
Monetary policy and sovereign debt concerns drive markets¹

In the period from late August to the beginning of December, two themes dominated global financial markets. Through early November, the perceived slow pace of economic recovery in the major advanced economies helped intensify investor expectations that central banks would introduce further accommodative measures. Since early November, concerns about sovereign risk in several euro area economies have resurfaced and become the dominant theme.

Much of the focus during the initial period was on the US Federal Reserve and its early November announcement of a second round of large-scale Treasury bond purchases. The Fed's ultimate announcement followed a prolonged period during which senior officials gave speeches combined with other public statements in an effort to prepare markets. As a consequence, US real and nominal bond yields dropped significantly while equity prices rose strongly between August and early November as investors increasingly priced in the expected actions. At the same time, market indicators suggested that bond investors were revising upwards their US inflation expectations.

The Fed's anticipated monetary easing had a visible impact on market prices well beyond the United States as well. The US dollar depreciated against most other major currencies. Together with even lower US interest rates, this made the dollar the funding currency of choice for foreign exchange carry trades and intensified capital flows to emerging markets. The result, which was reflected in higher equity and bond prices in the faster-growing emerging market economies, prompted a number of these countries to introduce policy measures aimed at dampening the rate of capital inflows.

Since early November, attention has shifted to the euro area, with market participants becoming increasingly concerned about exposures to Ireland and other economies. Once again, credit spreads increased significantly on government bonds issued by affected countries. This time concerns were driven by two factors: the deteriorating fiscal situation in Ireland that stemmed

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from continued government support for troubled banks; and consideration of EU treaty changes that would make it possible to impose losses on holders of bonds issued by governments in financial distress. Even as an EU support package for Ireland was agreed in late November, the stress persisted, with attention turning first to Portugal and Spain and later to Belgium and Italy. The situation did, however, stabilise in early December in anticipation of possible ECB support.

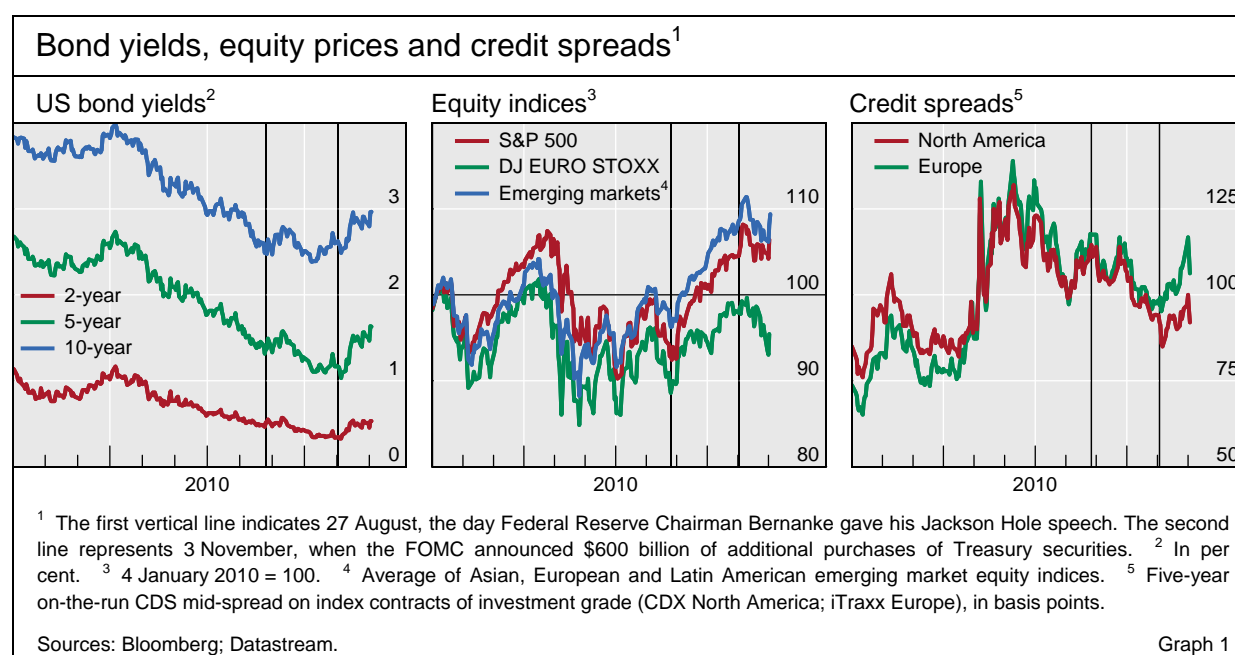
Investors price in further central bank easing

