Growth and inflation prospects take centre stage[1]

The devastating Japanese earthquake and tsunami and the associated nuclear crisis in early March resulted in a widespread but brief investor retreat to less risky assets. As uncertainty about the economic impact of these events subsided, investors refocused on global growth and inflation prospects as well as possible monetary policy responses. In May, concerns about euro area sovereign debt and the broader impact of any Greek debt restructuring increasingly weighed on investor sentiment.

As prospects for both global growth and inflation moderated over the period, bond yields declined in major developed countries. Prices of many commodities reached a plateau or even fell, lowering the near-term inflation outlook. Investors continued to expect strong growth in emerging economies, but cut back their growth expectations for the United States. The growth outlook for other major advanced economies remained subdued. Strong growth and continuing inflationary pressures from past increases in commodities prices prompted authorities in a number of emerging economies to tighten monetary policy further. Widening growth and interest rate differentials between emerging and developed economies resulted in a broad-based depreciation of the US dollar and capital inflows to emerging market bonds and equities.

As time progressed market participants became increasingly concerned about an eventual restructuring of Greek government debt. This, in turn, fuelled worries that such a restructuring could generate significant losses for European banks. Concerns about an ensuing slowing of economic growth led to a marked depreciation of the euro during May.

Focus on global growth and inflation follows earthquake shock

Japanese earthquake results in short-lived "flight to safety" …

The devastating 11 March Japanese earthquake, and the resulting tsunami and nuclear crisis, triggered a brief but widespread "flight to safety". In the days immediately following the earthquake, international equity indices fell sharply and government bond yields in all major developed markets declined as

[1] This article was produced by the BIS Monetary and Economic Department. The analysis covers the period to 25 May 2011. Questions about the article can be addressed to jacob.gyntelberg@bis.org, nick.vause@bis.org or goetz.von.peter@bis.org. Questions about data and graphs should be addressed to magdalena.erdem@bis.org or garry.tang@bis.org.

investors sought less risky assets (Graph 1). The first days after the disaster were marked by uncertainty about the severity of its economic repercussions and how these would affect asset returns, driving up implied volatilities in international government bond, equity and credit markets (Graph 2). But these effects largely reversed as uncertainty subsided and the Japanese and international authorities responded to events. By mid-April both international and non-Japan Asia equity indices were around 5% higher than immediately before the earthquake.

... and more persistent losses in certain markets

Even so, the disaster did generate more enduring losses in specific segments of financial markets, notably in the Japanese equity market. In late May, almost three months after the disaster, equity prices of Japanese utilities and financial companies were around 45% and 15%, respectively, below their pre-earthquake levels. This reflected investors' assessment of a much diminished future for nuclear energy in Japan and prospective insurance and credit losses. Equivalent indices for Japanese consumer goods and services sector firms also remained somewhat below pre-earthquake values. Internationally, nuclear energy and insurance companies were generally the sectors most affected, with market values failing to regain pre-earthquake levels. By contrast, valuations in other sectors generally recovered. The effects of the Japanese earthquake and tsunami are discussed in more detail in the box on pages 4–5.

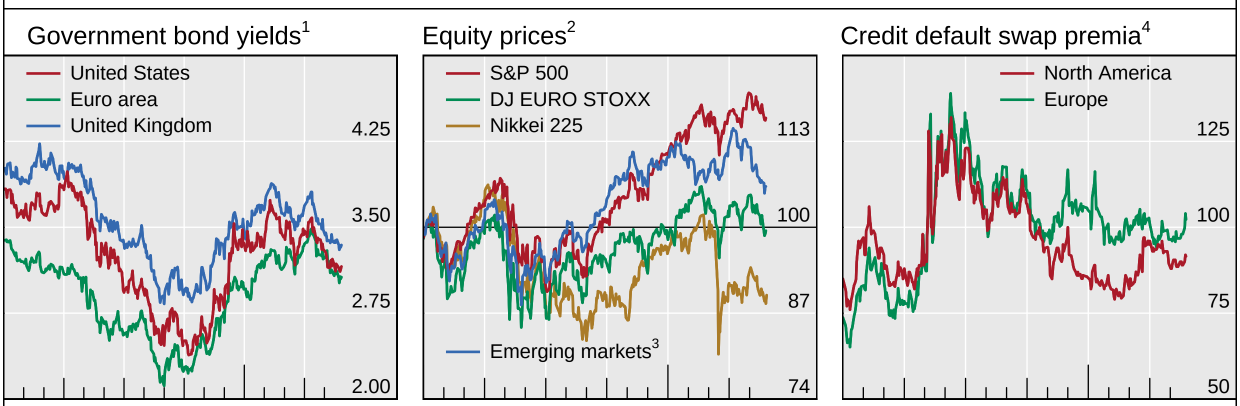
Weakening growth weighs on bond ...

