1 Risks from the international financial system

Sustained low interest rates have helped to stimulate economic recovery and underpin global financial markets, despite a number of adverse shocks. While there are a few signs of overheating in localised markets, there is no evidence of risk being systematically underpriced in financial markets.

But downside risks to stability remain. Sovereign and banking concerns are elevated in parts of Europe. Bond yields internationally are susceptible to a reversal from current low levels, which might lead to volatility in financial markets. And there are risks from changing conditions in funding markets, given banks' continuing use of potentially unstable sources of liquidity.

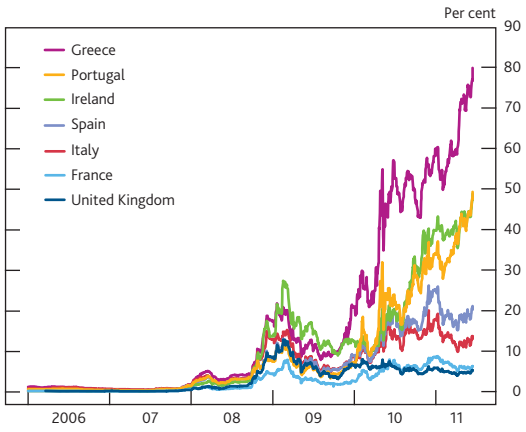
Table 1.A *Systemic Risk Survey*: key risks to the UK financial system[a][b]

	Nov. 2009	May 2010	Oct. 2010	May 2011
Economic downturn	68	67	83	69
Sovereign risk/public debt	24	69	39	65
Funding and liquidity problems	35	31	44	46
Regulation/taxes	49	41	45	32
Property price falls	27	28	41	31
Financial market disruption/dislocation	30	28	27	28
Household/corporate defaults	49	17	19	26

Sources: Bank of England *Systemic Risk Surveys* and Bank calculations.

(a) Per cent of respondents citing each risk. Market participants were asked to list (in free format) the five risks they believed would have the greatest impact on the UK financial system if they were to materialise. Risks cited in previous surveys have been regrouped into categories used to describe the latest data. Only risks that have been in the top five in at least one of the above surveys have been included in the table.
(b) The May 2011 survey was carried out between 19 April and 20 May 2011.

Chart 1.1 Mechanical market-implied default probabilities over the next five years for selected European sovereigns[a]



Sources: Markit Group Limited and Bank calculations.

(a) Probability of default, derived from CDS premia, from the perspective of a so-called 'risk-neutral' investor that is indifferent between a pay-off with certainty and an uncertain pay-off with the same expected value.

This section focuses on risks to UK banks from the international financial system. The rest of the *Report* examines: the credit risks faced by UK and key international banks from their exposures to sovereigns, banks and the real economy (Section 2); the resilience of the UK financial system to market and credit risks (Section 3); and, against this backdrop, the outlook for financial stability and the policy actions that the FPC advises to reduce risks to the financial system (Section 4).

Risks from the international financial system remain high. In the Bank of England's May 2011 *Systemic Risk Survey*, the proportion of respondents citing sovereign risk as a key threat to the UK financial system increased to 65%, from 39% in October last year (**Table 1.A**). Among other financial system risks, the proportions citing funding and liquidity problems and financial market disruption/dislocation were largely unchanged, but remain significant.

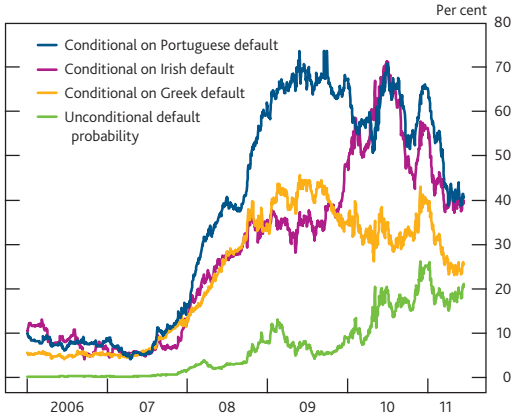
1.1 Developments in the international financial system

Markets have faced adverse shocks, including sovereign and banking strains in parts of Europe…

Global capital markets have been subject to a number of adverse shocks since the December 2010 *Report*, including continued sovereign stresses in the euro area. In May, Portugal became the third euro-area country to seek financial support from European authorities and the IMF. Sovereign credit default swap (CDS) premia for Portugal, Greece and Ireland have risen to new highs, suggesting significant ongoing market concern about the sustainability of countries' fiscal plans (**Chart 1.1**).

Markets also remain concerned about a broadening of problems to other euro-area countries. In the event that

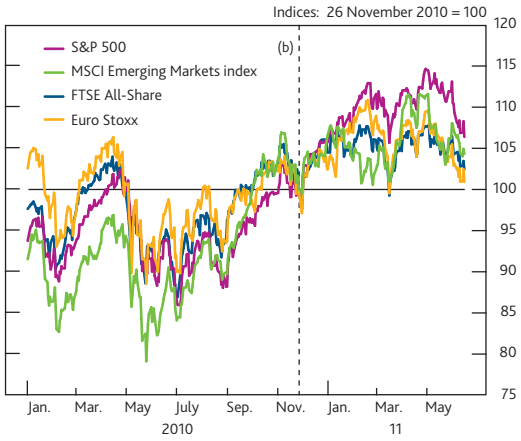
Chart 1.2 Mechanical market-implied default probabilities over the next five years for Spanish sovereign debt(a)



Sources: Markit Group Limited and Bank calculations.

(a) Probability of default, derived from CDS premia, from the perspective of a so-called 'risk-neutral' investor that is indifferent between a pay-off with certainty and an uncertain pay-off with the same expected value.

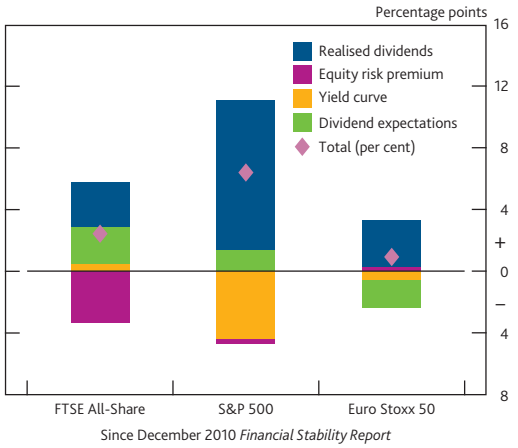
Chart 1.3 International equity indices(a)



Sources: Bloomberg, Thomson Reuters Datastream and Bank calculations.

(a) Denominated in units of local currency except for MSCI Emerging Markets index which is denominated in US dollars.
(b) December 2010 *Report*.

Chart 1.4 Contributions to changes in international equity indices(a)



Sources: Bloomberg, Thomson Reuters Datastream and Bank calculations.

