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The impact of sovereign credit risk on bank funding conditions

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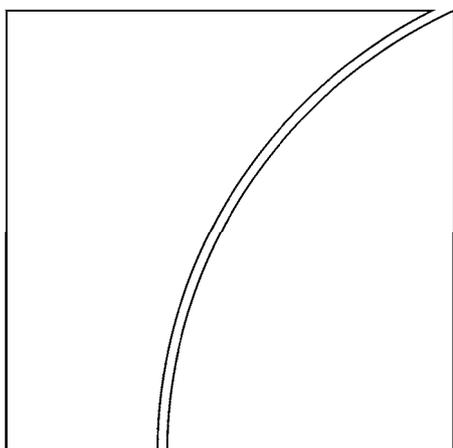
The impact of sovereign credit risk on bank funding conditions

Report submitted by a Study Group established by the Committee on
the Global Financial System

This Study Group was chaired by Fabio Panetta of the Bank of Italy

July 2011

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BANK FOR INTERNATIONAL SETTLEMENTS

Preface

In late 2010, the Committee on the Global Financial System (CGFS) established a Study Group to examine the relationship between sovereign credit risk and bank funding conditions, how banks might respond to an environment of ongoing elevated sovereign risk and the implications for policymakers. This is an important topic, as sovereign credit risk is already a significant issue for European banks, and over coming years may have implications for global financial stability.

The Study Group was chaired by Fabio Panetta of the Bank of Italy. The report was finalised in early June 2011, and presented to central bank Governors at the Global Economy Meeting later that month, where it received endorsement for publication.

We hope that this report will be a relevant and timely input to national and international discussions about managing the current circumstances of economic and financial strain.

Mark Carney

Chairman, Committee on the Global Financial System
Governor, Bank of Canada

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Introduction and executive summary

The financial crisis and the ensuing recession have caused a sharp deterioration in public finances across advanced economies, raising investor concerns about sovereign risk. The concerns have so far mainly affected the euro area, where some countries have seen their credit ratings downgraded during 2009–11 and their funding costs rise sharply. Other countries have also been affected, but to a much lesser extent. Greater sovereign risk is already having adverse effects on banks and financial markets.

Looking forward, sovereign risk concerns may affect a broad range of countries. In advanced economies, government debt levels are expected to rise over coming years, due to high fiscal deficits and rising pension and health care costs. In emerging economies, vulnerability to external shocks and political instability may have periodic adverse effects on sovereign risk. Overall, risk premia on government debt will likely be higher and more volatile than in the past. In some countries, sovereign debt has already lost its risk-free status; in others, it may do so in the future.

The challenge for authorities is to minimise the negative consequences for bank funding and the flow-on effects on the real economy. This report outlines the impact of sovereign risk concerns on the cost and availability of bank funding over recent years. It then describes the channels through which sovereign risk affects bank funding. The last section summarises the main conclusions and discusses some implications for banks and the official sector.

Two caveats are necessary before discussing the main findings. First, the analysis focuses on causality going from sovereigns to banks, as is already the case in some countries, and, looking forward, is a possible scenario for other economies. But causality may clearly also go from banks to sovereigns. However, even in this second case, sovereign risk eventually acquires its own dynamics and compounds the problems of the banking sector. Second, the report examines the link between sovereign risk and bank funding in general terms, based on recent experience and research. It does not assess actual sovereign risk and its impact on bank stability in individual countries at the present juncture.

Sovereign risk and the cost and composition of bank funding

Higher sovereign risk since late 2009 has pushed up the cost and adversely affected the composition of some euro area banks' funding, with the extent of the impact broadly in line with the deterioration in the creditworthiness of the home sovereign. Banks in Greece, Ireland and Portugal have found it difficult to raise wholesale debt and deposits, and have become reliant on central bank liquidity. The increase in the cost of wholesale funding has spilled over to banks located in other European countries, although to a much lesser extent. These banks have retained access to funding markets. Banks in other major advanced economies have experienced only modest changes in their wholesale funding costs.

Transmission channels through which sovereign risk affects bank funding

Rises in sovereign risk adversely affect banks' funding costs through several channels, due to the pervasive role of government debt in the financial system. First, losses on holdings of government debt weaken banks' balance sheets, increasing their riskiness and making funding more costly and difficult to obtain. Banks' exposures are mostly to the home sovereign. Second, higher sovereign risk reduces the value of the collateral banks can use to raise wholesale funding and central bank liquidity. The repercussions of this channel have so far been contained by the intervention of central banks. Third, sovereign downgrades generally flow through to lower ratings for domestic banks, increasing their wholesale funding costs, and potentially impairing their market access. Fourth, a weakening of the sovereign reduces the funding benefits that banks derive from implicit and explicit government guarantees. Since end-2009, the value of guarantees seems to have diminished for the

weaker euro area countries. Other channels were also examined, but our analysis was inconclusive regarding their significance (see Section 3).

Sovereign tensions in one country may spill over to banks in other countries, either through banks' direct exposures to the distressed foreign sovereign, or indirectly, as a result of cross-border interbank exposures or possible contagion across sovereign debt markets.

Implications for banks and some associated policy issues

Changes in banks' operations may mitigate their exposure to sovereign risk. On the assets side, banks might further diversify the country composition of their sovereign portfolio, to contain their overexposure to the home sovereign. For banks located outside the euro area this may imply, in addition to currency risk, a trade-off between sovereign and liquidity risk, as foreign sovereign securities may not be accepted to satisfy liquidity standards or as collateral in central bank and private repurchase agreements.

