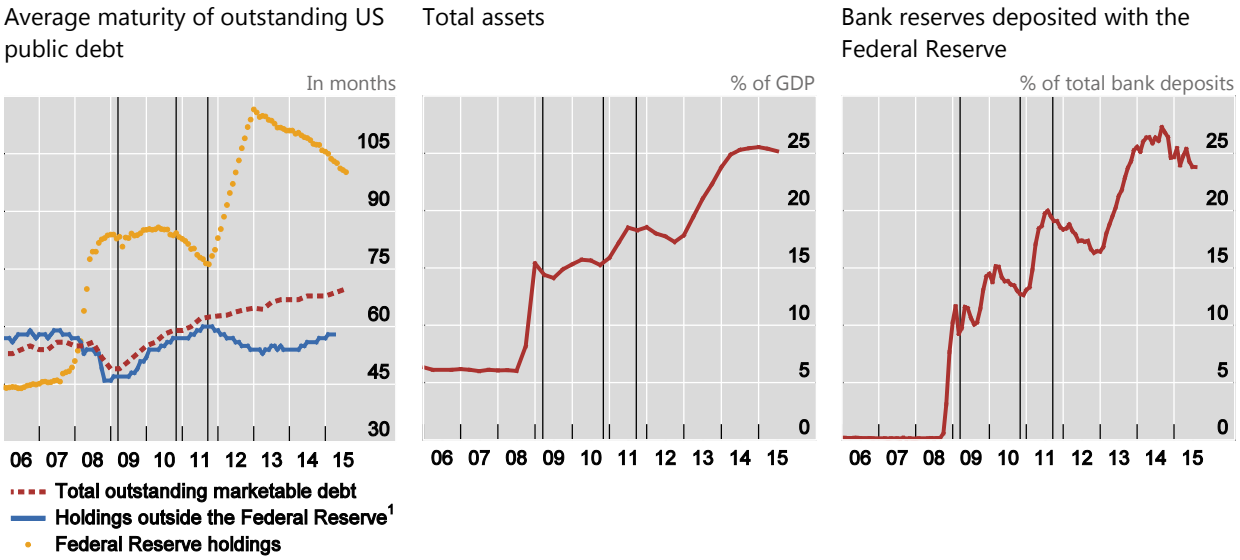
As growth remained weak during the long post-crisis aftermath with inflation low, central banks became more unconventional eventually deciding to radically lengthen the maturity of central bank assets. The purchase of long-term assets means that balance sheet policies will have more long-lasting, and therefore more uncertain, effects than if policy action had been limited to short-term rates or the

purchase of short-term assets. The left-hand panel of Graph 7 shows a dramatic rise in the average maturity of the Federal Reserve's holdings of public debt, in effect taking duration risk out of the market.

But note that the steady and significant rise in the average maturity of US Treasury issuance (dashed line) has worked in the opposite direction. Indeed, the published minutes of the Treasury Borrowing Advisory Committee reveal some interesting discussion on whether the Fed and the US Treasury have been working at cross-purposes (Turner, 2011). Larry Summers argued in a recent Brookings Panel discussion for closer co-ordination.[9] He argued that the Federal Reserve's QE policies reduced dollar long-term rates by 1.37 percentage points while the increase in the average maturity of Treasury debt issuance added back 0.48 percentage points (Greenwood et al., 2014). (Conversely, it could be argued that the longer average maturity of gross US Treasury issuance gives the US government greater room to reduce issuance at the long end to counter any future bond market volatility.) In a similar vein, a recent VOX essay by Jagjit Chadha (2014) reviews the evidence, which shows that decisions about the maturity of government debt do indeed matter for monetary policy. Equally, central bank bond purchases have important fiscal implications (Reddy et al, 2014).

The balance sheet of the Federal Reserve and US public debt

Graph 7



There were two Large Scale Asset Purchase (LSAP) programmes and a Maturity Extension Program (MEP). The vertical lines correspond to March 2009 (LSAP1), November 2010 (LSAP2) and September 2011 (MEP).

[1] Private sector and foreign official holdings.

Sources: Datastream; US Treasury; national data.

Having built up huge balance sheets since 2007, do central banks need to worry about how and when they reduce them as monetary policy normalises? There

[9] Co-ordination in the United Kingdom is more explicit. The UK Treasury has agreed to indemnify the Bank of England against possible losses from its QE programme. The Bank of England in its May 2014 *Inflation Report* said it would liaise with the Debt Management Office when deciding any programme of sales. The thorny issue of co-ordination between the central bank and the Treasury is reviewed in several papers in BIS (2012).

are very divergent views on this issue. Some argue 'no' – an independent central bank's control of short-term rates is enough to influence the whole structure of interest rates and to absorb bank reserves when required irrespective of the size of the central bank's balance sheet.