Growth and inflation expectations took centre stage as the immediate consequences of the Japanese earthquake for financial markets began to subside. Government bond yields in the United States declined as market participants revised downwards their growth forecasts and pushed back their expectations of a tightening of monetary policy. Yields in other developed economies also fell (Graph 1, left-hand panel), thus reversing the trend of the previous six months.

... equity ...

With the notable exception of Japan, major international equity indices were broadly unchanged over the period under review (Graph 1, centre panel). They increased and decreased roughly in step with government bond yields,

Bond yields, equity prices and credit spreads

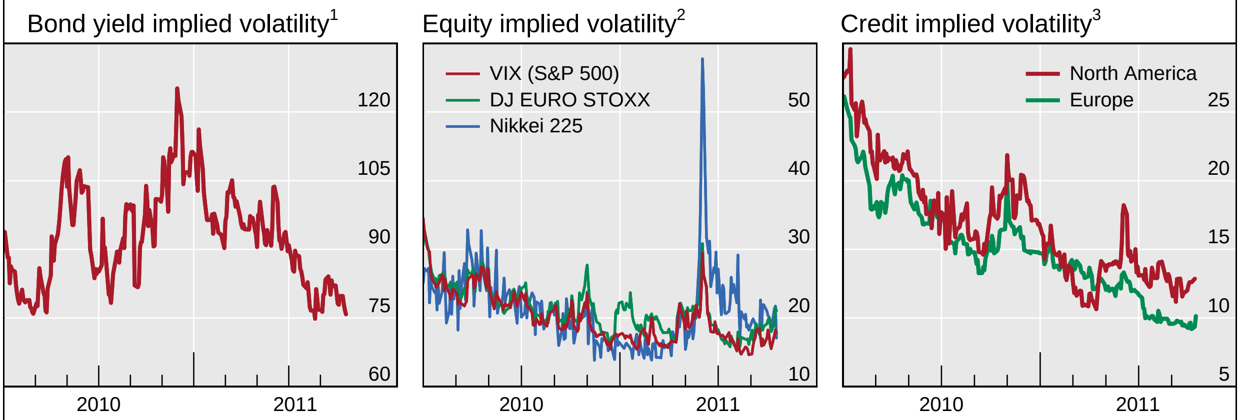


[1] Ten-year, in per cent. [2] 4 January 2010 = 100. [3] Average of Asian, European and Latin American emerging market equity indices. [4] Five-year on-the-run mid-spread on CDX North America and iTraxx Europe investment grade CDS indices, in basis points.

Sources: Bloomberg; Markit; BIS calculations.

Graph 1

Volatility in bond, equity and credit markets



[1] Merrill Lynch Option Volatility Estimate index; for US Treasury bonds. [2] Volatility implied by the price of at-the-money call option contracts on stock market indices, in per cent. [3] Volatility implied by the price of at-the-money one- to four-month option contracts on CDS indices (CDX High Yield and iTraxx Crossover), in basis points.

Sources: Bloomberg; Datastream; JPMorgan Chase. Graph 2

reflecting the influence of the same driving factors. In addition, growing concerns about public sector indebtedness appeared to depress equity prices in some countries. The escalation of concerns about Greek, Irish and Portuguese government debt in May (see the final section) weighed on equity values of European banks with significant holdings of these assets. It also seemed to undermine equity prices more broadly, with the DJ EURO STOXX index falling by over 5% in May, by increasing prospects for fiscal consolidation in the euro area, which investors saw as a drag on near-term economic growth. In the United States, Standard & Poor's attached a negative outlook to the government's AAA credit rating on 18 April, pointing to the need for fiscal consolidation.

… and credit markets

Changes in credit spreads were modest over the period, but nevertheless show some variation by region (Graph 1, right-hand panel). North American corporate credit default swap premia increased, while those of European companies were broadly unchanged or declined, for both investment grade and lower-rated credits. This probably reflects the divergent trends in growth expectations between the two regions during the review period. The median of forecasters' expectations for US growth in 2011 fell by around 25 basis points, while expectations for growth in Europe were essentially unchanged. Another factor may have been the approaching end of the Federal Reserve's second programme of asset purchases, which raised concerns that rising yields on Treasury bonds may have a negative impact on the prices of risky assets.

Abrupt decline in commodity prices

Commodity prices fall sharply in May …

The prices of a number of commodities fell sharply in early May (Graph 3, left-hand panel), thus reversing the upward trend of the previous two years. However, even before the surprisingly sharp drop, the pace of price increases had been subsiding. The string of bad harvests that had led to a doubling of the

The Japanese earthquake and tsunami

The destruction and human tragedy following the earthquake and tsunami in Japan have been huge. There was an immediate drop in economic activity due to damage to facilities, disruptions to supply lines and power shortages. Recent data releases show that household spending and production have plunged. Damage to the nuclear power plant in Fukushima and ensuing radiation leaks have added to the challenges. The possible implications of these events for the Japanese economy as well as the global economic outlook and financial markets are manifold, and uncertainties associated with these effects continue. Initial assessments by the Japanese Cabinet Office put the damage to the economy's capital stock at around $240 billion, which is more than double the damage following the Kobe earthquake in 1995. GDP declined by 0.9% on the previous quarter in the first three months of 2011. For the year, GDP growth is expected to be about 1 percentage point lower than earlier estimates.