Banks may lessen the adverse impact of sovereign risk on their funding by making greater use of stable funding sources such as bonds, retail deposits and equity. They could also increase their focus on minimising "risk-adjusted" funding costs by spreading their issuance over time and avoiding the clustering of maturing debt. Cross-border banks might also diversify their debt issues across different jurisdictions through their subsidiaries.

Internationally active banks – and their supervisors – need to track fiscal conditions in the foreign countries in which they operate, as any worsening in sovereign risk in those countries could affect their branches or subsidiaries, with negative spillovers on the parent bank.

There are also possible implications for the official sector. First and foremost, the negative spillovers from sovereign risk to bank risk, and the impossibility of fully protecting the banking system from a severely distressed domestic sovereign, is yet another reason to maintain sound public finance conditions. Moreover, increasing international financial integration and the close links between banks and sovereigns imply that global financial stability depends on the solidity of fiscal conditions in each individual country.¹

Sound supervisory and macroprudential policies are also of the essence, as a strong capital base and rigorous credit and liquidity risk management practices are indispensable in containing the impact of sovereign tensions on banks.

Moreover, because the crisis has shown that sovereign debt may not be liquid and riskless at all times, authorities should closely monitor the effects of regulatory policies which provide banks with strong incentives to hold large amounts of government securities.

Transparency is also important. During a sovereign crisis, when risk aversion is high, uncertainty about the quality of banks' assets (including sovereign portfolios) can create funding pressures for all banks. Depending on the specific circumstances, authorities might want to consider coordinated, industry-wide disclosures on banks' sovereign exposures.

To contain potential bank liquidity shortages induced by sovereign risk, central banks might consider having flexible operational frameworks that allow funding to be supplied against a broad range of collateral. But this is not costless – it shifts credit risk to the central bank and creates moral hazard – and so should be used sparingly and with appropriate safeguards.

Regulatory developments (such as the proposed changes in bank resolution regimes) will contribute to weakening the link between sovereign and bank risk, by reducing investors' expectations of government support for distressed banks. Looking ahead, authorities should monitor how regulatory changes influence the relationship between banks and sovereigns.

¹ If banking markets are closely integrated, each country is de facto responsible for preserving the stability of the global financial system. By maintaining sound fiscal conditions, it provides a public good to other countries.

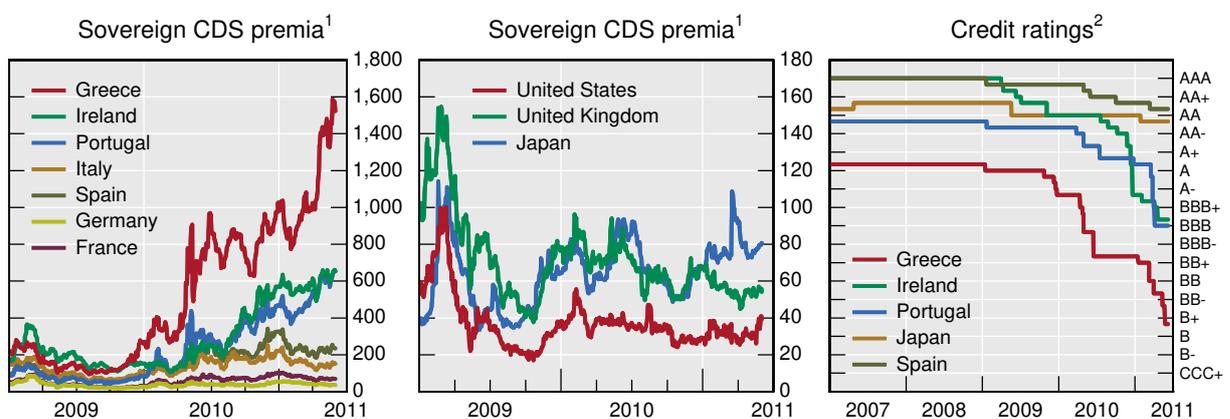
1. The deterioration in sovereigns' perceived creditworthiness²

The financial crisis and global economic downturn have caused a sharp deterioration in public finances across advanced economies. Fiscal deficits widened significantly, reflecting the effects of automatic stabilisers, discretionary stimulus measures to reduce the severity of the downturn, and support to the financial sector. Between end-2007 and end-2010, average budget deficits in advanced countries increased from 1% to 8% of GDP and gross government debt rose from 73% to 97% of GDP. In emerging economies, government debt levels are trending lower.

The situation is currently most severe in some euro area countries, which have seen their credit ratings lowered several notches and/or have experienced sizeable increases in their debt spreads (Graph 1). Greece, Ireland and Portugal have received international assistance, after they were unable to raise funding at reasonable cost. The driver of the increase in sovereign risk differs across these countries – for example, in Greece the financial crisis has exacerbated an already weak fiscal position, while in Ireland the government's fiscal position was considered strong before the crisis but has been severely affected by the cost of supporting banks. Nonetheless, even where the original causality went from banks to the sovereign, sovereign risk has reached the point where it is compounding the problems in the banking sector.³ Other euro area countries, such as Spain and, to a lesser extent, Belgium and Italy, have also been affected by investor concerns about fiscal conditions. Spain's credit rating has been downgraded to AA.