(a) As implied by a multi-stage dividend discount model. See Panigirtzoglou, N and Scammell, R (2002), 'Analysts' earnings forecasts and equity valuations', *Bank of England Quarterly Bulletin*, Spring, pages 59–66.

countries requiring financial support default, the market is attaching a somewhat higher weight to other euro-area countries coming under stress (**Chart 1.2**). Contagion risk could be amplified by uncertainty over where sovereign exposures ultimately lie or doubts over whether any voluntary debt restructuring would trigger a 'credit event' for CDS. Credit risks for UK banks from developments in the euro area are discussed in Section 2.

…and shocks in the Middle East, Japan and the United States…

Outside of Europe, there have been other shocks. Over the past six months, the Middle East and North Africa have experienced major political unrest, contributing to a sharp rise in the oil price. In March 2011, Japan was hit by a severe earthquake and tsunami. Japan's sovereign rating was put on negative watch by various credit rating agencies as a result, with Standard & Poor's having already downgraded Japan's sovereign rating from AA to AA- in January. And in April, Standard & Poor's revised its outlook on the US AAA rating from stable to negative watch, implying it sees a one-in-three chance of a downgrade over the next few years. The agency cited a lack of clarity over US fiscal policy towards tackling the size of the US budget deficit and rising government indebtedness. Since mid-May, the US Government has had to implement special measures to stay below its debt ceiling.

…but conditions in financial markets held firm for much of the period since the December Report…

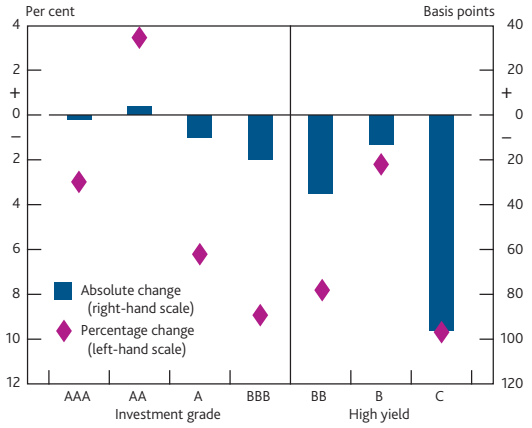
Against this backdrop of adverse shocks, asset prices have generally edged higher since the December 2010 *Report*, despite some falls in May and June. Equity prices rose marginally in the United Kingdom and euro area but more strongly in the United States (**Chart 1.3**). This appeared to reflect a larger rise in realised dividends in the United States (**Chart 1.4**). In debt markets, corporate bond spreads generally narrowed, particularly for higher-yielding debt (**Chart 1.5**). Changes in CDS premia for indices of US and European non-financial companies also suggested improved sentiment for higher-yielding debt relative to investment-grade debt.

Indicators of market risk appetite do not point to a particular strengthening of sentiment overall (**Chart 1.6**). Measures of market volatility fell during much of the period, however, and reached levels close to those last seen in 2007 (**Chart 1.7**). This was despite significant price movements in commodity markets during the spring. Commodity exposures have accounted for a growing proportion of large complex financial institutions' (LCFIs) total Value-at-Risk in recent years.

…helped by improvements in global economic conditions…

Improvements in near-term global growth prospects earlier in the year helped to underpin financial markets, though downside risks have increased more recently. Growth

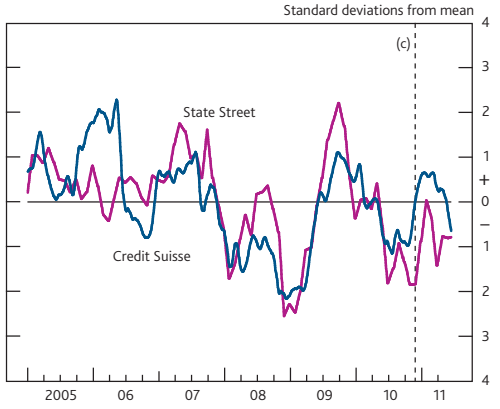
Chart 1.5 Change in US corporate bond spreads by rating[a]



Sources: Bank of America Merrill Lynch Global Research and Bank calculations.

(a) Change in option-adjusted spreads since December 2010 *Report*.

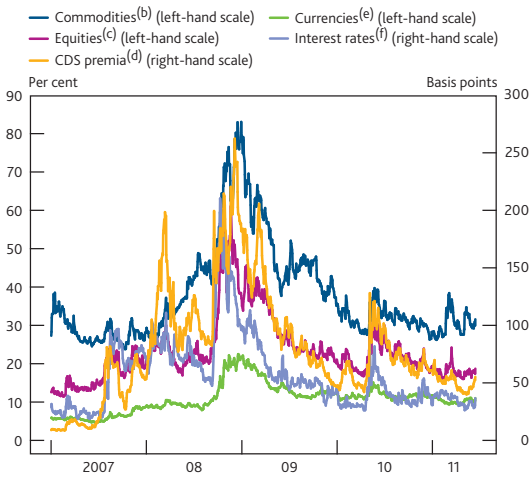
Chart 1.6 Indicators of risk appetite[a][b]



Sources: Bloomberg, Credit Suisse and Bank calculations.

(a) Indices are converted to a 20-day moving average, adjusted so that positive numbers indicate increased risk-taking and negative numbers indicate reduced risk-taking.
(b) Mean and standard deviation calculated from 28 July 2004.
(c) December 2010 *Report*.

Chart 1.7 Implied volatilities[a]



Sources: Bloomberg, British Bankers' Association, Chicago Mercantile Exchange, JPMorgan Chase & Co., NYSE Euronext (European) Cash products and Bank calculations.

(a) Three-month option-implied volatilities.
(b) West Texas Intermediate crude oil.
(c) Average of FTSE 100, S&P 500 and Euro Stoxx 50.
(d) Average of five-year on-the-run iTraxx Europe main and CDX North America investment-grade.
(e) Average of USD/EUR, EUR/GBP and USD/GBP.
(f) Average of three-month short sterling, eurodollar and Euribor.

prospects in major advanced countries have changed unevenly (**Chart 1.8**). In emerging economies, growth prospects have remained robust. But there are market concerns about possible overheating in some areas following a period of strong credit growth and high and rising inflation.

…which have led to a redistribution of capital within the global financial system.

These developments have contributed to a modest shift in the global pattern of financial flows towards advanced economies. Following very strong inflows in 2009 and 2010, there were outflows from dedicated emerging-economy equity funds during 2011 Q1 (**Chart 1.9**). Meanwhile, flows to advanced-economy and global equity funds picked up strongly following outflows during much of 2010. Geopolitical concerns may have contributed to the outflows from emerging-economy funds. But market participants suggest a reassessment of economic prospects relative to advanced countries was the most important factor. Inflows to emerging-economy funds resumed in 2011 Q2. Given better long-term growth prospects in emerging economies and their small share of major institutional investors' overall portfolios, strong portfolio flows to emerging economies may persist for the foreseeable future.