Financial markets reacted very strongly in the immediate aftermath of the disaster (Graph A). The Tokyo stock market plummeted by almost 20% in the first two business days after the earthquake, and Japanese sovereign CDS spreads jumped by 30 basis points, probably reflecting concerns about the extra fiscal burden implied by reconstruction. The foreign exchange market was also very volatile, with the Japanese yen appreciating sharply against the US dollar, reaching a high of 76.3 on 17 March. Reportedly, this was driven by market speculation that Japanese insurance companies would repatriate US dollar funds to meet yen-denominated claims.

The Bank of Japan responded swiftly. To ensure ample liquidity, it offered funding of ¥82.4 trillion in the first week after the earthquake, of which ¥57.8 trillion was actually provided to the market. The Bank also increased the amount of its asset purchase programme by ¥5 trillion, to prevent a deterioration in risk sentiment from adversely affecting output. In response to the yen's sharp appreciation, the Ministry of Finance and the central bank, together with other G7 countries, embarked on a concerted intervention in the foreign exchange market.

On 6–7 April, the Bank of Japan unveiled a ¥1 trillion special lending facility to channel funds to banks for lending to distressed businesses in the affected areas, and broadened the range of eligible collateral assets for money market operations. In addition, the government announced a supplementary budget of ¥4 trillion for reconstruction purposes on 22 April. These measures supported market functioning despite the severity of the shock. Markets calmed quickly after their initial reaction: the stock market recovered somewhat; the yen retreated to trade in the range of 82–83 against the US dollar; and Japan's CDS spread declined.

Market reactions to the Tohoku Pacific earthquake

Nikkei 225[1] | Yen against US dollar and euro[1, 2] | Japanese sovereign CDS spread[3]

The vertical line indicates the date of the earthquake.

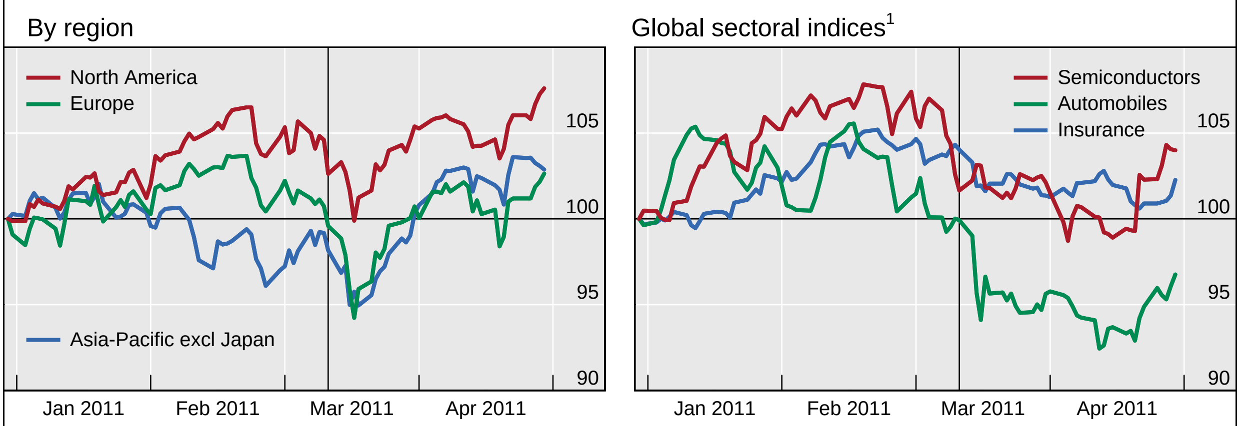
[1] 3 January 2011 = 100. [2] An increase indicates a yen appreciation. [3] Five-year spread, in basis points.

Source: Bloomberg. Graph A

Outside Japan, the impact on financial markets was limited, and largely confined to sectors seen as being most directly affected by supply chain disruptions or direct loss exposures. A primary concern in financial markets has been that an extended period of power shortages in Japan might adversely affect industrial production through global supply chains, given that Japan is a major producer of components for the semiconductor and automotive industries. Thus, while broad equity market indices have shown signs of resilience (Graph B, left-hand panel), certain sectoral indices fell sharply following the news of the disaster, and have subsequently recouped only part of their initial losses (Graph B, right-hand panel).

MSCI equity indices

In local currency; end-December 2010 = 100



The vertical line indicates the date of the earthquake.

[1] Relative to the MSCI Global index.