The United States, the United Kingdom and Japan have so far been less affected by sovereign risk concerns, despite the sharp increase in their public debt ratios over recent years. However, they have not been immune, with Japan being downgraded in January 2011, and the United States and United Kingdom being warned at various stages that they might lose their triple-A ratings.

Graph 1
CDS premia and ratings of advanced economies



¹ Five-year on-the-run CDS spreads, in basis points. ² Average of Fitch, Moody's and Standard & Poor's foreign currency long-term sovereign ratings.

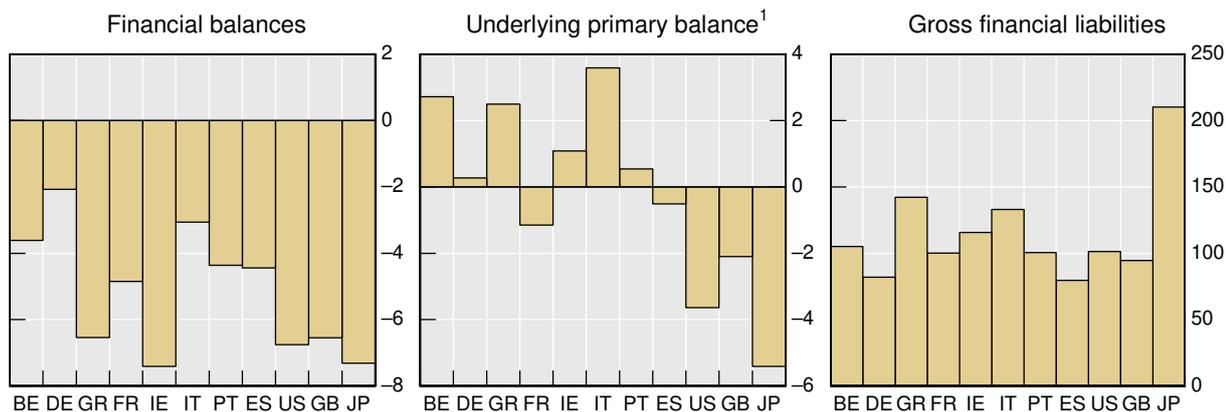
Sources: Bloomberg; Markit.

² Annex 3 provides a timeline of the evolution of the current sovereign debt crisis.

³ Some of the analysis in the report (such as Graph A4.5) may be affected by reverse causality from banks to sovereigns. For a broader discussion of reverse causality, see Annex 1: Spillovers from banks to sovereigns and possible feedback loops.

Looking forward, public finances in many advanced countries are likely to remain under pressure for some time. Government debt levels are expected to continue to rise over the next few years, with the United States, the United Kingdom, Japan and some euro area countries running large fiscal deficits (Graph 2).⁴ Over coming decades, countries also face rising pension and health care costs related to the ageing of their populations (assuming that there are no changes in entitlements).⁵ High combined debt levels of government, households and corporates in some countries also add to the sovereign's vulnerability.

Graph 2
Government debt and fiscal balances
As a percentage of GDP, for 2012



BE = Belgium; DE = Germany; ES = Spain; FR = France; GB = United Kingdom; GR = Greece; IE = Ireland; IT = Italy; JP = Japan; PT = Portugal; US = United States.

¹ Underlying primary balance is adjusted for the economic cycle and excludes non-recurring revenues / expenses and interest payments.

Source: OECD, *Economic Outlook*, December 2010.

Elevated sovereign debt levels in advanced countries may mean that their debt is no longer regarded as having zero credit risk and may not be liquid at all times. As a result, sovereign risk premia could be persistently higher and more volatile in the future than they have been in the past, particularly for less fiscally conservative governments. This will almost certainly have adverse consequences for banks, as evidenced by empirical analyses⁶, and history (see Annex 2: How previous sovereign crises have affected banks). Moreover, while this report focuses on the potential spillovers from sovereign risk to bank risk, the consequences of a severe deterioration of the creditworthiness of the sovereign would likely go well beyond banks, affecting the entire financial system.

2. Broad trends in the composition and cost of banks' funding⁷

To date, banks' balance sheet growth does not seem to differ systematically across countries based on public finance conditions (Graph 3).⁸ Clearer patterns are discernible in the

⁴ The OECD forecasts used in Graph 2 are one set of forecasts among many.

⁵ See Cecchetti et al (2010) and the BIS (2010a).

⁶ Demirgüç-Kunt and Huizinga (2010) show that in advanced countries banks' market valuation is negatively related to government debt and deficits. Borensztein and Panizza (2009) estimate a high probability of having a banking crisis conditional on a sovereign default.

⁷ In this report, bank nationalities have been shown separately where possible. Where nationalities have been grouped, the groupings are based on the dynamics of the underlying data, with similar countries put together. Consistent with this, the country groupings differ through the report. Owing to data limitations, the broad analysis of the composition of bank liabilities in Section 2 refers to banks resident in a given country, while the analysis of wholesale markets generally refers to banks headquartered in a given country.