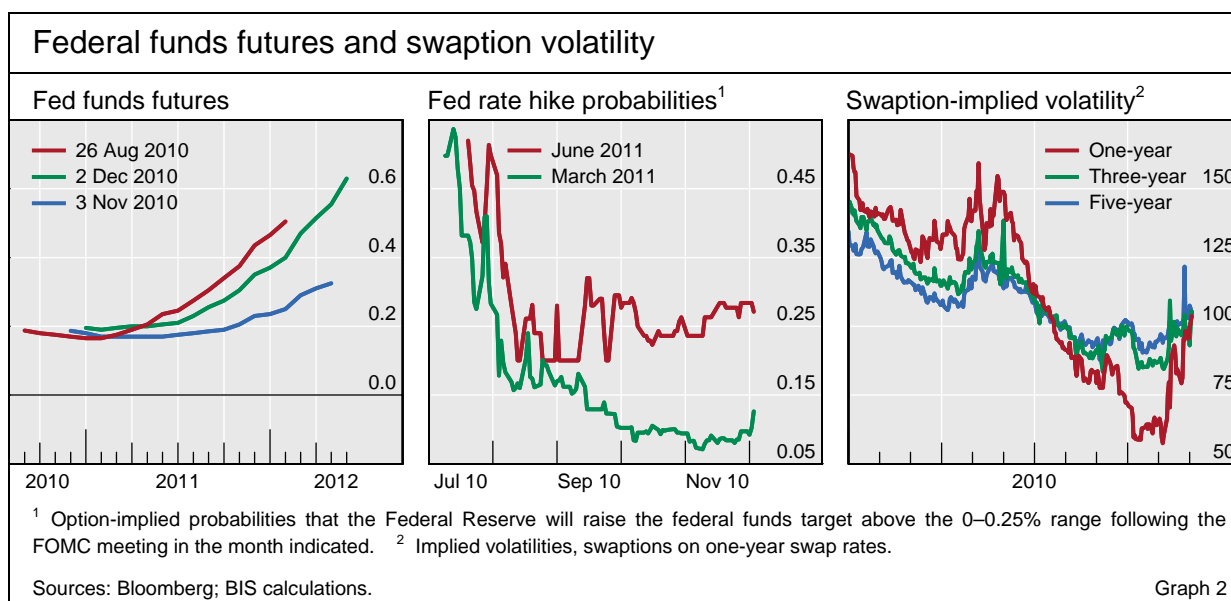
As investors grew increasingly concerned about the economic recovery in major advanced economies, expectations intensified that some central banks would ease monetary policy further. This was particularly the case for the United States, where expectations grew that the Federal Reserve would announce a second round of Treasury bond purchases, which it eventually did in early November. Even before that, in early October, the Bank of Japan had taken further steps to ease monetary conditions. The Bank announced that it would establish a ¥5 trillion Asset Purchase Programme, under which it would buy government bonds, commercial paper, corporate bonds, exchange-traded funds and real estate investment trusts in order to lower risk premia and push up asset prices. In the United Kingdom too, expectations that the Bank of England would expand its quantitative easing programme resurfaced. However, with UK headline inflation staying above target, investors remained divided in their views on the likelihood of such a move.

Expectations of further Fed easing ...

In the United States, yields on US government bonds had been moving downwards since around early May as investors had been increasingly anticipating that the Fed would expand its purchases of Treasuries (Graph 1, left-hand panel). The first concrete signs of additional monetary easing came in early August, when the Federal Open Market Committee (FOMC) announced that principal payments from agency debt and agency mortgage-backed

... push yields down ...





securities would be used to purchase additional Treasury securities, thereby keeping the Federal Reserve's holdings of securities at the prevailing level.

... and lift risky asset prices

Yields fell further from late August until early November, as Federal Reserve communications reinforced expectations of further monetary easing (Graph 1, left-hand panel; see also the box). In particular, in his Jackson Hole speech on 27 August, Chairman Bernanke discussed a range of policy options, including additional purchases of Treasuries. US equity prices benefited from lower yields both directly, via lower discount rates on expected future earnings, and indirectly, as a result of expected portfolio shifts away from lower-yielding Treasuries into riskier investments such as stocks (Graph 1, centre panel). Moreover, credit spreads tightened in the course of September–October (Graph 1, right-hand panel). These effects on prices of risky assets were not confined to the United States; to varying degrees, they were visible also in Europe and a number of emerging markets.

Investors priced in a further delay in the timing of the first US rate hike, as the Federal Reserve began hinting that it might keep the target for the federal funds rate close to zero for longer than markets had expected. The federal funds futures curve flattened, while the option-implied probability of near-term increases in the target rate edged downwards between late August and early November (Graph 2, left-hand and centre panels). These rate expectations reinforced the downward pressure on bond yields, especially for medium maturities. At the same time, implied interest rate volatilities retreated further, especially over short horizons, suggesting that investors had become less uncertain about the interest rate outlook (Graph 2, right-hand panel).

Break-even rates rise on expected Fed move ...

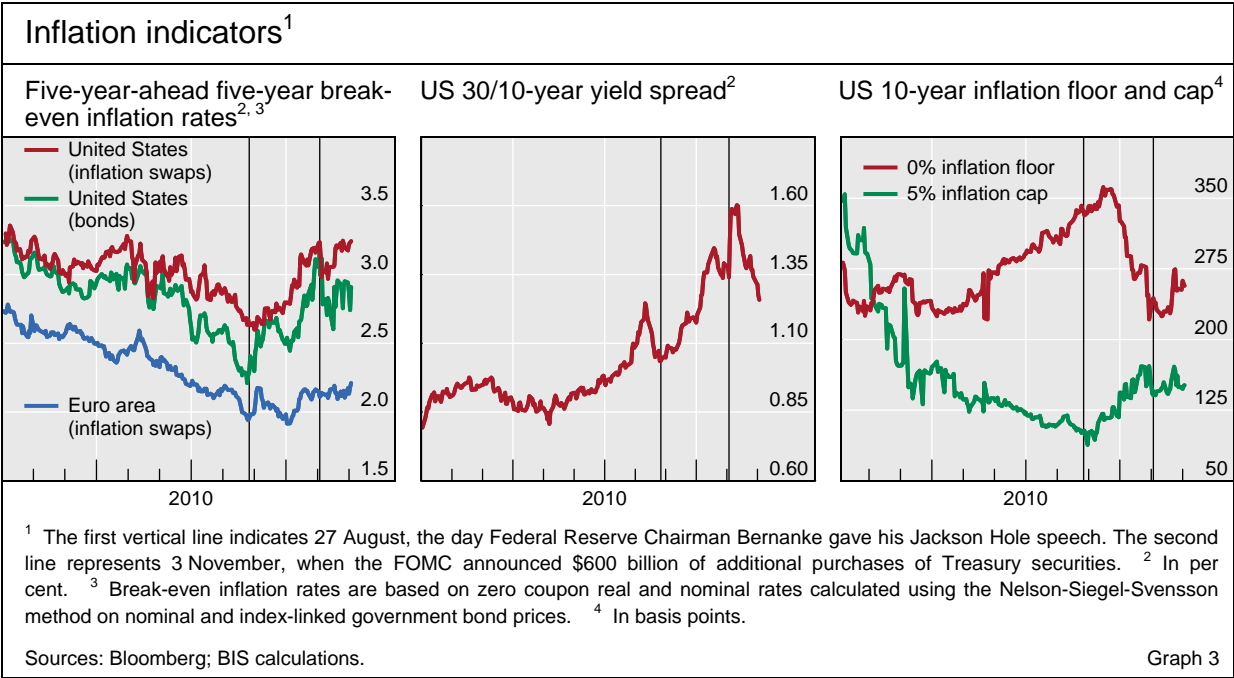
Market indicators of expected inflation in the United States moved in a way consistent with expectations of higher inflation between late August and early November. Although nominal yields declined as further Treasury purchases were priced in, real yields on inflation-linked bonds fell by substantially more as break-even inflation rates increased. In particular, the five-year forward break-even rate five years ahead – a standard measure of long-term inflation expectations – rose by almost 100 basis points between late