Source: Datastream.

Graph B

prices of agricultural commodities in the nine months to March 2011 came to an end, helping to stabilise prices. Weaker industrial production after the earthquake in Japan dampened the prices of industrial metals.

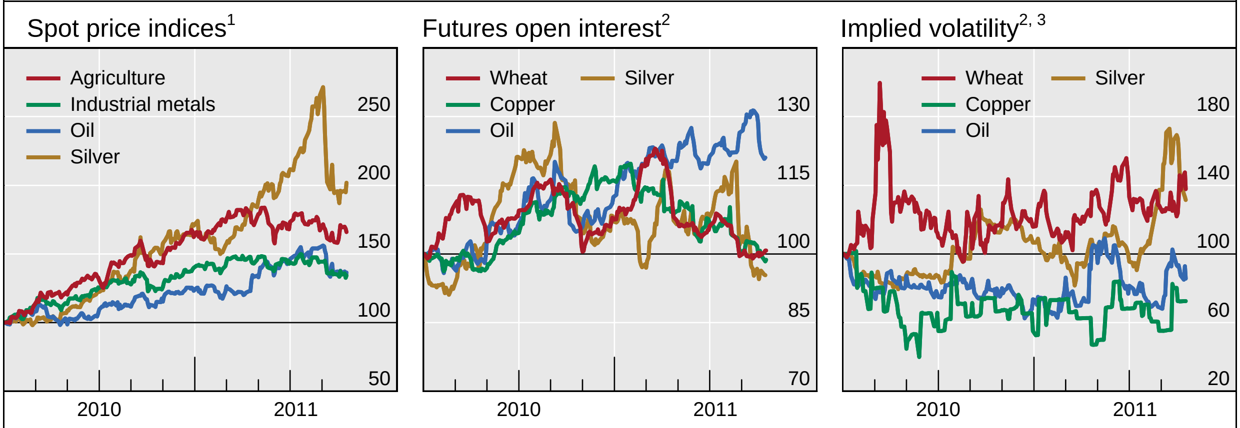
Oil turned out to be the main exception to the stabilisation of commodity prices. Prices rose by around 10% between March and early May as political tensions interrupted Libyan supplies, notwithstanding a commitment from the Organization of the Petroleum Exporting Countries (OPEC) in early March to offset this through an increase in its supply of oil. That said, this commitment may have contributed to reductions in implied volatilities of oil prices in March. Uncertainty about the future of nuclear energy following the disaster in Japan also put upward pressure on oil prices during the period.

… and financial investors withdraw

Prices of most commodities dropped sharply in a few days in early May. Silver prices plunged by 30% while oil prices fell by 10% during the same period. In both markets, increasing margin requirements significantly amplified initial price falls. Previous months' price increases had coincided with sizeable investments by financial investors seeking assets that would appreciate with global inflation. Open interest in commodity futures, which are the main financial instrument through which investors obtain exposure to commodity prices, rose significantly, in particular in the silver market. Moderating perceptions of global inflationary pressures following negative economic news in early May from the United States and Germany may have prompted some investors to close out their positions. Open interest in silver on futures markets

Commodity prices

1 July 2010 = 100



[1] S&P GSCI indices. [2] For copper, LME copper futures; for oil, NYMEX WTI crude futures; for wheat, CBOT wheat futures; for silver, COMEX silver 5000 troy oz. [3] Historical call implied volatilities for first generic futures contracts. For copper, COMEX copper futures.

Sources: Bloomberg; Datastream. Graph 3

fell by 15% on 6 May (Graph 3, centre panel). Since then, implied volatility for silver has risen sharply, suggesting that market participants perceive a risk of further sharp price falls (Graph 3, right-hand panel). In contrast, the implied volatility of oil prices is not especially elevated compared to levels of recent months.

Bond markets, inflation outlook and exchange rates

Near-term inflation outlook moderates …

Throughout the period under review, investors and policymakers remained focused on the inflationary impact of current and past changes in growth and commodity prices. Even though central banks around the world continued to face different growth outlooks for their economies, bond market prices indicated that near-term inflation expectations declined somewhat across the major mature economies between early March and late May. As growth expectations retrenched from April onwards, US, euro area and UK market-implied near-term inflation rates also fell (Graph 4). At the same time, the uncertainty surrounding near-term inflation developments earlier in the year dissipated somewhat. Implied near-term inflation volatility, inferred from the prices of two-year options on inflation, trended down for much of the period, particularly for the United States (Graph 4).