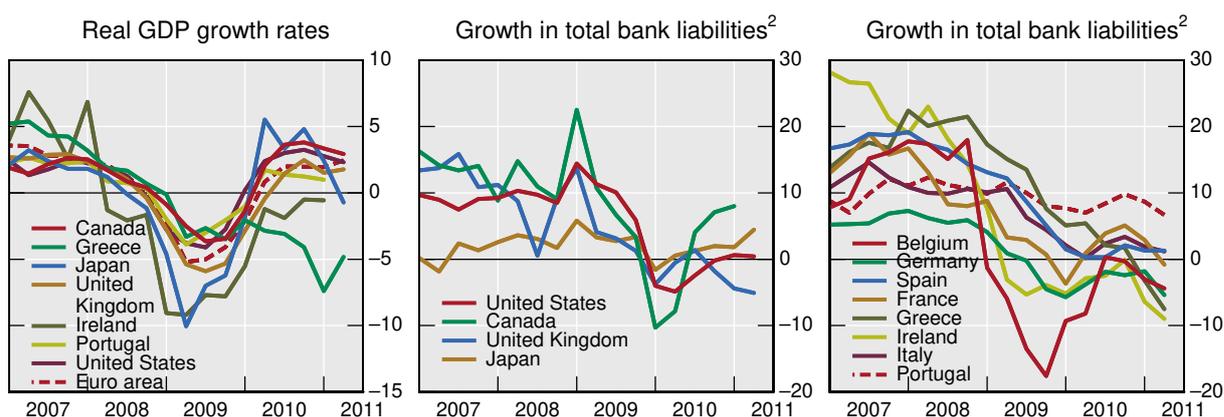
composition of banks' liabilities. For banks headquartered in countries with acute sovereign debt concerns, the share of funding derived from retail deposits, short-term wholesale debt and cross-border liabilities has generally fallen. In these countries, this shortfall was largely met via recourse to central bank funding and to bonds with a high degree of investor protection (covered bonds and government-guaranteed bonds), which were issued mainly for use as Eurosystem collateral. In contrast, in other countries, banks have slightly increased their use of retail deposits. Bond issuance has been generally weak, though trends differ somewhat across countries.

The cost of wholesale debt and deposit funding has risen significantly for banks from weak euro area countries. Banks in other countries have been affected to a much smaller extent. Part of the increase in banks' funding costs seems to reflect investor demand for higher compensation for taking on country risk.

2.1 Composition of bank funding

The composition of bank funding in the major advanced countries has been little changed since the onset of sovereign tensions in late 2009. Banks have generally continued to follow the funding patterns initiated in 2007, increasing their use of more stable funding sources such as retail deposits and equity, and reducing their use of interbank deposits and central bank financing (Graph A4.1).

Graph 3
GDP growth and changes in total bank liabilities¹



¹ Percentage changes over the same quarter in the previous year. ² For the United States, seasonally adjusted data for domestically chartered banks. For euro area countries, growth rates exclude changes to outstanding amounts which are not due to transactions; data refer to the monetary and financial institutions, excluding the European System of Central Banks.

Sources: OECD, central banks.

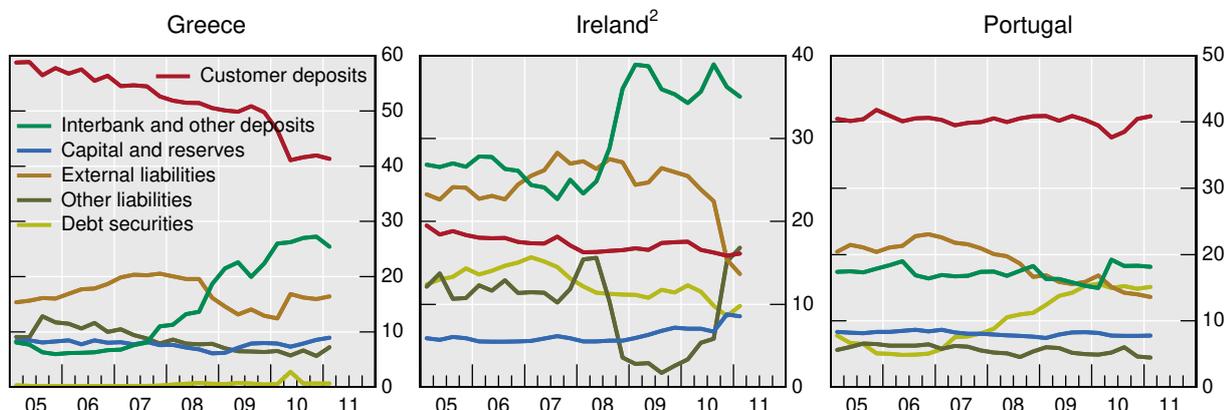
In contrast, the composition of funding has changed significantly for banks located in Greece, Ireland and Portugal (Graph 4). In these countries, customer deposits have generally declined as a share of total assets. This fall is particularly marked in Greece, while in Ireland the reduction was strong in absolute terms (but the decrease in share terms is limited by the contraction in total liabilities). The share of external liabilities has also decreased, especially in Ireland and Portugal. Interbank and other deposits have risen, reflecting greater reliance on central bank liquidity (which currently accounts for between 7 and 17% of total funding;

⁸ In most economies, banks' assets decelerated markedly around two to four quarters after the start of the economic downturn, reaching a trough in late 2009 and early 2010. The deleveraging was pronounced for Irish banks, but negative asset growth was also observed in France and Germany. Over the course of 2010, as advanced economies returned to growth, bank asset expansion picked up in most countries. In that phase, the growth of bank assets was negative in Ireland but strong in Portugal.

see Graph 5). Borrowing from the Eurosystem has allowed banks in these countries to avoid shrinking their balance sheets aggressively, thereby preventing a credit crunch.