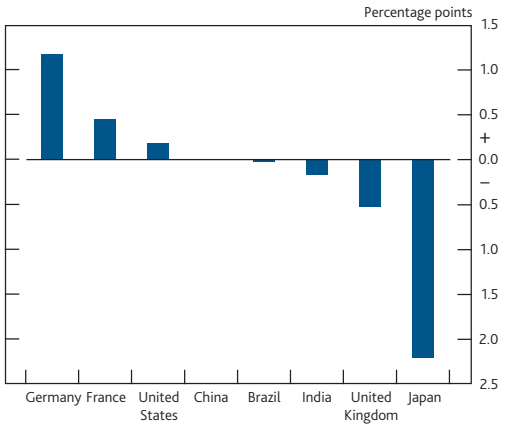
Cross-border bank lending, another major component of international capital flows, has proved highly cyclical. Since the onset of the financial crisis, total cross-border lending has been subdued. Lending to advanced countries has been particularly weak. It fell in 2010 Q4 as euro-area banks reduced claims on other European countries, possibly reflecting concerns about sovereign risks (**Chart 1.10**). In contrast, cross-border lending to emerging economies recovered quickly in 2009 and 2010, most notably to Latin America and Asia. More recent data available for UK-resident banks show lending to emerging economies strengthened further in 2011, and lending to advanced countries rebounded.(1)

Demand for US government debt from emerging economies remains strong…

Strong capital flows to emerging economies are desirable, as these economies offer the highest prospective returns on investment and such flows would help the process of global rebalancing. For many emerging economies, however, portfolio inflows from the United States have been exceeded by outflows into advanced-economy debt, particularly official purchases of US Treasuries, as current account surpluses are used to build reserves (**Chart 1.11**). Strong demand for US government debt, reflecting in part the US dollar's reserve currency status, has resulted in non-residents playing an increasingly important role in funding the US fiscal deficit. The

(1) UK-resident data include external claims of branches and subsidiaries of non-UK owned monetary and financial institutions located in the United Kingdom.

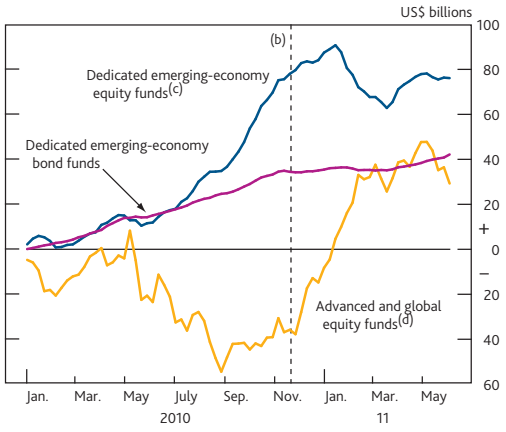
Chart 1.8 Revisions to 2011 economic growth forecasts for selected countries(a)



Sources: IMF *World Economic Outlook* (October 2010 and June 2011) and Bank calculations.

(a) Between October 2010 and June 2011.

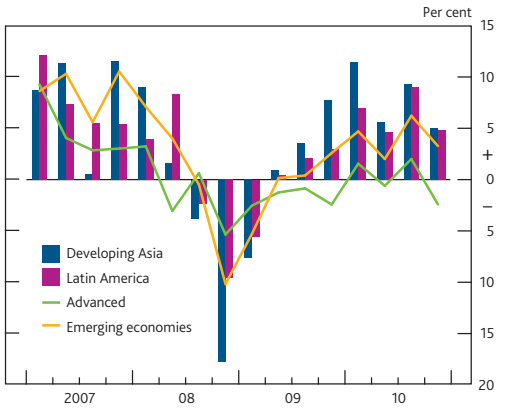
Chart 1.9 Pattern of investment flows into equity and bond funds(a)



Sources: Emerging Portfolio Fund Research and Bank calculations.

(a) Cumulative investment flows into selected equity and bond funds by investors globally since January 2010. The data capture within-country flows (eg investments by US-domiciled mutual funds in US equities) as well as cross-border flows.
(b) December 2010 *Report*.
(c) Includes newly industrialised economies.
(d) 'Advanced and global' includes the following equity funds: Global, Japan, Pacific, United States and Western Europe.

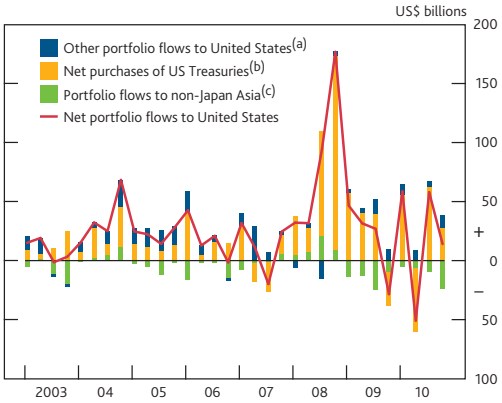
Chart 1.10 Change in gross cross-border banking claims(a)



Sources: Bank for International Settlements (BIS) and Bank calculations.

(a) Change in BIS-resident banks' aggregate cross-border claims by region. Calculated as the exchange rate adjusted flow during a quarter as a percentage of the stock of outstanding loans at the end of the previous quarter.

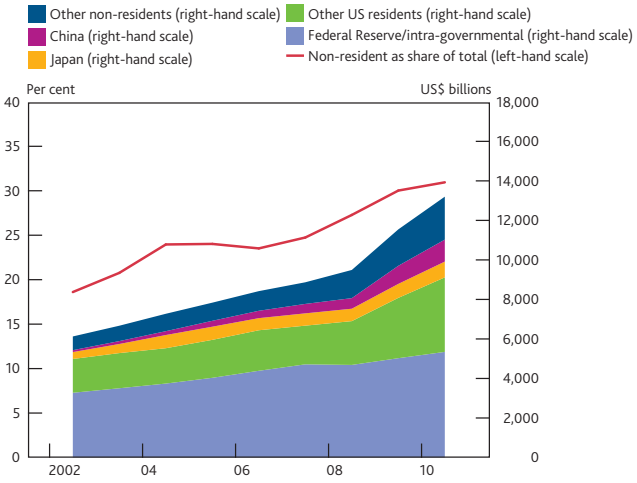
Chart 1.11 Portfolio flows between the United States and non-Japan Asia



Sources: Bureau of Economic Analysis, United States Department of the Treasury and Bank calculations.

(a) Net purchases of US portfolio assets excluding US Treasuries by non-Japan Asia residents.
(b) Net purchases of US Treasuries by non-Japan Asia residents.
(c) Net purchases of non-Japan Asia portfolio assets by US residents (shown as negative flow to United States).

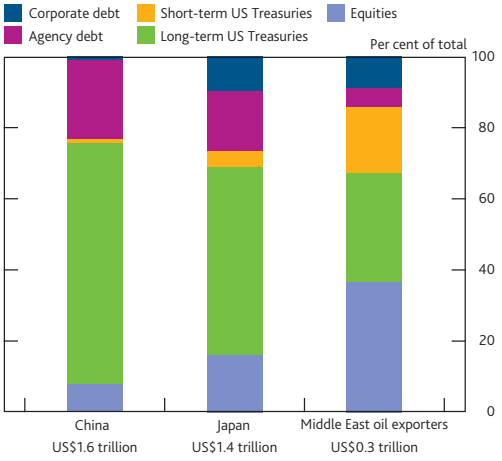
Chart 1.12 Holdings of US Treasuries(a)



Sources: United States Department of the Treasury and Bank calculations.