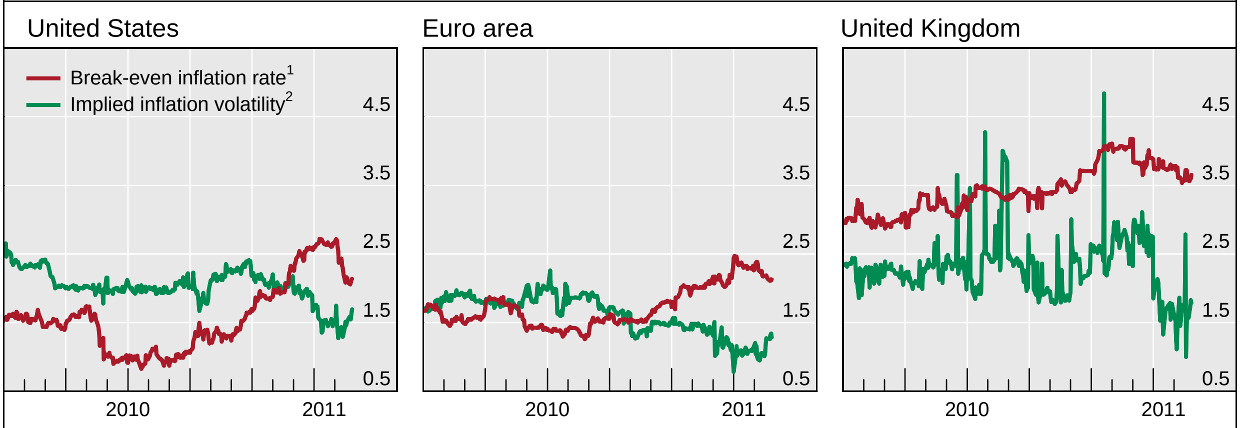
… and inflation uncertainty declines

Investors price in later US and UK policy rate hikes

Market participants pushed back the expected timing of the first increase in policy rates in the United States and the United Kingdom. The Federal Reserve kept the federal funds rate target unchanged throughout, despite increases in market-implied near-term inflation until mid-April. Afterwards, the moderating outlook for short-term inflation and the renewed commitment to keep rates low for an extended period, made at the first ever press conference on 27 April following a meeting of the Federal Open Market Committee, led investors to reprice the odds of an early increase in interest rates. By late May, market-implied forward rates indicated that market participants expected policy

Short-term break-even inflation rates and inflation volatility

In per cent



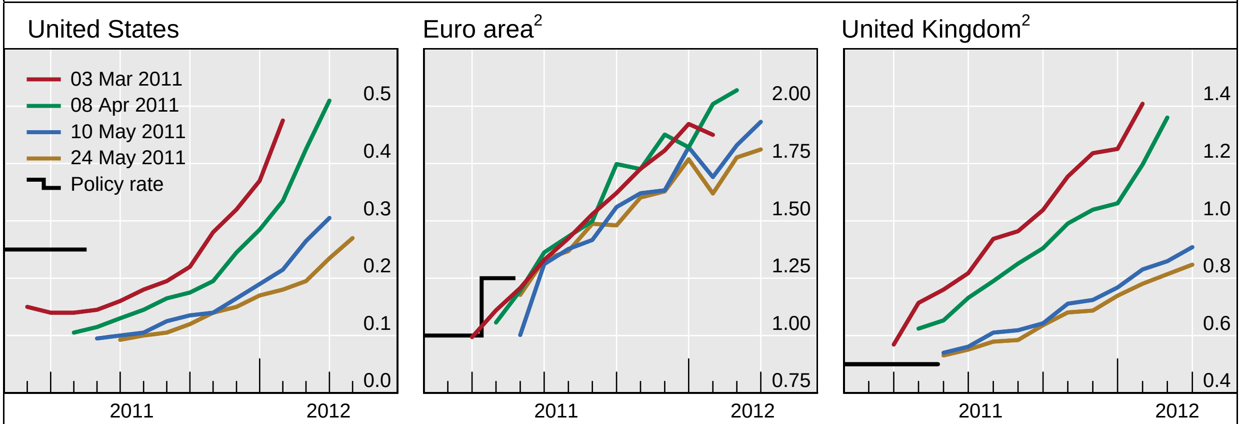
[1] Based on two-year inflation swap prices. [2] Backed out from two-year inflation cap prices, using the model of F Black, "The pricing of commodity contracts", *Journal of Financial Economics*, 3, 1976, pp 167–79, assuming a flat term structure of implied forward volatilities in the pricing of the series of caplets embedded in the cap.

Sources: Bloomberg; BIS calculations. Graph 4

rates to remain stable until late 2011 (Graph 5, left-hand panel). The Fed's decision to keep policy accommodative at its April meeting also led to declining US government bond yields and a weakening of the dollar. By contrast, oil prices and equity prices rose, sending benchmark equity indices to near three-year highs.

Market participants also revised their expectations about when the Bank of England might respond to rising inflation and increase policy rates. Market-implied forward rates indicate that investors put significant odds on a rate hike at the meeting of the Monetary Policy Committee in early March (Graph 5, right-hand panel). They pushed back the expected timing of the first rate hike when the expected increase did not materialise. In the subsequent months, market participants continued to revise their expectations in response to moderating inflationary pressures.