Graph 4
Composition of banks' liabilities in Greece, Ireland and Portugal¹

As a percentage of total assets

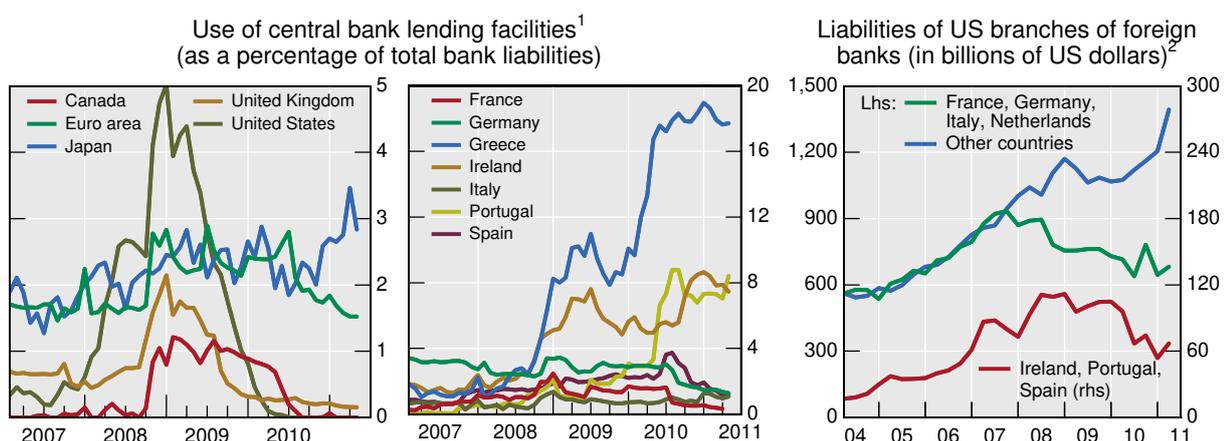


¹ Monetary and financial institutions, excluding the European System of Central Banks and shares in money market funds. Interbank and other deposits includes, but is not limited to, borrowing from the Eurosystem. ² External liabilities are only non-residents' deposits.

Source: Central banks.

The funding challenges faced by banks in euro area countries hit by concerns about fiscal sustainability have also been evident in specific markets. For instance, these banks' US branches – which are mostly funded with non-insured interbank and wholesale deposits, and hence are sensitive to changes in investors' risk perceptions – have been severely affected. Since late 2009, the liabilities of branches of Irish, Portuguese and Spanish banks have decreased by one-third, compared with a milder decline in the liabilities of branches of other euro area banks and an increase in liabilities for banks from other countries (Graph 5).

Graph 5
Liabilities of US branches of foreign banks and banks' recourse to central bank funding



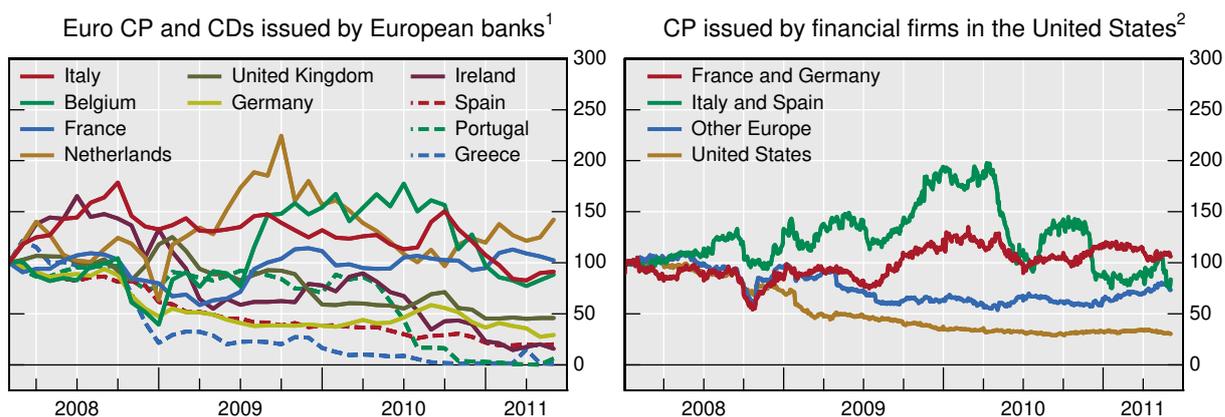
¹ Central bank lending includes: for Canada, securities purchased under resale agreements; for the euro area, lending to credit institutions related to monetary policy operations and other claims on euro area residents in euros; for Japan, loans and receivables under resale agreements; for the United Kingdom, short-term and long-term sterling operations; for the United States, repos, term auction facility and discount window lending. ² Other countries consist of all other countries with branches in the United States.

Sources: Federal Financial Institutions Examination Council 002 report; Datastream; national data.

The sovereign debt crisis has also had a clear impact on commercial paper (CP) and certificates of deposit (CDs) issued in the euro and US markets, which represent key sources of short-term funds for euro area banks.⁹ In the euro market, while the reduction over the last two years has been fairly generalised across European banking systems, outstanding amounts have fallen particularly sharply for banks headquartered in Greece, Ireland, Portugal and Spain (Graph 6). In the United States, the outstanding CP issued by Spanish and Italian banks has also fallen somewhat over the entire period, with the declines concentrated in the periods of acute sovereign tensions (April and November 2010). Irish banks (not shown in the graph) have largely withdrawn from the market.

Graph 6

European banks' issuance of commercial paper and certificates of deposit



¹ End-of month outstanding stock; January 2008 = 100. ² Daily outstanding stock; January 2008 = 100.