Others argue 'yes' – witness the quip of Marvin Goodfriend (2014) that QE is but a 'bond market carry trade' that risks jeopardizing the operational credibility of monetary policy.[10] Resolution of this disagreement probably partly depends on the nature of the shocks to hit the economy when central bank balance sheets are still large.

In any event, markets will continue to assess how central bank balance sheet policies might influence longer-term rates once the zero lower bound (ZLB) constraint for the policy rate has passed. Market participants are well aware that central banks in the advanced economies have traditionally been uncomfortable with large holdings of long-term assets on their balance sheets. From September 2009, governors of the major central banks (including Messrs Bernanke and Trichet) publicly expressed the hope that they would soon be able to begin their 'exit' from un-conventional policies. But such hopes were dashed by the deepening euro crisis from mid-2010.

The communication of future balance sheet policies raises delicate issues. Some opacity is inevitable. When a central bank buys an asset in order to drive up its price, it is unlikely at the same time to announce a specific date for selling the asset back to the market. Doing so, and particularly if the announced date is near, would just blunt the impact of the initial purchase. It would also violate the principle that central bank policies should be 'data dependent', responding to economic developments as they actually unfold.

There is also controversy about whether the size and nature of the central bank's asset portfolio would become a second instrument of monetary policy. Historically – that is, before the 1980s when the new Keynesian model led many to neglect key asset portfolio rebalancing effects – the central bank's balance sheet had been viewed as important for monetary policy. Ben Friedman (2014) recently argued that the central bank's balance sheet is likely to become part of the standard toolkit of monetary policy in normal times. Echoing Tobin's portfolio balance theory, he underlines in particular that 'the central bank's ability to choose what quantity of assets to purchase (with consequent increases in its liabilities) is not merely an artefact of the policy interest rate being at the lower bound'. Others have argued that, if inflation around zero were to become the new norm, the ZLB problem would resurface in the next cyclical downturn, putting balance sheet policy back on the agenda.

This issue is relevant for the exit strategy. Policies of Quantitative Tightening – that is, selling assets in secondary markets – could moderate any increase in the policy rate. Both the Federal Reserve and the Bank of England have explicitly recognized this trade-off. The May 2014 *Inflation Report* of the Bank of England noted that 'any reduction in the stock of purchased assets is likely to be associated

[10] He wrote that the 'Federal Reserve balance sheet reflects the front end of a carry trade in that, by the end of 2014, about $3 trillion of reserves paying 0.25% will finance a like quantity of security holdings averaging 10 years or more in maturity earning 2.5%'. The terms of such a carry trade in recent years are illustrated in Graph 6.

with a lower path of Bank Rate'. The Federal Open Market Committee minutes in April 2011 reveal that participants noted that:

> "for any given degree of policy tightening, more-gradual sales that commenced later in the normalization process would allow for an earlier increase of the federal funds rate target from its effective lower bound than would be the case if asset sales commenced earlier and at a more rapid pace."

But one practical difficulty is the lack of previous experience to help quantify how bond markets would react to central bank sales. Signalling effects could be very powerful. News of central bank selling even on a modest scale could send markets a signal that is more powerful than the portfolio balance effects of actual sales ('They are testing the water for further, larger sales'). Because the accumulated evidence on the effects of changes in the policy rate is more extensive, policy-makers can feel more comfortable altering the policy rate.

Both the Federal Reserve and the Bank of England have ceased new asset purchases on a net basis, but continue to reinvest the proceeds of maturing debt. Both have indicated that the initial normalization steps will take the form of policy rate increases, rather than sales of assets. The Bank of England has explained its logic of sequencing by indicating "it is likely to defer sales of assets at least until Bank Rate has reached a level from which it could be cut materially, were more stimulus to be required".

But beyond the next couple of years, once policy rates are well clear of zero, there is no way of knowing when or how central banks in the advanced economies will reduce their holdings of bonds. Once central banks stop reinvesting the proceeds of maturing bonds, they could passively allow their stock to run off – but it would take about 5 years to bring their balance sheets to a more normal level. It is tempting to see a policy of just allowing bonds to mature as the easy option because it would avoid contentious decisions about actual sales. But it would not be a neutral policy choice. It would mean that the timing of shrinking – which would have effects on both financial markets and the macroeconomy – would depend only on the pattern of past purchases, and be quite independent of actual economic conditions. It could even continue into the next recession. And a central bank that wants to maintain control of inflation, monetary conditions and the supply of credit would not want to rule out selling bonds at some future date. That choice would have to depend on future circumstances.[11]