(a) Data for China exclude Hong Kong and Macau, which are reported separately.

Chart 1.13 Holdings of US securities by China, Japan and Middle East oil-exporting countries(a)(b)



Sources: United States Department of the Treasury and Bank calculations.

(a) As at 30 June 2010.
(b) Data for China exclude Hong Kong and Macau, which are reported separately. The Middle East exporters are Bahrain, Iran, Iraq, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

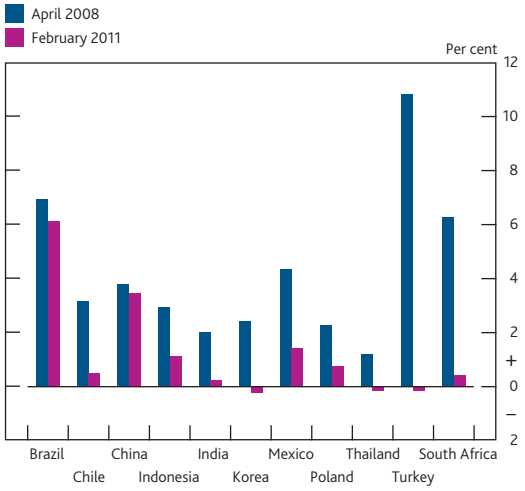
share of US Treasuries held by non-residents has risen to just under a third in the past decade, with mainland China and Japan alone accounting for half of non-resident holdings (**Chart 1.12**).

…though the balance of capital flows may shift over the medium term.

Looking ahead, changes in current accounts could affect demand for US and other advanced-economy government debt. For example, a sustained oil price rise would shift current account surpluses from goods-exporting countries in Asia to oil exporters. Middle East oil-exporting countries have not been as strong buyers of long-term US Treasuries over the past few years as China, choosing to hold a broader range of US assets (**Chart 1.13**).

The response of emerging economies to signs of overheating could also affect global capital flows. A number of emerging-economy central banks have tightened monetary policy recently or taken macroprudential measures. But real interest rates remain low or negative in many larger economies (**Chart 1.14**) and credit growth is high (Section 2). Some authorities are seemingly reluctant to raise interest rates because of the additional capital inflows this could attract. Allowing currencies to appreciate gradually, by not investing surplus funds into advanced-economy assets, would be one way for countries to reduce inflationary pressures.

Chart 1.14 Real policy rates in selected emerging economies(a)



Source: IMF *World Economic Outlook* (April 2011).

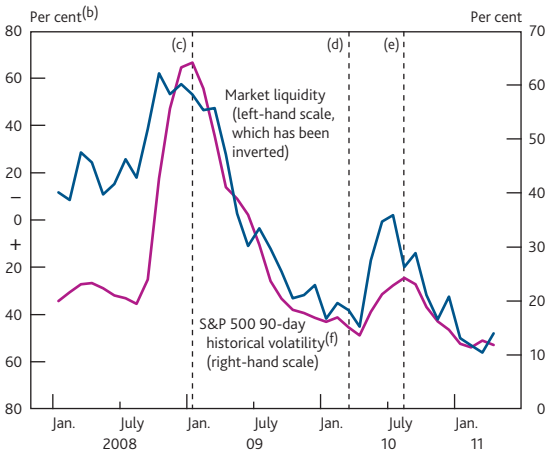
(a) Nominal policy rates deflated by two year ahead inflation projections.

1.2 Sources of risk from the international financial system

Developments in global financial markets have important implications for UK banks. Trading and investment banking activities can be substantial sources of profit or loss. And wholesale markets provide short and long-term funding and enable firms to manage their risks. At present, UK and international banks are especially exposed to the following broad classes of financial market risks:

- an abrupt reversal of low bond yields or increase in market volatility;
- a sudden change in asset valuations resulting from a repricing of risk; and
- continuing reliance on unstable sources of wholesale funding, including from non-bank financial institutions.

Chart 1.15 Market liquidity and volatility(a)



Sources: Bank of America Merrill Lynch (BoAML), Bloomberg and Bank calculations.

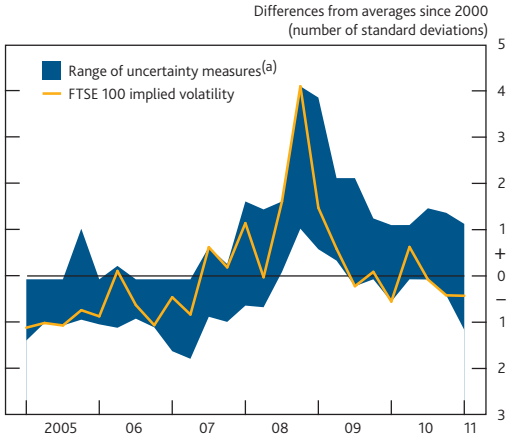
(a) Data to close of business on 31 May 2011.
(b) Balance of respondents to BoAML survey regarding market conditions as liquid. Scale inverted.
(c) 28 January 2009, FOMC statement interpreted by some market participants as signalling Federal Reserve intention to launch quantitative easing (QE).
(d) 31 March 2010, first phase of QE completed.
(e) 28 August 2010, Federal Reserve Chairman Ben Bernanke speech at Jackson Hole. Interpreted by some market participants as signalling Federal Reserve intention to launch second phase of QE.
(f) Average of daily historical volatility in each month.

Low market volatility may not last…

Improvements in market liquidity(1) have been an important factor underpinning global financial markets recently. As shown in **Chart 1.15**, large falls in market volatility since early 2009 have been closely associated with perceptions of greater market liquidity. US monetary policy may have driven

(1) Market liquidity is defined as the ease with which market participants can offset or eliminate financial positions without significantly affecting their market price.

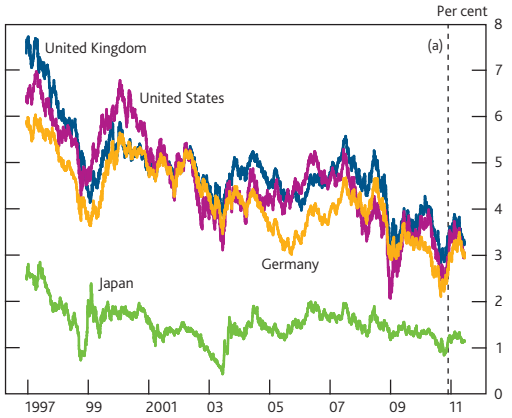
Chart 1.16 Measures of UK economic uncertainty



Sources: CBI, Consensus Economics, Dow Jones Factiva, GfK NOP on behalf of the European Commission, ONS, Thomson Reuters Datastream and Bank calculations.

(a) A higher number indicates greater uncertainty. Includes: CBI measures of demand uncertainty as a factor likely to limit capital expenditure for manufacturing and business/consumer services weighted together using nominal shares in value added. Quarterly average standard deviation of monthly Consensus Economics forecasts for GDP one and two years ahead seasonally adjusted by Bank staff. The standard deviation of daily price movements in the FTSE index and sterling ERI within a quarter. The IBES weighted average standard deviation of twelve-month forward earnings per share forecasts. And the quarterly average of media reports citing 'economic uncertainty' in five national broadsheet newspapers.