Implied forward interest rates[1]



[1] For the United States, federal funds futures; for the euro area, EONIA forward rates; for the United Kingdom, SONIA forward rates. [2] One-month rates implied by overnight index swaps.

Sources: Bloomberg; BIS calculations. Graph 5

In Europe, signs of a more robust recovery early in the period reinforced expectations that inflation had reached levels high enough to prompt increases in the ECB policy rate (Graph 5, centre panel). This contrasted with the pattern seen during most of 2010, when the expected timing of rate hikes had been repeatedly pushed further into the future. By early March, implied forward interest rates indicated that the first euro area tightening move was likely to occur in April. In line with expectations, the ECB on 7 April raised the main refinancing rate by 25 basis points to 1.25%. The hike had been signalled in speeches, and forward rate developments during March indicated that the move was broadly anticipated by market participants. By mid-May, implied forward interest rates indicated that the next ECB policy tightening was expected in July. At its May meeting, the Governing Council kept the policy rate at its new level, which the ECB characterised as "still accommodative".

Real bond rates decline

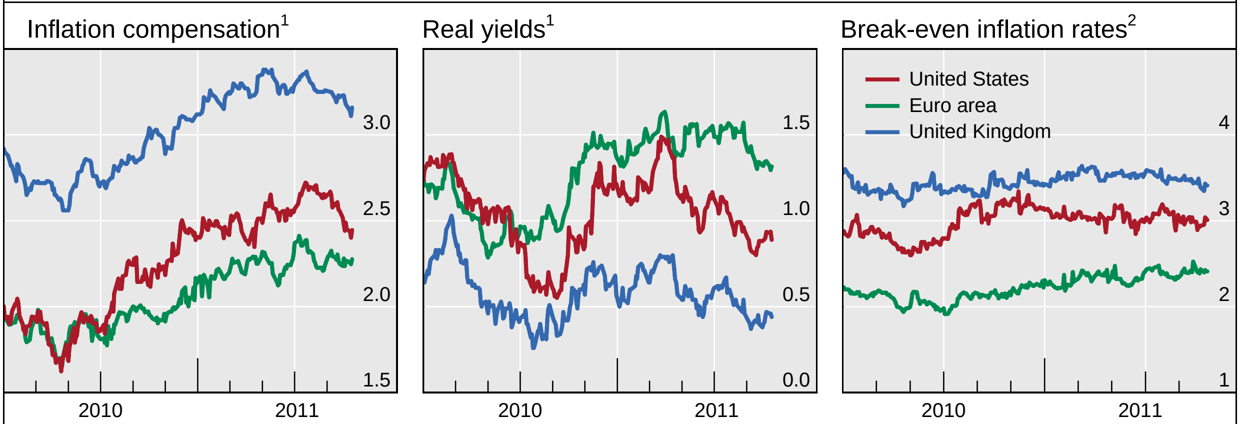
The combination of a weaker recovery and the prospect of postponed monetary policy tightening drove the decline in long-term government bond yields across major mature economies. In the UK case, the decrease in nominal yields reflected both a gradual decline in compensation for inflation and falling real rates (Graph 6, left-hand and centre panels). In contrast, declines in both the euro area and US 10-year nominal yields were due mainly to lower real yields. Finally, bond market implied inflation expectations for the euro area, the United Kingdom and the United States remained stable (Graph 6, right-hand panel). On balance, therefore, investors appeared to view the very gradual normalisation of monetary policy priced into futures markets as still consistent with stable longer-run inflation.

Tighter monetary policy in emerging markets

Monetary policy in most emerging market economies was on an entirely different track from that in the major advanced economies. The central banks of China, India, Brazil and several other emerging markets all tightened policy in response to inflationary pressures from commodity markets and strong economic activity. The People's Bank of China further increased bank reserve requirements by a total of 150 basis points during the review period, bringing