5. The exchange rate and dollar debt

Near-zero policy rates in the advanced economies did aggravate currency appreciation pressures in the EM economies, especially in the early years of the financial crisis. This may have constrained the policy rate set by an EM central bank more than in earlier periods when global short-term rates were higher. While the evidence over a sample period of many years is that the effect of the foreign interest rate on the setting of the policy rate in EMs with flexible exchange rates is

[11] As the then-Governor of the Bank of England put it, "the Bank must have the ability…to sell gilts and withdraw money from the economy when that becomes necessary. Otherwise, we run the risk of losing control over monetary conditions" (King (2012)).

usually small (Obstfeld (2015)), there is some evidence from data for recent years of a larger influence (Hofmann and Bogdanova (2012)). At the same time, the greater importance of local bond markets has made the long-term interest rate in EM currencies more important as a transmission channel. Altering short-term policy rates to counter this is theoretically possible, but is often ruled out of practical consideration by the desire not to aggravate exchange rate appreciation pressures.

In any event, EM central banks continued to accumulate forex reserves on a large scale in an attempt to reduce currency appreciation pressures coming from low foreign interest rates (and, in some cases, their own current account surpluses). Although analysis of this is beyond the scope of this paper, the growth of central bank balance sheets in the EMs has increased the size of the balance sheets of the local banking systems, usually increasing liquidity in money markets. There is evidence that bank credit to the private sector tends to rise even when intervention is sterilized: see Caruana (2011), Filardo and Yetman (2012), Gadanecz et al. (2014), Garcia (2011) and Mohanty and Turner (2006). Selling forex reserves – as in 2015 – will tend to reverse such bank credit expansion.

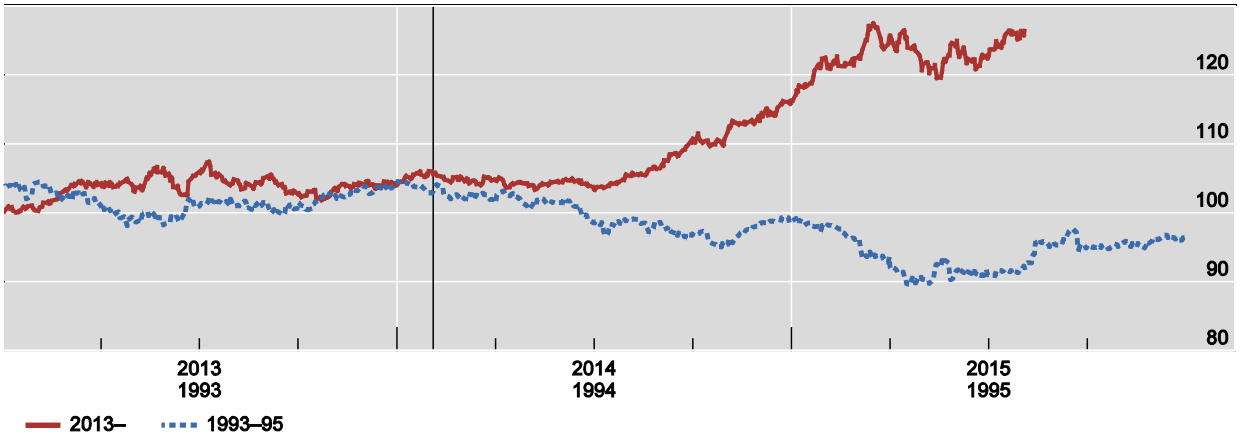
Worries about excessive currency appreciation are not necessarily mercantilist but are often rooted in justified concerns about financial stability. The terms-of-trade gains from currency appreciation may persuade households that their permanent income has risen so that they can borrow more. It may also persuade banks that local borrowers have become better risks. Compressed risk premia then fuel credit expansion. Because the main potential counterweight (ie, that currency appreciation depresses demand for the country's tradables) is weak in commodity-exporting countries, such destabilizing dynamics are often particularly strong in commodity-exporting countries during a boom, which can make firms and households more optimistic about future income growth. They are also strong when local borrowers have foreign currency debts (as in many EMs): they see their balance sheets strengthen when the currency appreciates, and banks are willing to lend them more. The model developed by Bruno and Shin (2012) has currency appreciation making the balance sheets of local borrowers appear stronger, encouraging banks to lend them even more.