August and early November to over 3% (Graph 3, left-hand panel). This increase contrasted with developments in the euro area, where investors did not anticipate further monetary easing. The corresponding euro forward break-even rate edged upwards only some 30 basis points over the same period. Another long-term inflation indicator, namely the spread between US 30-year and 10-year nominal bonds, also signalled higher expected inflation, widening by around 60 basis points (Graph 3, centre panel). Taken at face value, this would indicate that the Fed had raised inflation expectations, even as recent readings of underlying inflation dropped further below the level seen as consistent with its mandate.

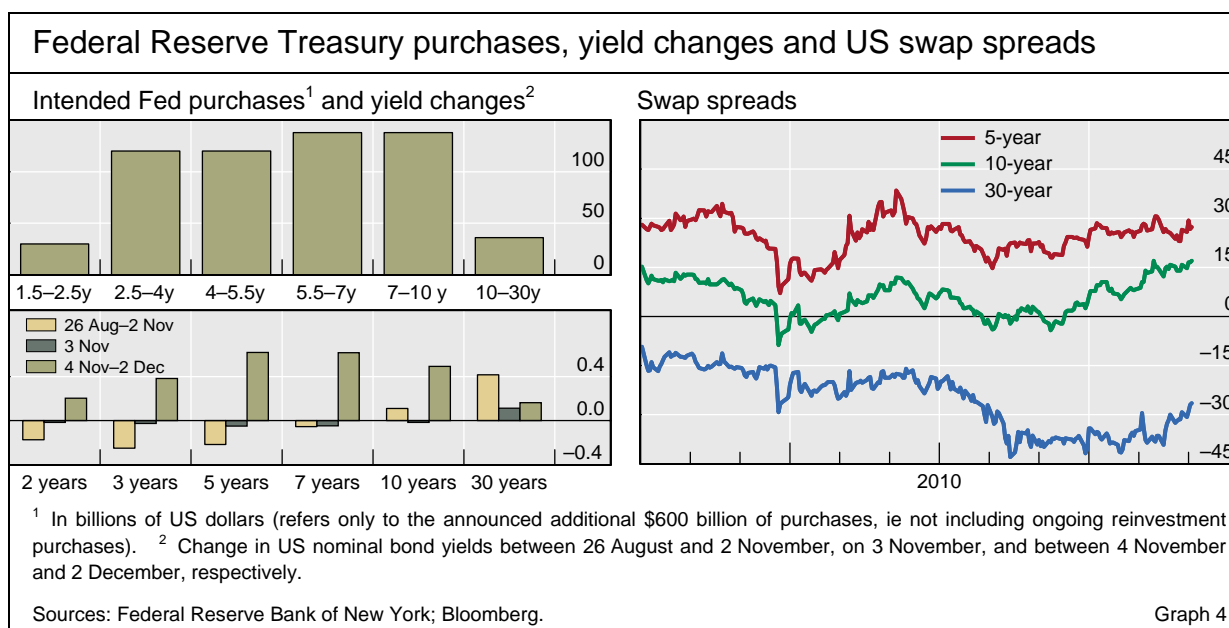
Prices in inflation derivatives markets also suggest that concerns about deflation in the United States began to abate from around September onwards. For example, the price of a US 10-year 0% inflation floor, which had been trending upwards since April, fell back significantly in the course of September and October (Graph 3, right-hand panel). This instrument pays off if the US CPI falls in any of the next 10 years, and is therefore seen as less valuable as the likelihood of deflation decreases. At the same time, prices of derivatives that pay off in case of high rates of inflation climbed after having declined slowly in previous months. The price of a 10-year 5% inflation cap, for instance, rose by about 50% in September and October, indicating that investors saw greater value in an instrument that would pay off if consumer prices were to rise by more than 5% in any of the coming 10 years. As such, this was an indication that market participants considered that the likelihood of high inflation rates – while still small – had increased.

... and deflation concerns dissipate

Bond yields moved little immediately following the widely anticipated announcement on 3 November that the Federal Reserve would extend its Large-Scale Asset Purchases (LSAP) programme and purchase a further \$600 billion of longer-term Treasury securities. Most of the Fed’s intended purchases (86%) were earmarked to take place in the 2½- to 10-year segment



Graph 3



(Graph 4, top left-hand panel). Yields in this range had fallen in the weeks leading up to the announcement, as investors correctly anticipated much of the maturity concentration of the Fed's purchases, but also as a result of growing expectations that the near zero policy would be extended further (Graph 4, bottom left-hand panel). However, market participants appear to have overestimated the Fed purchases at the very long end of the yield curve. As it turned out, only 4% of the purchases were planned for the 17- to 30-year maturity segment, and consequently the 30-year bond yield rose by more than 10 basis points on the day of the FOMC announcement. The diverging effects along the Treasury curve were also evident from swap spreads, with short- to medium-term spreads rising over September–October in contrast to the 30-year spread (Graph 4, right-hand panel).