Decomposition of 10-year government bond yields

In per cent

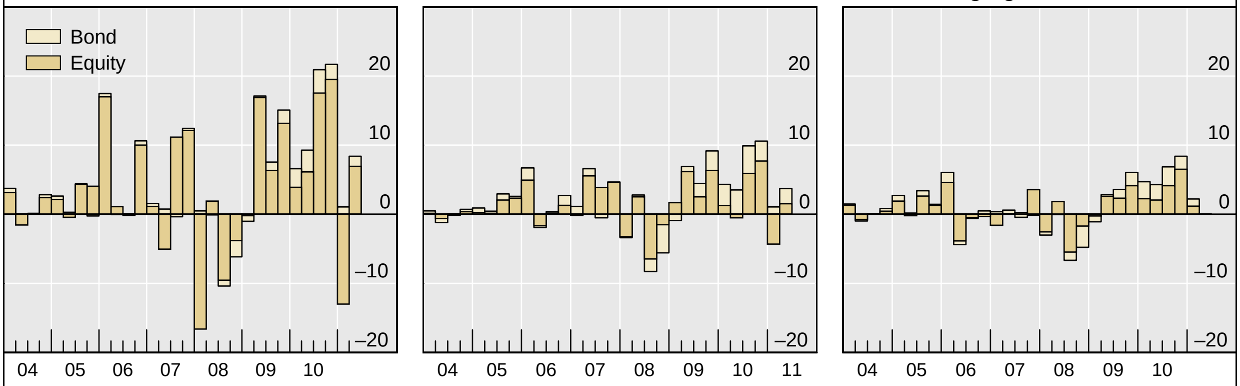


[1] Contribution to 10-year nominal yield from inflation compensation and the real yield over 0–10 years. All rates are zero coupon rates. [2] Five-year-ahead five-year break-even inflation rates from inflation swaps.

Sources: Bloomberg; national data; BIS calculations. Graph 6

Capital flows into emerging markets[1]

In billions of US dollars



[1] Sums of weekly data up to 18 May 2011 across the 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

the ratio to 21%. The Reserve Bank of India raised its repo rate by a total of 75 basis points to 7.25%. And the Central Bank of Brazil increased the SELIC target rate to 12%. Real policy rates however remained below zero in several countries.

High growth and interest rate differentials drive capital flows and currency markets

Differing monetary policy trajectories and growth paths between developing and developed markets help explain shifts in capital flows into emerging markets and movements in exchange rates. Emerging market bond and equity funds saw inflows during April and May, after flows in the opposite direction in the first quarter of the year (Graph 7). The US dollar depreciated against many currencies for much of the review period (Graph 8, left-hand and centre panels).

Fiscal concerns return to euro area government bond markets

Sovereign debt concerns return

Investor attention returned to the sustainability of public finances in the euro area, particularly in Greece, Ireland and Portugal. Yields on Greek, Irish and Portuguese government bonds rose during April and May, mainly driven by more negative assessments of the countries' repayment capacities (Graph 9, left-hand panel). Also, during the period as a whole, sovereign CDS spreads increased more at the shorter end of the maturity spectrum (Graph 9, centre panel). This development is consistent with the view that a credit event in the near term was perceived as more likely by investors.[2]

Credit spreads soar …

All three countries were downgraded by major credit rating agencies during the period. The cost of credit protection on sovereign debt advanced through April, with spreads of CDS referencing one-year debt shooting up to over 2,000 basis points for Greece, 800 basis points for Ireland and 720 basis

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

points for Portugal. Although CDS spreads have a mixed record as predictors of default, the rapid increase in short-term spread levels underscored the rise in investors' near-term concerns. A series of missed deficit targets in Greece added to the negative investor sentiment, prompting bond yields to rise significantly in the space of a few weeks.

With large fiscal deficits and continued low growth, Portugal became the third euro area sovereign to seek financial assistance on 6 April. The request came after a fiscal austerity package was voted down in parliament and the prime minister resigned on 23 March, pushing Portuguese bond yields noticeably higher.

... despite policy efforts

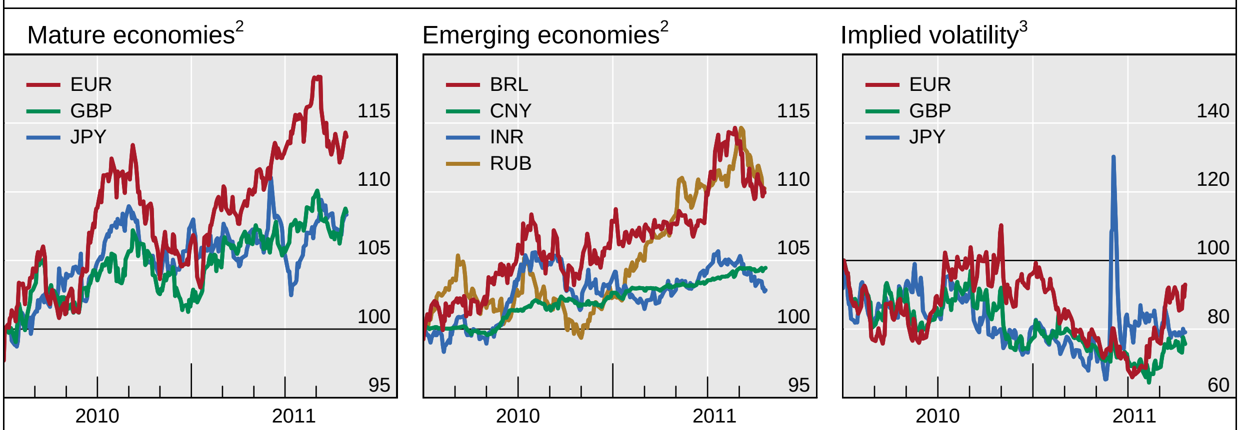
Credit spreads remained elevated even as policymakers successfully negotiated a three-year programme for Portugal. While both bond yields and credit spreads continued to reflect significant investor concerns, they also indicated that market participants were increasingly taking a more differentiated view across euro area sovereign borrowers. For most of the period until the end of May this decoupling was most visible for Italy and Spain, whose spreads over German government bonds remained relatively stable. In the case of Spain, this probably reflects the perceived progress in implementing fiscal adjustments and banking reforms. Progress on the consolidation of Spanish "cajas" (savings banks) has also allowed recapitalisation needs to be better gauged, thereby reducing investor uncertainty.