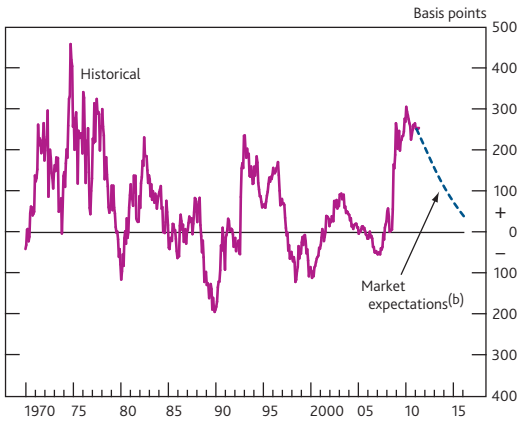
Chart 1.17 International ten-year spot government bond yields



Source: Thomson Reuters Datastream.

(a) December 2010 *Report*.

Chart 1.18 Slope of the sterling yield curve(a)



Sources: Bloomberg and Bank calculations.

(a) Chart shows only end-of-month data. Spread between ten-year and two-year UK government bond yields.
(b) Derived from the UK government bond forward yield curve.

some of this improvement, notably the two phases of US quantitative easing announced in early 2009 and 2010. And buoyant market liquidity may be helping to sustain asset valuations. Some measures of financial market uncertainty have been low relative to broader measures of economic uncertainty (**Chart 1.16**). This suggests that financial markets may be underestimating future macroeconomic risk.

…and low bond yields remain susceptible to reversal…

Government bond yields remain at low levels by historical standards (**Chart 1.17**). Yields at shorter maturities are furthest below long-term averages, reflecting accommodative monetary conditions. As highlighted in previous *Reports*, low yields have been an intended consequence of authorities' monetary policies over the past few years. Yields could, however, be susceptible to a reversion towards more typical levels.

…affecting banks directly…

A sudden 'snap back' in yields may carry risks to the global financial system, particularly when yields have been low for so long. Low interest rates, combined with an unusually steep yield curve (**Chart 1.18**), have allowed banks to generate interest income — or carry — from lending at long maturities and borrowing short. Any significant flattening or reversal of yield curves could cause banks to incur large mark-to-market losses on unhedged carry trades in their trading book. Cross-currency carry trades, where assets in high-yielding currencies are funded by borrowing in low-yielding currencies, present additional risks as unfavourable exchange rate movements can cause or exacerbate losses. Yield differentials suggest that the attractiveness of carry trades between US dollar and certain emerging-economy currencies has risen since late 2010 (**Chart 1.19**).

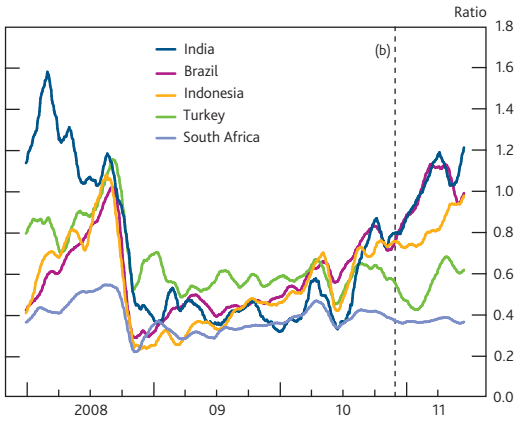
A rise in yields could result in banks also experiencing mark-to-market losses on unhedged holdings of government debt. This could have a greater impact than in the past as banks have been building liquid assets to meet regulatory requirements. Since 2008, major UK banks have increased their holdings of global government debt securities from 5.9% to 9.6% of total assets.

…with potential for a wider impact on financial markets.

The shift of the US dollar yield curve in 1994 had a widespread effect across international asset markets leading to bank losses on trading book exposures.(1) Other periods of yield curve reversal, such as Japan in 2003 and the United States in 2006, had a more muted impact on capital markets. Amplification channels may be important for understanding the different impact from yield curve adjustments. For example, mortgage duration hedging, where holders of mortgage-backed securities (MBS) attempt to protect themselves against

(1) See Box 1 on pages 22–23 of the December 2010 *Report*.

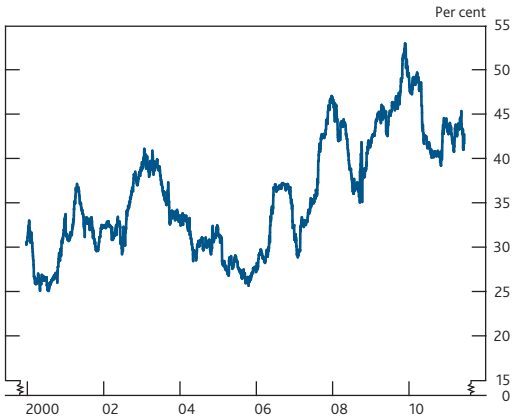
Chart 1.19 Attractiveness of selected emerging-economy currency carry trades against the US dollar[a]



Sources: Bloomberg and Bank calculations.

(a) Defined as the one-month rolling average of the spread between three-month deposit rates for selected economies and the United States, divided by the implied volatility of the bilateral exchange rate.
(b) December 2010 *Report*.

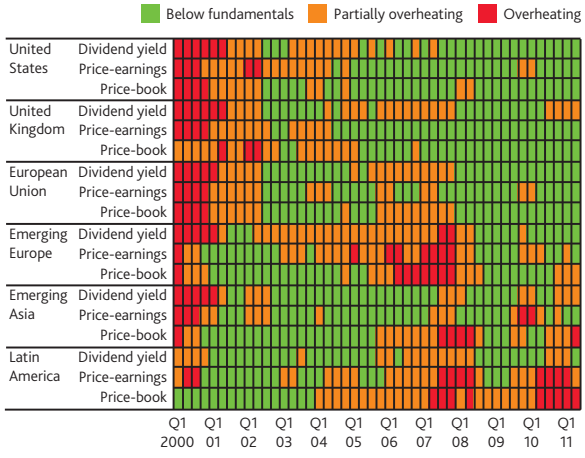
Chart 1.20 Comovement of asset returns[a][b]



Sources: Bank of America Merrill Lynch, Thomson Reuters Datastream and Bank calculations.

(a) Percentage of variability across daily asset returns explained by the first principal component over a six-month rolling window.
(b) Commodities are grain, industrial and precious metals; equity indices are FTSE All-Share, S&P 500 and Euro Stoxx 50; bond indices are US corporate BBB and euro corporate BBB.

Chart 1.21 Equity price valuation measure[a][b]



Sources: Thomson Reuters Datastream and Bank calculations.

(a) Shading is based on a score that reflects the number of standard deviations away from the mean for each series. Green represents observations below the median score. Orange represents observations between the median and the 85th percentile. Red represents observations between the 85th and 100th percentiles.
(b) 2011 Q2 data up to close of business on 15 June 2011.

increased duration risk as rates rise, was an important amplifier in 1994. Current levels of duration hedging may be low as a significant proportion of MBS is held by the Federal Reserve, which does not duration hedge.