In the weeks following the Fed's LSAP announcement, much of the yield declines and some of the other asset price effects seen in the lead-up to the announcement were undone (Graph 4, bottom left-hand panel, and Graphs 1–3). In part, this was probably due to profit-taking in an environment where LSAP-related trades had been put on en masse. Some better than expected macroeconomic data in November contributed too. The rise in yields also appears to have reflected a downward revision by investors of the likelihood that the Fed would introduce additional LSAPs or other unconventional easing measures. This change in mood, in turn, came as concerns were voiced about possible unintended consequences of such policy moves.

Whereas expectations of easing monetary policy in major advanced economies helped lift prices of risky assets, investors had to digest news that monetary policy was being tightened in a number of major emerging economies. Having rebounded quickly after the crisis and continued to grow briskly thereafter, many of these countries were seeing growing inflationary pressures. The Reserve Bank of India increased the repo rate for the sixth

Yields rise again in November

Emerging economies tighten policy

Negative real yields on US Treasury Inflation-Protected Securities (TIPS)

On 25 October 2010, the US Treasury for the first time ever issued TIPS[®] at a negative real yield. TIPS are bonds that pay coupons on a principal that is indexed to the US CPI, and that pay a principal at maturity that compensates for increases in the CPI since the bond was issued. At the auction, investors bought \$10 billion of 4½-year TIPS bonds, for which they paid \$105.51 for \$100.00 principal and a 0.50% coupon. The pricing of the bonds implied that the real yield to maturity was –0.55% annually, meaning that investors who bought this issue were expecting to lose over ½% annually on their investment in real terms.[®] Why did investors accept this deal?

The high prices paid at the auction were in line with the prevailing pricing in the TIPS market, where real yields had already fallen well below zero, in particular for short- to medium-term bonds (Graph A, left-hand panel). While real yields, together with nominal yields, had been falling throughout much of 2010, the slide accelerated following Federal Reserve Chairman Bernanke's Jackson Hole speech on 27 August, which investors saw as signalling additional Fed Treasury purchases (Large-Scale Asset Purchases (LSAPs)). In the two months after this event, the fall in real yields outpaced the decline in the nominal yields, eventually pushing real five-year yields below zero.

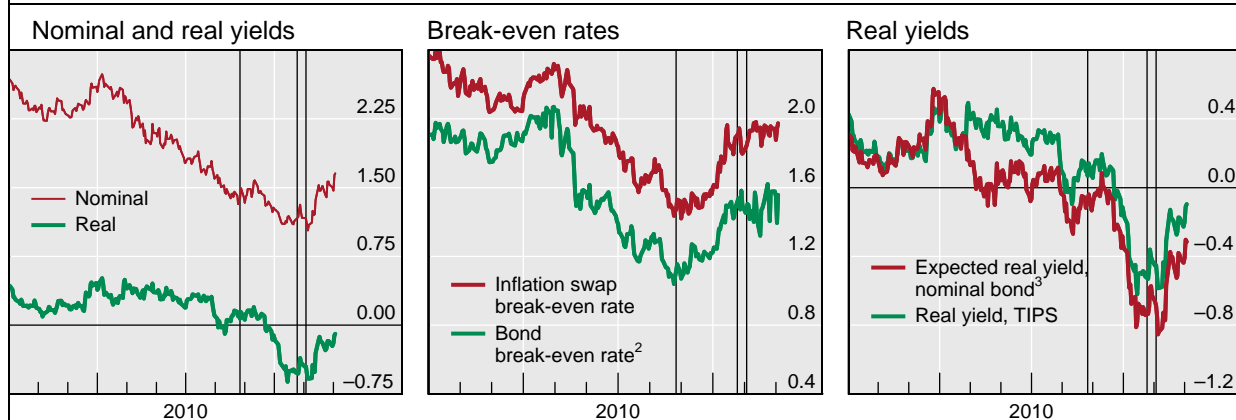
The drop in real yields mainly reflected increasing inflation compensation (expected inflation and inflation risk premium) among investors in September–October (Graph A, centre panel), in line with growing expectations of easier US monetary policy. In an environment where LSAP expectations were placing particular downward pressure on nominal yields, higher inflation expectations or inflation risk premia had to be accommodated by real yields dropping even more.[®]

There was little evidence to suggest that bond market-specific factors (such as bond liquidity considerations) were behind the rise in bond break-even rates. Inflation swap rates rose broadly in parallel with the bond break-evens in September–October.[®] If, instead, changing investor perceptions about the relative liquidity of the nominal and the index-linked bond market segments had been driving developments, the two break-even measures would probably have moved less in sync. The same argument would apply to the possibility that the bond break-even rate could have been “distorted” by expectations of Fed interventions in bond markets.

The negative real yields were also in line with the pricing of nominal bonds. For example, a rough measure of the *expected* real yield on five-year nominal Treasuries, obtained by subtracting the five-year inflation swap rate from the nominal yield, moved essentially in parallel with the real TIPS yield, and was also deeply negative on the day when the aforementioned TIPS auction took place (Graph A, right-hand panel).[®] This too suggests that there was nothing “odd” about the pricing of TIPS bonds around that time.

Five-year Treasury yields and break-even rates¹

In per cent



¹ The first vertical line represents 27 August, the day Federal Reserve Chairman Bernanke gave his Jackson Hole speech. The second line represents 25 October, the date of the TIPS auction discussed in this box. The third line represents 3 November, when the FOMC announced \$600 billion of additional purchases of Treasury securities. ² Based on zero coupon nominal and real yields. ³ Approximated as the nominal five-year Treasury yield minus the five-year inflation swap rate.

Sources: Bloomberg; BIS calculations.

Graph A

The negative real yields also reflected market expectations that future short-term real yields would be negative for some time. According to the standard expectations hypothesis, the yield on a Treasury bond reflects the average future short-term interest rate during the life of the bond plus a term premium component. This applies to nominal as well as real bond yields. With the Fed continuing to signal that it is committed to keeping the nominal fed funds rate close to zero for a prolonged period, short-term real interest rates will be negative for as long as inflation is positive. Hence, abstracting from term premia, TIPS yields should turn negative over maturities where average short-term real rates are expected to remain negative.