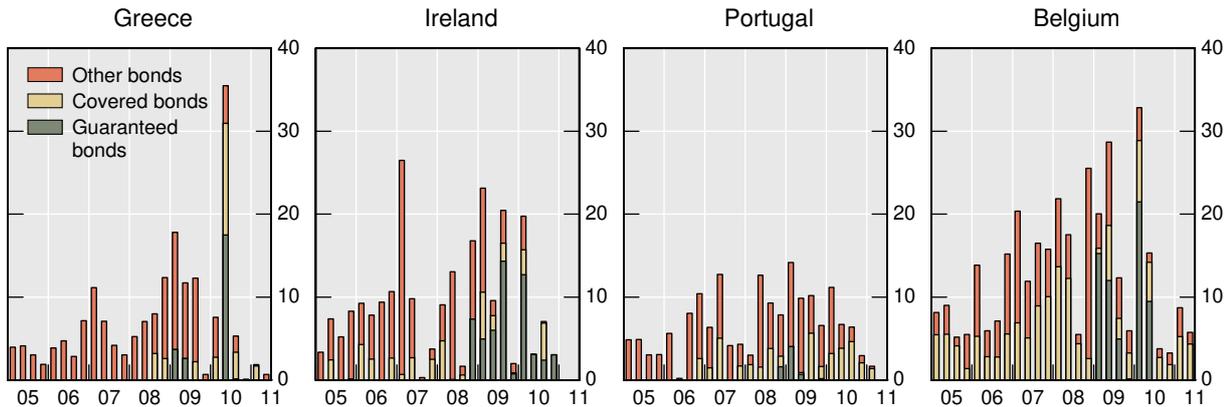
Sources: Federal Reserve Board based on the Depository Trust and Clearing Corporation (DTCC); Dealogic.

Gross and net international bond issuance by banks in the United States, the United Kingdom and the euro area shrank during 2009 and 2010, largely reflecting reductions in mortgage- and asset-backed debt in the first two economies and senior debt in the latter one (Graph A4.2). Within the euro area, the share of gross bond issuance featuring a high degree of investor protection (government-guaranteed and covered bonds) has roughly doubled to 50% (Graph A4.3). For banks headquartered in Greece, Ireland and Portugal, the shift towards “safer” bonds has been even more pronounced (Graph 7), and was largely motivated by the need to create collateral that is eligible in Eurosystem refinancing operations. A large Belgian bank has also issued substantial amounts of government-guaranteed bonds.

Banks' capital raisings in 2010 were much lower than in the previous two years, when they raised large amounts of equity from both public and private sources to cover writedowns and losses from the financial crisis. Within the euro area, most of the new shares were placed by German, Italian and Spanish banks, but there were also issues by Greek and Irish banks.

⁹ As of end-2010, euro market CP and CDs outstanding totalled \$670 billion (with half issued by banks), while unsecured financial CP outstanding on the US market totalled \$550 billion.

Graph 7
Banks' gross bond issuance in selected euro area countries¹
 In billions of US dollars



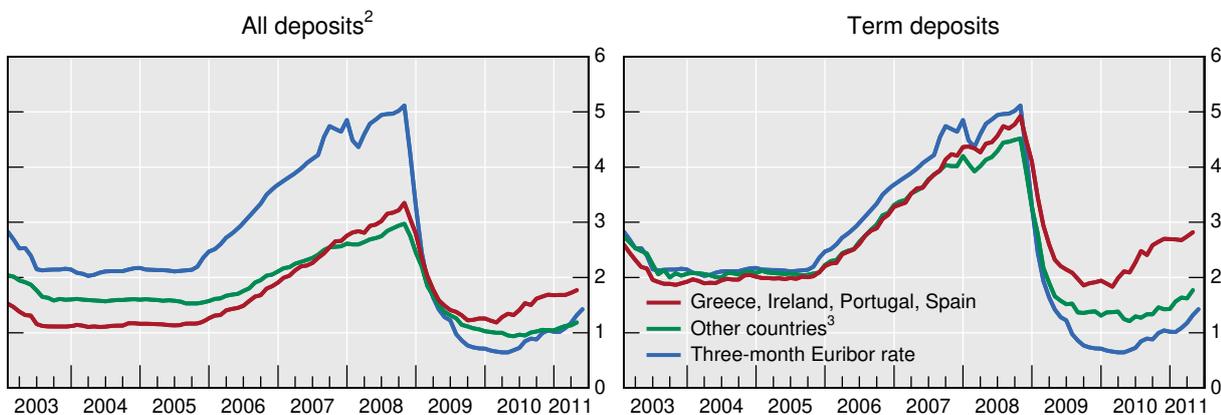
¹ Based on the sector and nationality of the issuer's parent company. Data for Q2 2011 only includes issuance in April and May.

Sources: Dealogic; BIS.

2.2 Banks' funding costs

Sovereign debt concerns have pushed up banks' funding costs, with wholesale markets more affected than retail deposits.¹⁰ Banks from the peripheral euro area countries have been most affected, but banks in other advanced countries – where the deterioration of public finance conditions is less pronounced – have also experienced some funding cost pressures.

Graph 8
Interest rates on bank deposits of households and non-financial companies in the euro area¹
 In per cent



¹ Monthly data weighted average for each group of countries. ² Overnight deposits, deposits with an agreed maturity and deposits redeemable at notice. ³ Austria, Belgium, Germany, Finland, France, Italy and the Netherlands.