Meanwhile, low interest rates may be leading to increased risk-taking in some markets…

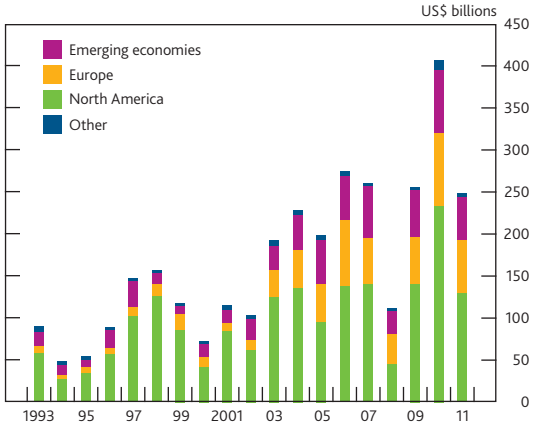
Low yields on safe assets could encourage investors to take on greater risk in a so-called 'search for yield'. An increase in risk appetite was an intended consequence of policy actions to stimulate growth, following the sharp retrenchment during the crisis. But there could be risks if investors herd to certain markets in search of higher returns. That would expose them to potential losses in the event of a reassessment of risk. And price comovements across some asset classes are historically high (**Chart 1.20**), suggesting shocks could be transmitted rapidly across markets.

…such as emerging-economy equities and high-yield bonds…

At the moment, search for yield seems to be localised in a few markets, as was also the case in 2003/04. Market contacts suggest that, given a shortage of high-quality assets, demand is being displaced to lower-quality assets. But there are very few signs of acute overheating or generalised risk-taking across global capital markets. For example, equity prices generally do not appear out of line with historical valuation measures. There have been some signs of overheating in equity markets in a few countries and regions, however, with Latin America and emerging Asia most affected (**Chart 1.21**). And demand for lower-grade corporate debt has also been high. Issuance of emerging-economy, European and US high-yield corporate debt reached record levels in 2010 and has remained strong in 2011 (**Chart 1.22**). The compression of spreads between different corporate bond risk grades suggests investors may be differentiating less between credit types than in the past. Model-based estimates suggest that both US high-yield and investment-grade corporate debt pricing embody a relatively low liquidity risk premium by historical standards (**Chart 1.23**). But liquidity premia for UK and euro-area investment-grade corporate debt appear close to long-term averages.

There has been little evidence of investors seeking complex products on a significant scale, which would be one way to increase risk exposure. But market contacts have noted a recent weakening in lending standards. For example, issuance of 'covenant-lite' leveraged loans, where investors accept fewer safeguards if a debtor company's finances deteriorate in return for a higher yield, seems to be re-emerging (**Chart 1.24**). In private equity markets, contacts report greater use of payment-in-kind deals, where no interest is paid on bonds until maturity. Contacts have also suggested that due diligence by some investors on emerging-economy corporate debt issuance may have been poor recently.

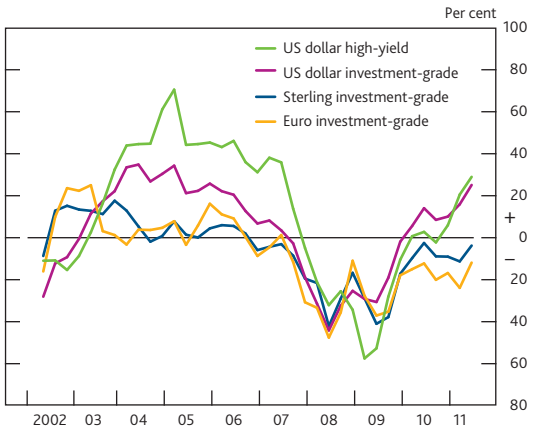
Chart 1.22 Issuance of sub-investment grade corporate bonds by region[a][b]



Sources: Dealogic and Bank calculations.

(a) Emerging economies includes Africa, Caribbean, Indian subcontinent, Latin America, Middle East, North Asia and South East Asia. 'Other' includes Australasia and Japan. Includes issuance in all currencies.
(b) 2011 data are to 31 May 2011.

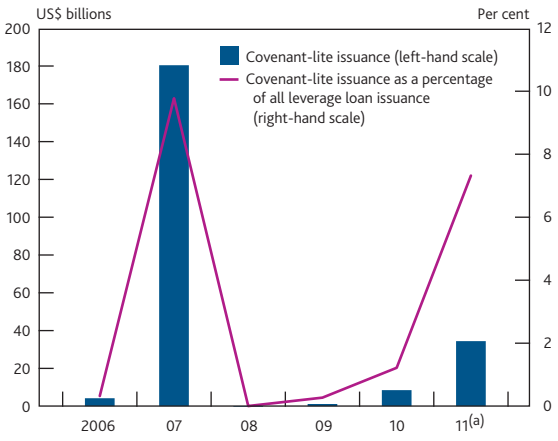
Chart 1.23 Corporate bond valuation measure[a][b]



Sources: Bank of America Merrill Lynch, Bloomberg, Thomson Reuters Datastream and Bank calculations.

(a) Shows the difference between actual and estimated equilibrium spreads as a percentage. Positive numbers suggest overvaluation, negative numbers undervaluation.
(b) Equilibrium corporate bond spreads are defined as the total estimated credit component plus a five-year rolling average of the illiquidity premia. Full details of the approach used for the decomposition of corporate bond spreads can be found in Churm, R and Panigirtzoglou, N (2005), 'Decomposing credit spreads', *Bank of England Working Paper no. 253*.

Chart 1.24 Issuance of 'covenant-lite' leverage loan deals



Sources: Dealogic and Bank calculations.

(a) Data to close of business on 31 May 2011.

...as investors target absolute returns.

One reason for a search for yield may be investors seeking to maintain nominal returns at previously high levels. Global flows into hedge funds have risen strongly since 2009, though total funds under management remain below 2007 peaks. A Barclays Capital survey found that a growing proportion of commodity investors have been looking for absolute returns rather than buying for more traditional reasons, such as portfolio diversification. In the United Kingdom, flows to absolute return funds (ARFs), where investors seek to maintain a given return regardless of market conditions, have risen sharply over the past three years. Market intelligence suggests that demand for ARFs has come from both retail and institutional investors. But funds invested in ARFs remain very small compared with, for example, total hedge fund assets.

Any shocks could be amplified by leverage...

Leverage can amplify the impact of price shocks. But current demand for leveraged products seems limited. Global volumes of new leveraged loan deals rose in 2010 but were still two thirds below pre-crisis peaks. And there have been relatively few new issues of collateralised loan obligations (CLOs), though market contacts suggest there has been demand for leveraged products from CLOs set up before the crisis.[1] At an institutional level, LCFI leverage has fallen over the past couple of years (Section 3). Although hedge fund leverage has risen marginally (**Chart 1.25**), with market contacts reporting easier financing terms, there is no evidence of excessive levels for any hedge fund strategy. Levels of hedge fund leverage remain very conservative compared with banks.

...structure and complexity...