A scenario where currency appreciation and domestic credit expansion go hand-in-hand is of more than academic interest. Most financial crises in the past have been preceded by just such a development, with credit expansion and currency appreciation very often feeding on each other. Gourinchas and Obstfeld (2012) report clear evidence that overvalued exchange rates during cyclical booms (with large capital inflows) increase the risk of financial crises. Once there is a 'sudden stop' in capital flows, the country is forced to rapidly correct its trade deficit by reducing income to match the (diminished) level of tradables output. The exchange rate often overshoots, sometimes making those with currency mismatches insolvent. Note the sharp decline in EM currencies since 2011, shown in Graph 4.

This currency depreciation scenario can be especially damaging when the dollar is appreciating against other major currencies. This is because foreign debts are still predominantly dominated in dollars – and, as McCauley et al. (2015) document, aggregate dollar credit (ie through banks as well as bond markets, which was illustrated in Graph 1) to non-banks outside the United States now exceeds $9 trillion, up 50% from the beginning of 2010.

Nominal effective exchange rate of the US dollar[1]

Year i = 100[2] Graph 8



The vertical line indicates 4 February 1994, when the Fed funds rate was raised for the first time for over five years.

[1] Versus a basket of major currencies. [2] i= 1993 for "1993–95" and i=2013 for "2013–".

Sources: Federal Reserve; BIS calculations.

The effective exchange rate of the dollar has appreciated strongly over the past year or so (Graph 8). The dollar is currently 25% above its average 2010–12 level. Recall that the 1994 Fed tightening saw no such rise in the dollar – actually it tended to weaken. A major reason for this important difference is that current market expectations are that monetary policy normalization in the advanced economies will be asynchronous, with the Federal Reserve and the Bank of England tightening first. The balance sheets of both central banks have stopped increasing, and will begin to fall sometime after policy rates have risen. Markets expect the Federal funds rate and the UK's Bank rate to rise later this year or in early 2016.

By contrast, euro and yen interest rates are expected to remain close to zero until end-2016. Much of continental Europe has recently introduced negative policy or central bank deposit rates, creating negative yields on many medium-term government bonds – unprecedented in economic history (Hannoun, 2015). In addition, the balance sheets of the Bank of Japan and the ECB are expanding in a major way. Movements in cross-rates of the major currencies created by such monetary policy divergence can affect an EM economy even if its own effective exchange rate is unchanged. For many companies, the currency that matters more for trade competitiveness (eg the yen in Asia) will not be the currency of denomination of their debts (that is, the dollar). This is one reason why the increased foreign debts of EM corporations denominated in dollars require attention.

Conclusion

A near-zero 'world' real long-term interest rate for such a long time is unusual, and there is no consensus on the underlying factors behind it. Nevertheless, it is clear that changes in the term premium, rather than expected future short-term rates, have been key. The central role of the US dollar is underlined by the very big expansion in US dollar bond credit to non-banks outside the United States, with two-thirds coming from bond investors also outside the United States.

Large scale bond purchases by some major central banks did contribute to – but were not the only factor in – lowering the 'world' long-term real interest rate. Low long-term rates at the centre of the financial world helped to push foreign investors into local government bond markets in many EMs that offered higher yields. It has also encouraged increased EM borrowing on capital markets – corporations in foreign currency on international markets and governments in local currency on domestic markets.

Such bond markets are comparatively illiquid. The growth of an inventive asset management industry and the spread of many bond funds redeemable daily have made many segments seem liquid to end-investors. Easy borrowing conditions in global markets have pushed foreign investors to increase their exposures to interest rate risk, to EM currency risk and to liquidity risk. These developments have also helped to increase the size of the aggregate balance sheet of the domestic banking system in many EMs. Domestic bank credit did indeed expand sharply in the EMs in the post-crisis period, and bank lending conditions have eased.

At some point, all this will reverse – gradually or abruptly. The process of global monetary normalization, perhaps led by the United States, will affect the EMs through several new channels. One important factor will be how and when the Federal Reserve shrinks its huge balance sheet over the next 5 years or so. What happens in bond markets, international and domestic, will be key (see, eg, El-Erian (2015), Wigglesworth and Moore (2015) and Wolf (2015)). The policies of other monetary authorities will influence not only the 'world' long-term rate but also exchange rates. Note, however, that global non-monetary forces – some emanating from the EMs themselves – holding real long-term rates down may persist.

Changes in global debt markets will in turn shape conditions in domestic banking markets. Central banks may have to grapple with illiquid interbank markets, or worse. Monetary policy in the EMs has lost some traction as hard-to-influence long-term rates have become more important in their financial systems. The policy rate continues to be adjusted to meet domestic objectives: in this sense, monetary independence has been preserved. But central banks now have to take greater account of the impact of domestic policy rates on their bond markets, on the exchange rate and on their banks. As Obstfeld (2015) aptly puts it, "financial globalisation has worsened the trade-offs monetary policy faces in navigating between multiple domestic objectives".

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