An additional factor contributing to higher TIPS prices, and hence lower real yields, is that these bonds incorporate an option-like feature that is valuable in times of high uncertainty about the future path of inflation. First of all, TIPS – in contrast to nominal bonds – offer investors insurance against inflation surprises. In addition, this inflation insurance is asymmetric. While investors are compensated for higher inflation by having the principal indexed to the CPI, the principal is not reduced in case of deflation.^⑥ Hence, TIPS investors benefit from deflation in the same way as nominal bond investors, but they receive the extra benefit of protection from rising inflation.^⑦ Put differently, TIPS have a built-in inflation option with a strike price of 0% inflation. This option, as any option, is particularly valuable when it is at the money (close to the strike price) and when uncertainty (volatility) is high. This essentially characterises the current US situation. It therefore adds further value to TIPS bonds, thereby depressing their yields more.^⑧ Thus, investors accepted a negative real yield in order to protect the principal from inflation while maintaining the option to benefit from possible deflation.

^⑥ These instruments are sometimes also referred to as Treasury Inflation-Indexed Securities (TIIS). ^⑦ This is unless the US CPI were to fall over the period until the maturity of the bond; see below. ^⑧ Investors widely anticipated that the Fed would concentrate almost all of its purchases in the nominal Treasury market. ^⑨ An inflation swap (zero coupon) pays the CPI inflation accrued on a notional value over the relevant maturity of the swap against a fixed payment, which reflects the inflation swap price. ^⑩ On 25 October, the date of the TIPS issue, the five-year nominal yield stood at 1.18% while the five-year inflation swap rate (which is a rough measure of expected inflation over the next five years) was 1.91%, implying an expected real yield on the nominal bond of around -0.73%. ^⑪ This is by construction. The US Treasury will repay the higher of par and the inflation-adjusted principal at maturity. ^⑫ There is still a small disadvantage for TIPS holders in case of deflation over the life of the bond, compared with holders of nominal bonds, in that the deflation floor applies only to the principal, not to the coupons. TIPS coupons are based on the inflation-adjusted principal, even if inflation turns out to be negative. ^⑬ This option is especially valuable for newly issued TIPS, which have not accrued much inflation and for which the principal therefore is close to par. As a result, yields on such bonds tend to be lower than for more seasoned bonds with similar outstanding time to maturity.

consecutive time this year in early November, while the People's Bank of China increased the benchmark deposit and loan rates by 25 basis points in October and announced two further 50 basis point hikes of the renminbi reserve requirement ratio for depository financial institutions in November. Equity indices in Hong Kong and Shanghai dropped sharply in mid-November as news of accelerating consumer prices in China spurred fears of additional policy moves.

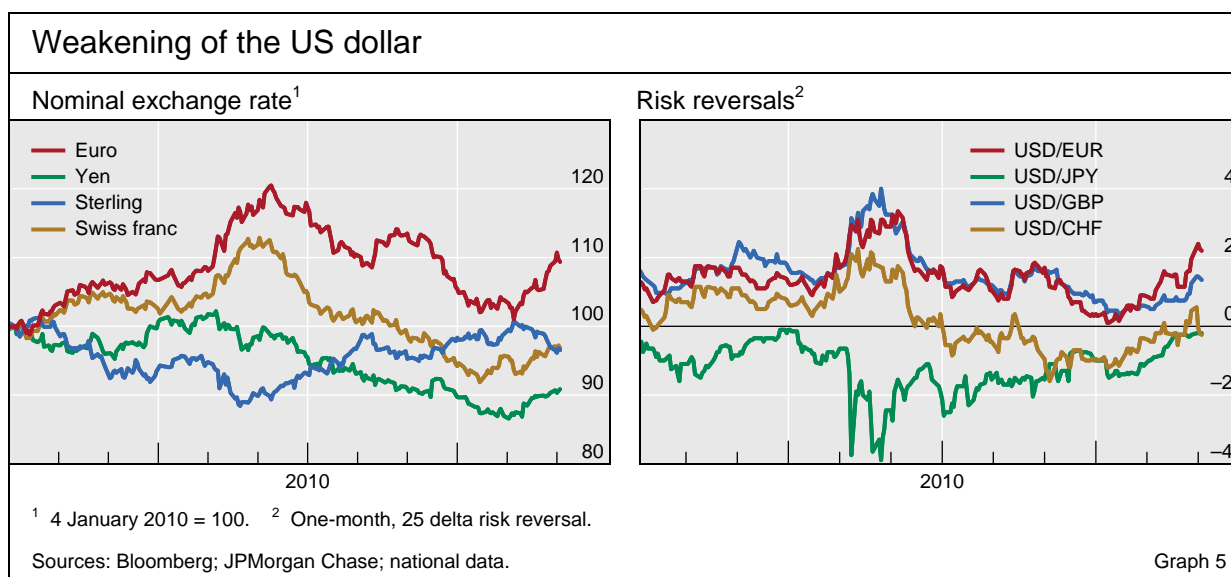
Capital flows increase and the US dollar depreciates

The US dollar depreciates ...

Between late August and early November, expectations of further US monetary easing contributed to a broad-based depreciation of the dollar (Graph 5, left-hand panel). As the dollar weakened, several countries, including China, Chinese Taipei, Japan and Korea, intervened in foreign exchange markets to avoid further currency appreciation.