Financial instrument structures can also amplify and propagate stress across markets, as discussed in Box 1. A current example is the rapid growth in exchange-traded funds (ETFs), which have been characterised by increasing complexity, opacity and interconnectedness. ETFs can give rise to risks that may not be transparent to end-investors, making it harder for them to understand and manage their exposures. Where the main investors in complex products have short investment horizons and are leveraged, such as banks, there is greater potential for destabilising fire sales. According to market contacts, banks are not currently involved in the ETF market as outright investors. Global banks remain exposed to the ETF market, however, through their roles as swap counterparties, securities lenders and market makers. 'Synthetic' ETFs, where investors' cash is entered in a structured derivative transaction with a counterparty — typically an affiliated bank — create further links between the banking system and the ETF market. While market intelligence suggests the synthetic ETF market is concentrated around a

(1) CLOs are a form of securitisation where payments from a number of business loans — sometimes leveraged loans from private equity deals — are pooled together, repackaged and sold to investors.

Box 1
Financial instrument complexity, interconnectedness and opacity

The financial industry is characterised by its tendency to innovate, continuously designing and offering new products to customers. Innovation that leads to efficiency gains — for example, by allowing more effective matching of savers' and borrowers' risk preferences — should reduce the cost of financial intermediation. But the emergence of new and complex financial instruments, especially if not supported by suitable developments in market infrastructure, can also entail risks. For example, the recent crisis was preceded by a gross underestimation of the risks posed by complex structured credit products and the resulting network of intra-financial system exposures. This contributed to the scale and breadth of the crisis.

This box identifies features of financial instruments that can result in a mispricing of risk and contribute to the build-up of systemic risk. It then applies this framework to assess the financial stability implications of the growing complexity and innovation in some segments of the market for exchange-traded funds (ETFs).

Financial instrument characteristics

Complexity

Advances in financial engineering have allowed the financial system to offer increasingly complex financial products. There are several facets to complexity. One relates to the sheer scale of information required to understand the risk characteristics of financial instruments. Another relates to the advanced mathematical modelling necessary to value these products. As a consequence, investors may not be able to assess the risk of these instruments adequately or quantify the uncertainty around their valuation. This can contribute to 'risk illusion'. If such complexity leads investors to outsource risk assessment to a small number of agents (such as rating agencies), the lack of diversity in views can further amplify systemic risk.

These aspects of complexity have been evident in parts of the financial system for some time, most notably in certain segments of the market for structured credit. For example, understanding the risk characteristics of collateralised debt obligations referencing asset-backed securities (CDOs of ABS) required large amounts of information on underlying loans.(1) A typical CDO could reference more than 100 residential mortgage-backed securities, each of which could in turn reference about 5,000 underlying mortgages. And investors relied on complex models, for example to estimate default correlations, which proved to have been miscalibrated.

Interconnectedness

Financial transactions that result in chains of counterparty exposures increase interconnectedness within the financial system. Counterparty risk is inherent in synthetic products — financial instruments that are created artificially by mimicking or repackaging the cash flows of other securities using derivatives. But it also arises in simple cash transactions, such as repo and securities lending. Individual market participants will typically seek to protect themselves against the risk of counterparty default through a range of mitigating actions. Yet some of these actions, for example using credit default swaps to hedge counterparty risk, further increase interconnectedness. With long chains of credit claims, individual participants are unlikely to be able to understand and price the risks to which they are exposed. Recent regulatory initiatives to expand central clearing of over-the-counter derivatives seek to mitigate some of these risks by introducing 'firebreaks' and simplifying the network of intra-financial exposures.

The rapid growth of the credit derivatives market ahead of the crisis illustrates these frictions. The resulting web of counterparty exposures meant that investors were uncertain about the distribution of risk, which often resided in opaque parts of the system such as monoline insurers. And as the risk of counterparty default was underestimated, the financial system held too little capital against large, gross intra-financial system exposures.

Opacity

Both complexity and interconnectedness obscure investors' understanding of the level and distribution of risk across the system, even if there is a reasonable degree of disclosure — which is often not the case. The resulting opacity of financial instruments can be a source of systemic risk in itself. Information frictions were at the heart of the breakdown of trading and the associated evaporation of liquidity in many markets during the crisis. In periods of stress, investors with imperfect information over the quality of assets reduce their buying prices, while holders of 'good' assets are unwilling to sell at prevailing market prices. The collapse of securitisation markets in the recent crisis was one manifestation of this problem. The greater the opacity of instruments, the greater the risk to market functioning.

Monitoring the evolution of markets: ETFs

The crisis experience has shown that innovations originally designed to improve the ability of the financial industry to manage risk can sometimes themselves evolve into sources of systemic risk. This highlights the importance of continued monitoring of markets that exhibit these characteristics.

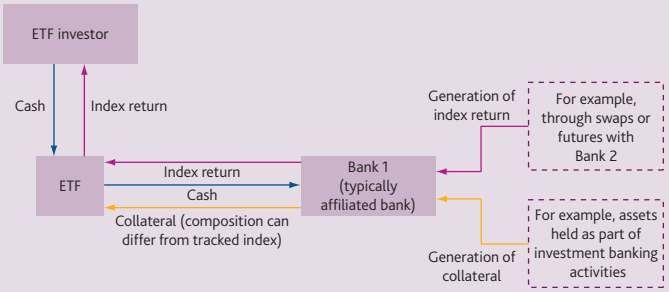
Although the crisis stalled the rapid growth in complex structured credit products, financial institutions are still managing their legacy exposures to these instruments. And new products are constantly being developed. For example, a range of new funding instruments have emerged since the crisis, partly in response to the introduction of tougher regulatory standards.(2) And some banks are considering new ways of transferring risk, for example by securitising their derivative counterparty exposures.

One market that has attracted significant attention recently for its strong growth and rapid financial innovation is ETFs.(3) As discussed in the June 2010 *Report*, ETFs are investment vehicles that provide exposure to a diversified portfolio of assets, often to an index. Relative to traditional mutual funds, they offer the additional benefit to investors of continuous trading on exchanges.

ETFs started off by using investors' cash to purchase the basket of securities comprising the index from the market — so-called 'physical' replication. Physical ETFs are relatively simple products. Nonetheless, they typically engage in securities lending to boost returns. This exposes them to counterparty risk. And if securities are lent in exchange for cash which is reinvested in illiquid assets, the liquidity position of the ETF itself might be at risk. Limited disclosure over securities lending practices can also increase opacity.

A relatively recent innovation has been the growth of 'synthetic' ETF structures. Unlike physical ETFs, synthetic funds do not purchase the index securities outright but gain exposure to the underlying assets by entering into derivatives contracts with a counterparty, typically an affiliated bank. As part of a series of related transactions (**Figure 1**), the bank receives cash and promises to deliver the returns of the index, posting securities as collateral to the ETF. Because the collateral does not need to match the assets of the index being tracked, the bank might have incentives to use the synthetic ETF structure as a source of collateralised borrowing to fund illiquid portfolios.