Source: ECB.

The average interest rate on banks' retail deposits in Greece, Ireland, Portugal and Spain started rising in early 2010, even though money market rates and deposit rates in other euro

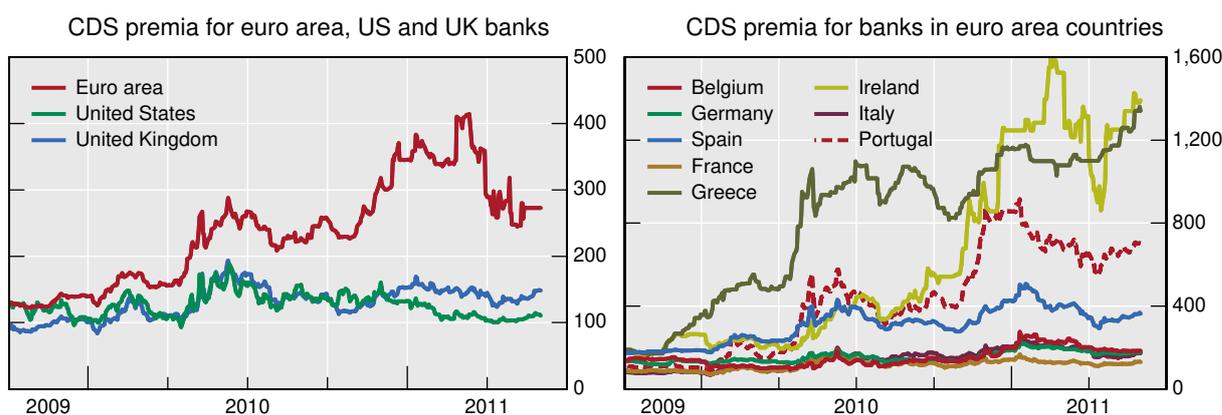
¹⁰ International comparisons of bank funding costs are affected by the fact that, during the financial crisis, in some countries (including the United States, the Netherlands and the United Kingdom) banks received substantial government aid, which helped to contain funding costs, while in other countries (such as Canada, Italy and Japan) banks received little or no public support. See Panetta et al (2009) and Ho and Signoretti (2012).

area countries were drifting lower (Graph 8). Over the past year, the average deposit rate for the four countries has increased by half a percentage point. The increase – which was driven by rates on term deposits – is consistent with increasing competition for deposits, reflecting banks’ attempts to boost their deposit base and lengthen its maturity, thus mitigating the effects of the reduction in market financing. However, it may also reflect customers’ requiring higher compensation for holding longer-term deposits at these banks.

Differences in banks’ funding costs have been starker on wholesale markets.¹¹ In November 2009, following the announcement of a much larger than expected Greek budget deficit, Greek banks’ CDS premia rose sharply (Graph 9). In April 2010, some euro area countries were downgraded and market tensions pushed up bank CDS premia in most advanced countries, including the United States and the United Kingdom. Intervention by the official sector in early May led to an improvement in market conditions.¹² A positive, temporary effect also came from the release of the results of the EU bank stress tests in July. In October 2010 tensions escalated, due to the repercussions of the Irish crisis and proposed EU treaty changes that would impose losses on holders of bonds issued by governments in financial distress. The CDS premia of European banks rose noticeably. In the first quarter of 2011 bank funding conditions improved, mainly owing to expectations of a reinforcement of financial assistance programmes among euro area countries. However, fresh tensions emerged in April, when Portugal applied for international support. Sovereign CDS spreads widened for Greece, Ireland and Portugal, while they narrowed or were not affected for other countries. Bank CDS spreads were little changed in most euro area countries.

Graph 9

Credit default swap premia for banks in Europe and the United States¹



¹ For each country, the simple average of five-year CDS premia on senior bonds issued by the major banks. The most popular CDS contract in Europe (modified restructuring) differs from that in the United States (modified-modified). This can affect the level of CDS premia.

Sources: Datastream; Merrill Lynch.

Since late 2009, banks’ funding conditions have moved more closely with those of their home sovereign. First, the correlation between sovereign and bank CDS premia has been reasonably high and rising in several advanced countries, particularly some euro area ones

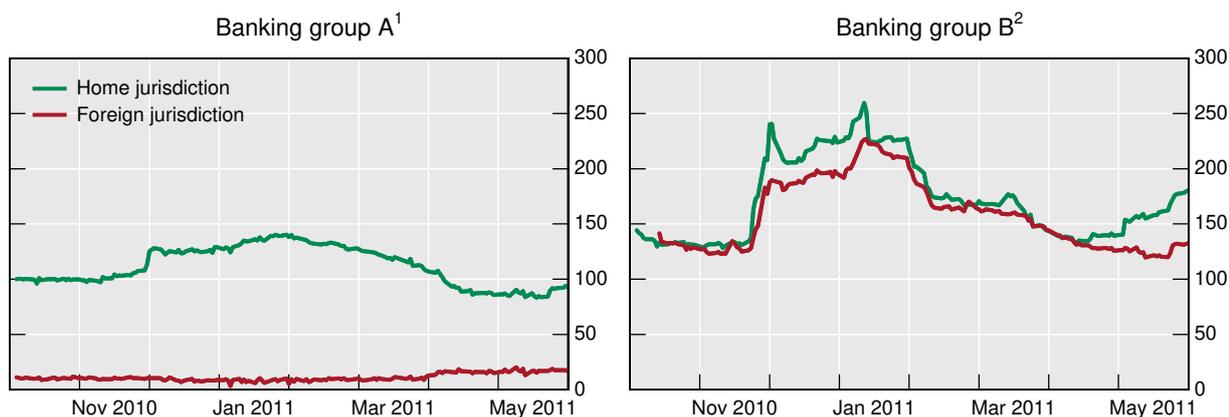
¹¹ In this report, the analysis of the cost of bank wholesale funding is based on bank CDS premia, which are more closely comparable across different banks than other forms of wholesale funding (such as bonds). The qualitative results are similar to those based on banks’ bond spreads (unreported).