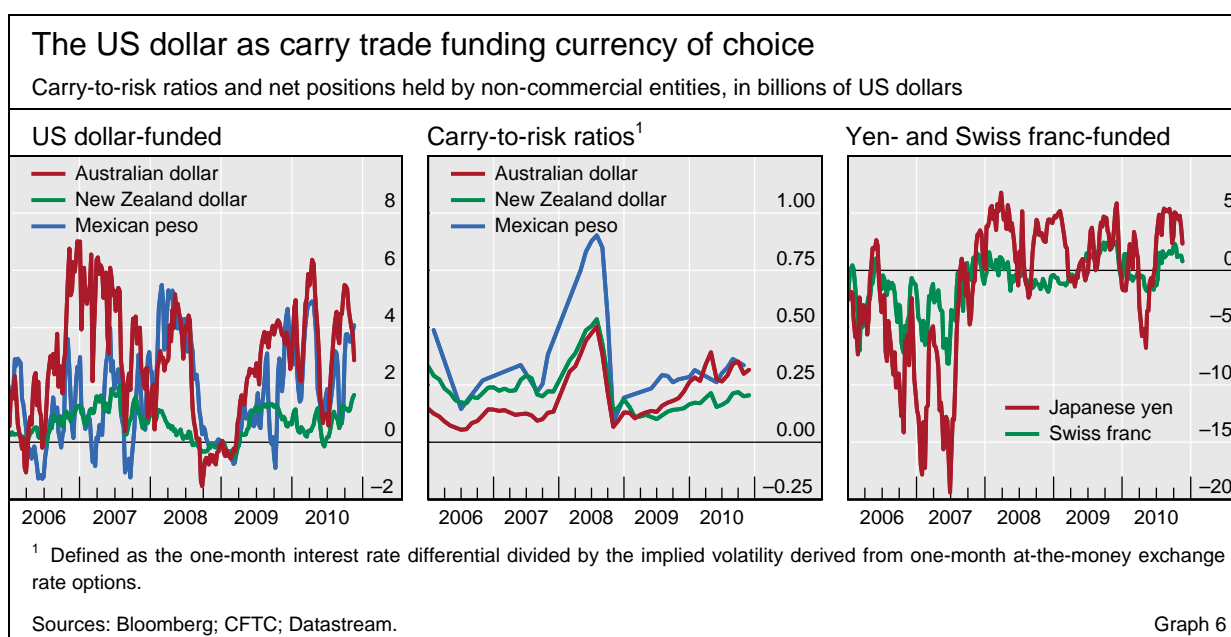
... and becomes the carry trade funding currency of choice

The low US interest rates combined with almost unidirectional expected exchange rate moves made the dollar the new funding currency of choice for FX carry trades. This can be seen from the price of risk reversals for the US



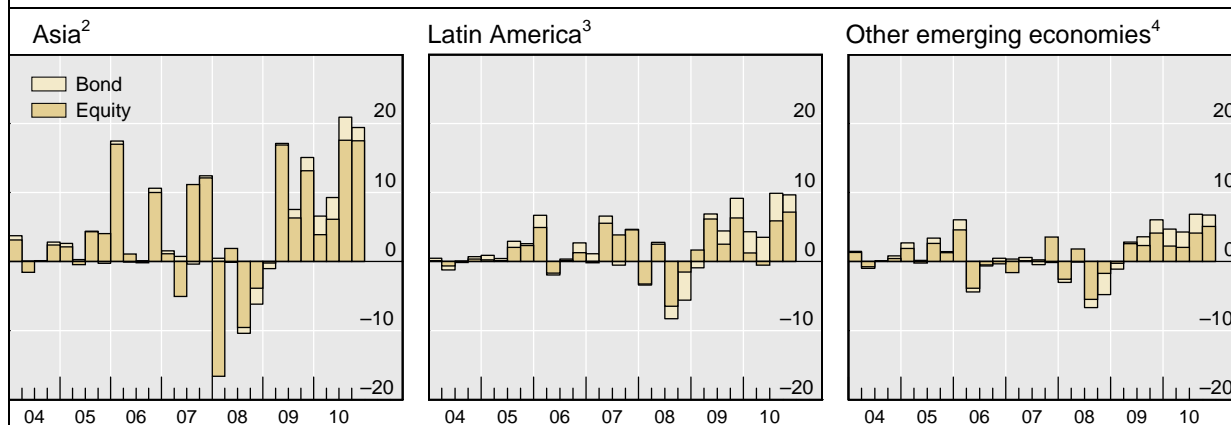
dollar against the major currencies. Risk reversals are defined as the price differential for two equivalently out-of-the-money options. They thus reflect option-market participants' relative willingness to hedge against appreciation and depreciation of the target currency, yielding a rough estimate of the skew (asymmetry) of the expected exchange rate movements. The risk reversal price for the period between late August and early November (Graph 5, right-hand panel) broadly confirmed that investors were willing to pay more for an out-of-the-money option that paid out if the dollar depreciated than one that paid out if the dollar appreciated.

Foreign exchange carry trade volumes are notoriously difficult to track due to lack of data. This partly reflects the fact that carry trades are often implemented through derivatives such as cross-currency positions in futures, forwards and swaps, for which reliable quantitative information is scarce. One can, however, obtain a sense of the direction of cross-currency carry trades using information on net positioning by non-commercial entities from the



Capital flows into emerging markets¹

In billions of US dollars



¹ Sums of weekly data until 1 December 2010; sums across economies listed. ² China, Chinese Taipei, Hong Kong SAR, India, Indonesia, Korea, Malaysia, the Philippines, Singapore and Thailand. ³ Argentina, Brazil, Chile, Colombia, Mexico, Peru and Venezuela. ⁴ The Czech Republic, Hungary, Poland, Russia, South Africa and Turkey.