Another positive development was seen for Ireland. Here the mandated stress tests of Irish banks in late March pointed to bank recapitalisation needs of €24 billion, notably less than originally provisioned for in the support programme. This outcome met with a mildly positive sovereign bond market reaction and lower bank CDS spreads (Graph 9, right-hand panel), suggesting that market participants regarded the stress tests as credible.

Concerns about Greek debt reach new highs

At the same time, developments in Greece continued to test both policymakers and investors. By mid-May, Greek government bond yields as well as credit spreads reached new highs, apparently reflecting market

Exchange rates against the US dollar[1]

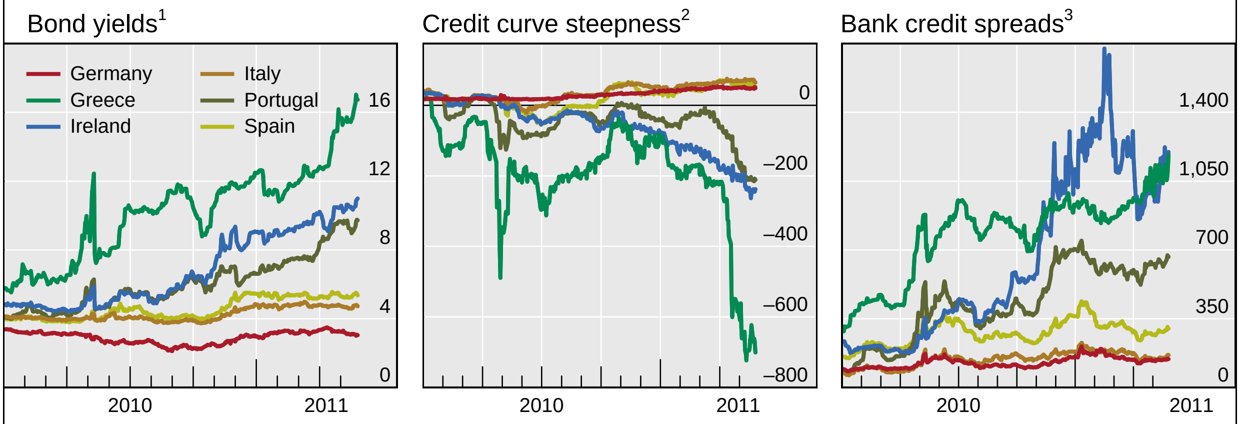


BRL = Brazilian real; CNY = Chinese renminbi; EUR = euro; GBP = pound sterling; INR = Indian rupee; JPY = Japanese yen; RUB = Russian rouble.

[1] 1 July 2010 = 100. [2] An increase indicates an appreciation against the US dollar. [3] One-month option implied volatility.

Source: Bloomberg. Graph 8

Euro area sovereigns and banks



[1] Ten-year government bond yields, in per cent. [2] Difference between 10-year and two-year CDS spreads, in basis points. [3] Equally weighted average of senior five-year CDS spreads of selected banks.

Sources: Bloomberg; Markit; BIS calculations. Graph 9

participants' view that a voluntary restructuring could occur in the near term. This perception in part reflected statements by European policymakers, even though no formal decisions had been taken and programme reviews were still under way. Towards the end of May, concerns about euro area sovereign debt and the broader impact of any Greek debt restructuring increasingly weighed on investor sentiment.

The cost and composition of funding for euro area banks has continued to reflect the deterioration in sovereign creditworthiness. In addition, domestic and foreign exposures to government bonds continued to raise concerns about European banks (see the Highlights section). Credit spreads for banks in fiscally strained European countries remained well above those for other banks (Graph 9, right-hand panel). Also, Greek, Irish and Portuguese banks continue to have limited access to private market funding, with small-scale debt issuance confined to covered or guaranteed bonds, and have become reliant on central bank liquidity, which funds 18%, 8% and 7% of their total assets, respectively.

Euro drops on debt concerns

The intensifying concerns about Greek, Irish and Portuguese debt also had repercussions for the euro area as a whole. The euro depreciated against many currencies in May, and uncertainty about near-term movements in the exchange rate increased markedly, as reflected for example in the implied volatility of the euro-dollar rate (Graph 8, right-hand panel).