Figure 1 Stylised example of a synthetic ETF

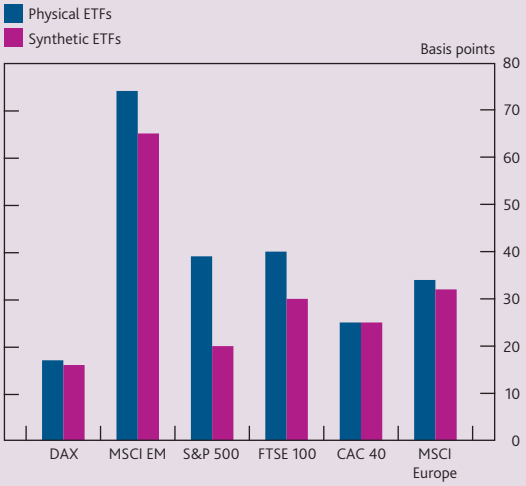


Source: Bank of England.

Synthetic ETFs exhibit more of the characteristics that might contribute to the build-up of systemic risk. They are more complex than physical ETFs, although the degree of complexity remains far below that of some structured credit products developed in the run-up to the crisis. The derivative transactions between ETFs and affiliated banks (or those that the bank itself might undertake to gain exposure to the index) result in the build-up of counterparty credit exposures between market participants. And synthetic structures might pose funding liquidity risk to banks acting as swap counterparties if there is a sudden withdrawal of investors from the ETF market. Lack of consistent disclosures, for example over the nature of derivatives transactions and the quality of collateral received from counterparties, further increases opacity.

Although both types of ETF effectively offer the same service to investors, synthetic ETFs appear to do so at a generally lower cost (**Chart A**). This cost differential might reflect synergies between the asset management service provided by the ETF and banks' investment banking operations. But it is also possible that the additional risks associated with synthetic replication might not be fully understood by investors who are attracted by the lower costs.

Chart A Total expense ratios (TERs) of physical and synthetic ETFs listed in Europe(a)(b)

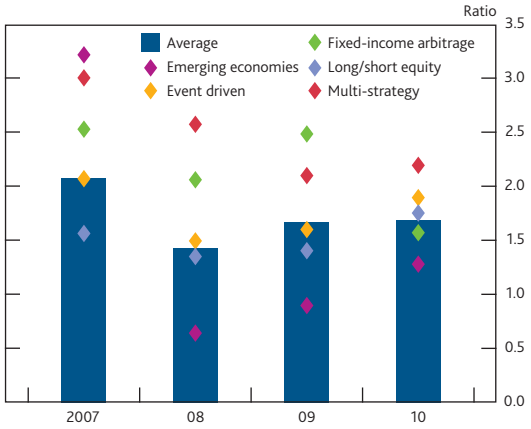


Source: BlackRock Global ETF Research and Implementation Strategy.

(a) Asset-weighted average TERs. TER calculated as the fund's total operating costs to its average net assets.
(b) The sample covers physical and synthetic ETFs listed in Europe and tracking major global equity indices.

(1) CDOs of ABS are structured fixed-income securities whose performance is linked to the performance of underlying pools of ABS collateral. In this respect, they fall under the broad category of 'resecuritisations'.
(2) See December 2010 *Report*, Box 3, 'Recent developments in bank funding markets', pages 38–39.
(3) See, for example, Financial Stability Board (2011), 'Potential financial stability issues arising from recent trends in Exchange-Traded Funds'.

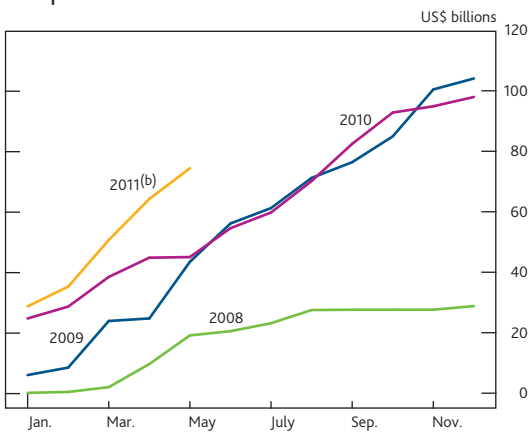
Chart 1.25 Average hedge fund leverage and leverage by strategy[a][b][c]



Sources: BarclayHedge and FSA Hedge Fund as Counterparty Survey.

(a) Data are based on a sample of hedge funds only.
(b) Leverage is measured on a long leverage basis. Long leverage is equal to the sum of the value of all long market positions divided by the equity of a fund.
(c) Only the top five largest hedge fund strategies are shown based on assets under management data from BarclayHedge. Managed futures strategies are not included.

Chart 1.26 US dollar-denominated debt issuance by European banks[a]



Sources: Dealogic and Bank calculations.

(a) Secured and unsecured issuance.
(b) Monthly data to end-May.

Chart 1.27 Sterling-dollar and euro-dollar basis swap rates

Source: Bloomberg.

(a) Additional rate over three-month sterling Libor to swap US dollars, which pay three-month dollar Libor, for sterling for one year.
(b) Additional rate over three-month Euribor to swap US dollars, which pay three-month dollar Libor, for euros for one year.

few large banks, UK banks are not significant players in this market at present.

…or regulatory developments.

Regulation can sometimes also affect market dynamics. For example, new EU regulations for the insurance sector ('Solvency II') introduce a common risk framework for insurance firms, including greater use of modelling. But there are concerns it could also amplify shocks in capital markets. Under Solvency II, European insurers will have to follow a more comprehensive mark-to-market valuation approach for assets. Although UK insurers already use a mark-to-market approach, many European insurers will be adopting such an approach for the first time. In conjunction with a binding minimum capital requirement, this introduces a greater risk that falling asset prices and mark-to-market losses could force insurers to sell assets into a stressed market, exacerbating volatility. Such a dynamic prompted the FSA to accelerate changes to the regulatory regime for UK insurers in 2003. Use of similar models by firms could also lead to common behaviour.

Banks remain vulnerable to funding liquidity risks…

As highlighted in previous *Reports*, banks are exposed to sudden changes in market conditions through their funding activities. This is a particular concern given the scale of European banks' financing needs over the next two years. For example, when euro-area sovereign concerns escalated in April 2010, UK and other European banks' funding costs increased and the maturity of their wholesale financing shortened, especially in the dollar funding market.

European banks have continued to rely on short-term dollar funding markets. Recently, US investor appetite for European bank debt has been high. This is reflected in strong issuance of US dollar debt by European banks (**Chart 1.26**). The euro-dollar basis swap spread has also narrowed, suggesting a reduced premium for UK and other European banks acquiring US dollars (**Chart 1.27**). But these markets have proved susceptible to stresses in the past. Section 3 describes the role of US money market mutual funds in providing short-term dollar funding to European banks.

…while use of innovative funding arrangements may result in new vulnerabilities.

Competition for funds, and the need to build larger buffers to meet tighter liquidity regulations, has encouraged banks to explore more innovative funding arrangements. These instruments have the potential to create new dependencies and risks in financial markets. For example, a few LCFIs have used synthetic ETFs as a source of funding for less liquid parts of their balance sheet. This form of funding is presently not important for UK banks, but is a sizable source of funding for a small number of euro-area banks. Box 4 examines the characteristics of a robust funding structure for banks.