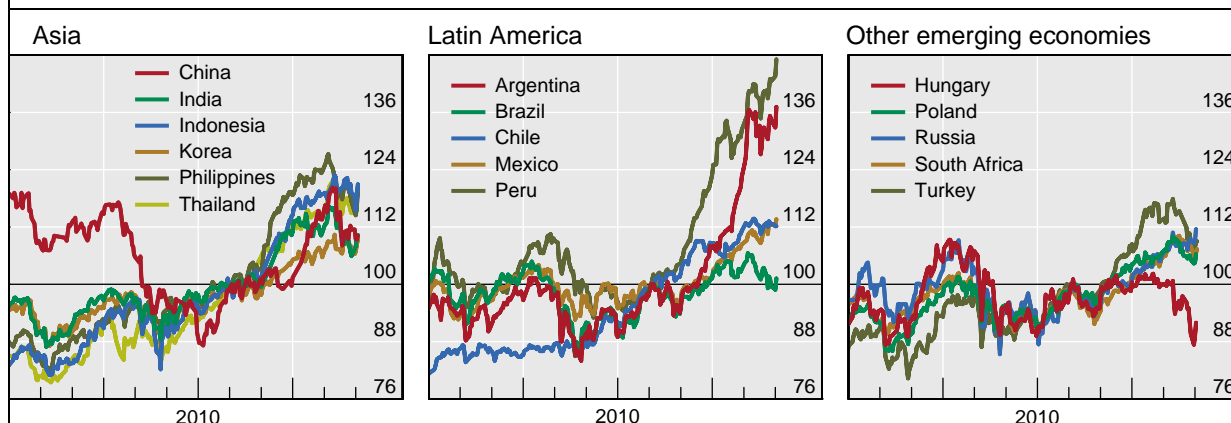
Source: EPFR.

Graph 7

Chicago currency futures markets. Non-commercial entities are those that do not have business in the underlying currency of the derivatives contract, including hedge funds and other non-bank financial institutions. This commonly used indicator clearly suggests that net short positions in US dollars increased from late August onwards, although they reversed somewhat as from early November. Target currencies included the Australian dollar, New Zealand dollar and Mexican peso. Positions involving the Australian dollar, in particular, reached levels last seen in 2006 and early 2007 (Graph 6, left-hand panel). This pattern is broadly in line with the relatively high forward-looking market-implied carry-to-risk ratios (Graph 6, centre panel). Rising net long positions in the yen and the Swiss franc, which have historically been the preferred carry trade funding currencies, were also consistent with expectations of US dollar weakening (Graph 6, right-hand panel).

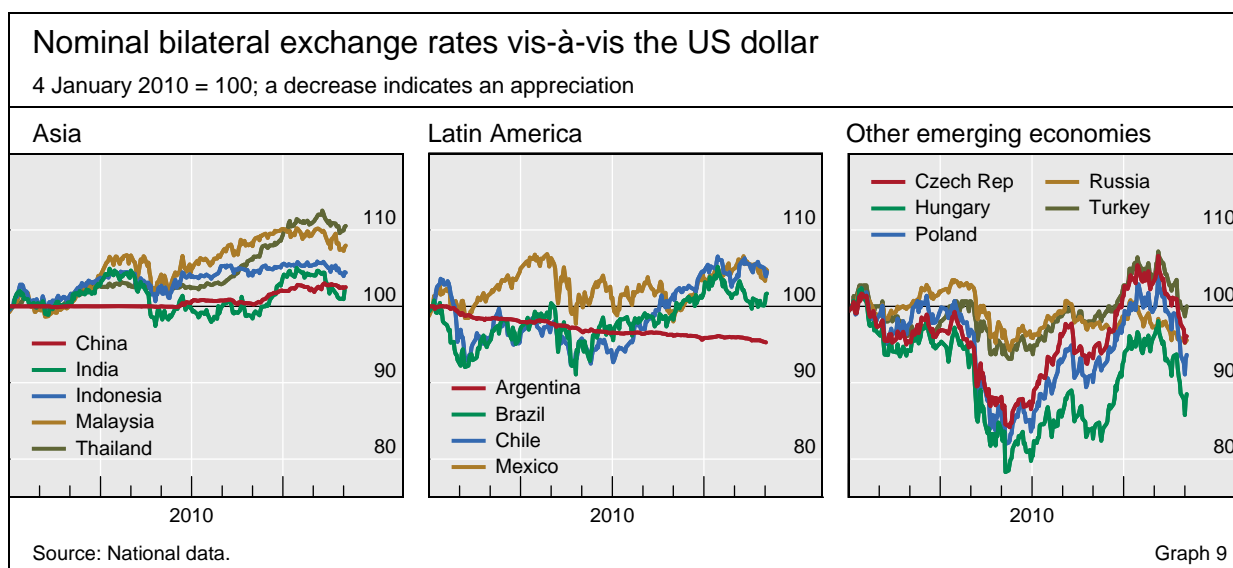
Emerging market equity prices

In local currency; 2 August 2010 = 100



Sources: Bloomberg; Datastream.

Graph 8



Between late August and early November, expectations of continued low growth and further monetary easing in the United States also led to an acceleration of capital inflows into higher-growth emerging market economies. Asia, in particular, saw a significant increase in equity inflows (Graph 7, left-hand panel). Latin America and other emerging market economies too experienced significant inflows into both equities and bonds (Graph 7, centre and right-hand panels). The acceleration of capital inflows was clearly reflected in higher equity prices in a number of emerging market countries (Graph 8) but was also visible in bond prices.

Continued capital inflows were accompanied by rapid appreciation of several emerging market currencies against the US dollar between late August and early November (Graph 9). Appreciation pressures were stronger for countries with high growth prospects and larger interest rate differentials. Appreciation was generally smaller for the currencies of countries that continued to manage their exchange rate fully or partially against the US dollar. As a result, appreciation was less pronounced in Asia, and China in particular.

Several countries resisted, or at least tried to moderate, rapid nominal exchange rate appreciation by a variety of means. These included further reserve accumulation, increased issuance of local currency bonds to foreign investors, and making domestic currency markets less attractive, inter alia by imposing higher taxes on foreign bond investors. Brazil increased its transaction tax on foreign fixed income investments in two steps from 2% to 6% during October, interrupting the upward trend of the Brazilian real compared with other regional currencies. The reduced attractiveness of real-denominated assets for foreign investors was also reflected in a significant spread widening between on- and offshore deposit rates. Thailand reduced the attractiveness of foreign portfolio investment by removing tax breaks for foreign investors on domestic bonds. In mid-November, Korea announced that it would reimpose a 14% tax on foreign investors' returns on government bond investments.

Capital flows into emerging economies increase ...

... leading to higher equity and bond prices ...

... and currency appreciation

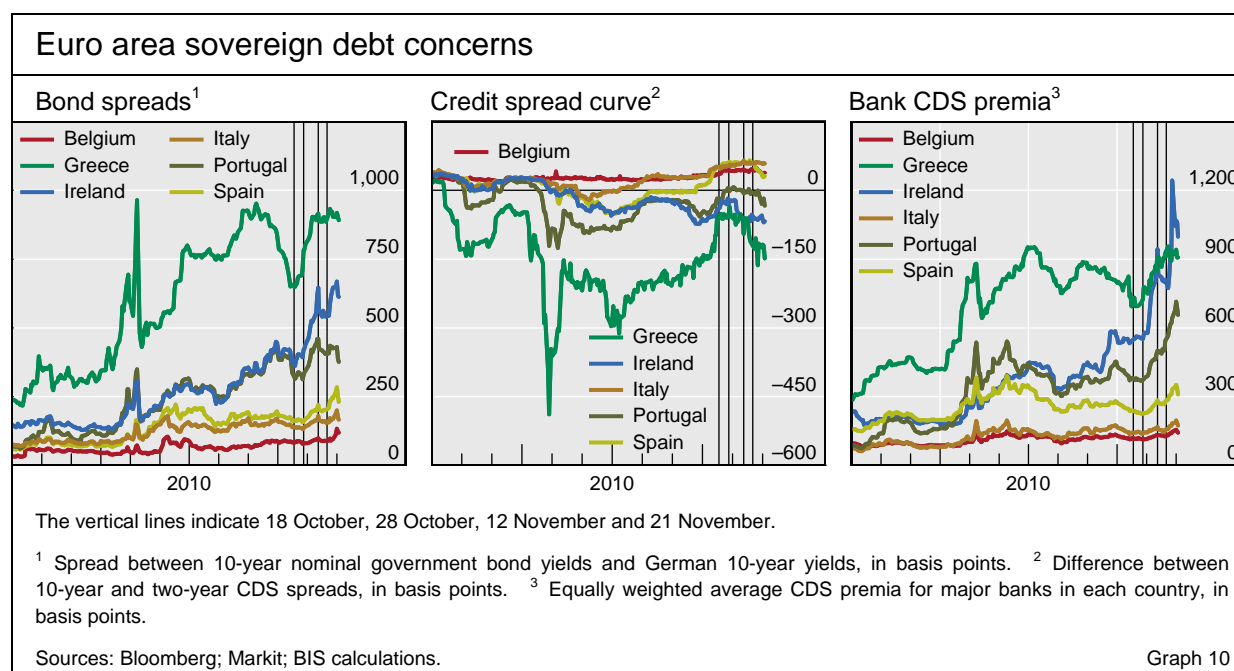
Euro area sovereign risk concerns resurface

Sovereign risk worries return ...

Concerns about credit risk in a number of economies in the euro area surged in late October and November. Irish government bonds came under particularly strong pressure, but Greek, Portuguese, Spanish and later Belgian and Italian government bonds were also affected (Graph 10, left-hand panel). Sovereign yield spreads between these countries and Germany continued to reflect concerns about their public finances and, in the case of Ireland, the budgetary impact of the banking problems. In this atmosphere, proposals to establish a crisis resolution mechanism that could impose losses on bond holders in situations where governments face financial distress contributed to a sharp increase in spreads and ultimately to a support package for Ireland.

... partly on the prospect of government bond haircuts

The surge in sovereign credit spreads began on 18 October, when the French and German governments agreed to take steps that would make it possible to impose haircuts on bonds should a government not be able to service its debt. Spreads widened further after a European Council statement on 28 October made it clear that other EU governments had agreed to the proposal. In the following two weeks, Irish spreads went up by more than 200 basis points and the CDS spread curve inverted (Graph 10, centre panel), indicating that market participants now saw a more immediate risk of a negative credit event.² To forestall further spread increases, the finance ministers of several European countries on 12 November reiterated that burden-sharing would apply only to bonds issued after 2013. This announcement brought merely a temporary calm. Focus quickly turned to the Irish banking system, which had grown more reliant on the central bank as repo market loans using Irish government bonds as collateral had become



² Credit events specified by CDS contract clauses include default on scheduled payments and involuntary debt restructurings.

prohibitively expensive. Irish banks' funding problems were clearly reflected in their credit spreads, which surpassed those of Greek banks (Graph 10, right-hand panel).

In the weeks that followed, the turbulence spread to several other euro area countries. Following intense investor and financial press speculation, policymakers responded by announcing on Sunday 21 November that Ireland would receive financial assistance in order to safeguard financial stability in the European Union as a whole. The support would be given in the context of a joint EU and IMF programme financed via the European Financial Stabilisation Mechanism (EFSM) and the European Financial Stability Facility (EFSF), supplemented by loans from other EU member states. Investors reacted positively to the announced support package, but the respite was short-lived due to a number of new developments. First, disagreements within the Irish coalition government resulted in an Irish election being called for early 2011. Second, on 24 November Standard & Poor's downgraded Irish government debt from AA- to A with a negative outlook, prompting further increases in Irish credit spreads. With no obvious new information as the trigger, investor attention turned first to Portugal and Spain and later to Belgium and Italy. Government bond and CDS spreads in those countries reached new highs.

Markets stabilised somewhat in early December in anticipation of possible ECB support. On 2 December, the ECB announced that it would continue to provide exceptional liquidity support via three-month financing at fixed rates with full allotment until April 2011. According to market commentary, the ECB also initiated bond purchases at larger than usual trade sizes on that same day. Yields fell by around 50 and 25 basis points on 10-year Irish and Portuguese bonds, respectively, in a just a few hours.

The impact of the Irish rescue package is short-lived ...

... as attention shifts to Portugal, Spain and later Belgium and Italy