¹² Several euro area countries tightened public finances. Public bodies intervened through the Eurosystem’s Securities Markets Programme and, for countries under exceptionally strong pressure, the provision of financing via the European Financial Stabilisation Mechanism and the European Financial Stability Facility, supplemented by IMF assistance. This contained contagion. See Bank of Italy (2010) and ECB (2010b).

(Graph A4.5). Second, spreads at issuance on bank bonds have been affected by the condition of the sovereign (see Box A: *The impact of sovereign risk on the cost of bank funding*). Third, for some large European cross-border banking groups that are located in non-triple-A countries and that issue bonds in different jurisdictions, the cost of issuing in their home country has exceeded the cost of issuing via their subsidiaries in AAA-rated host countries (Graph 10).¹³ These findings are consistent with empirical analyses.¹⁴

Graph 10
Spreads for bonds issued in different jurisdictions by large banking groups

Daily data, in basis points



¹ Secondary market asset swap spreads on covered bonds maturing in 2016 and 2017, issued in the foreign and home jurisdiction, respectively, by banks belonging to the same group; the foreign subsidiary has a lower rating than the parent bank. ² Secondary market asset swap spreads on unsecured senior bonds maturing in 2015, issued in different jurisdictions by banks from the same group; the foreign subsidiary has a lower rating than the parent bank.

Source: Bloomberg.

The tensions emanating from the weaker euro area countries seem to have spilled over not only to banks located in countries with vulnerable fiscal positions (such as Italy, Belgium and Spain), but also to banks headquartered in countries with stronger public finances but with sizeable exposures to banks or sovereigns in peripheral Europe, such as France, Germany and the United Kingdom. The CDS premia of banks from this second group of countries rose during late 2010, when possible haircuts on government bonds first became an issue, and have a reasonably high correlation with the sovereign CDS spreads of the countries hit by the crisis (Graph 11). Measures of expected default frequencies (EDFs¹⁵) of French, German and Italian banks co-moved closely in 2010–11.

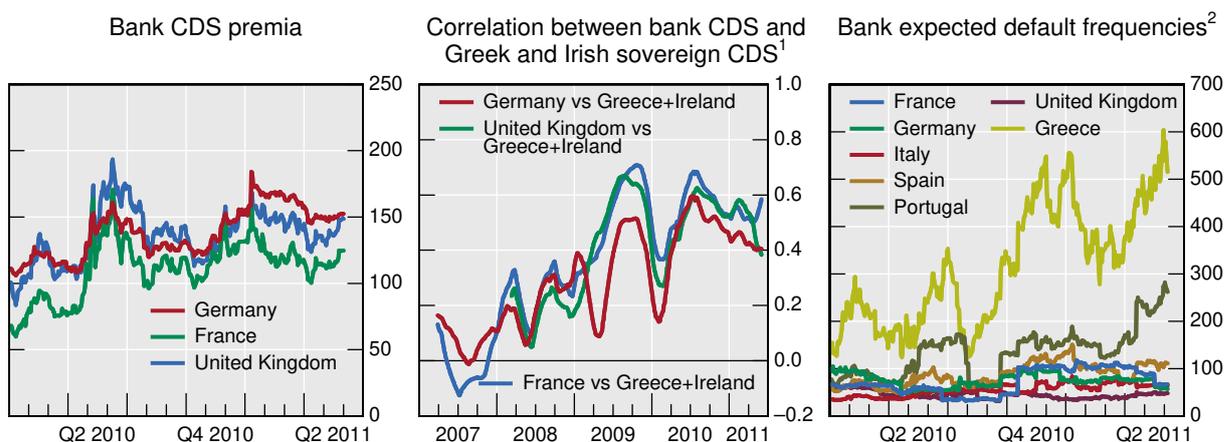
¹³ Besides the conditions of the home and host sovereigns, these differences in funding costs reflect other factors including: the systemic importance of the subsidiary bank in the host country (an indicator of the public support it may receive from the host sovereign in case of difficulties); the credit rating of parent and subsidiary banks; and the characteristics of the bonds (for instance the quality of the mortgages backing the covered bonds issued by Group A). The differences in funding costs have been noticed by market commentators; see *Financial Times* (2011).

¹⁴ Demirgüç-Kunt and Huizinga (2010) find that during the financial crisis the increase in bank CDS premia is significantly related to the deterioration of public finance conditions. Goldman Sachs (2010) finds that during the euro area debt crisis, bank CDS premia were significantly positively correlated with the CDS premia of the respective sovereigns (the relationship is found to be stronger than for corporate CDS premia).

¹⁵ Moody's KMV's expected default frequencies are an indicator of banks' creditworthiness as perceived by stock market investors, as they provide a measure of the probability, implied by the level and volatility of share prices, that assets will have a lower market value than liabilities over a one-year horizon.

Graph 11

Bank CDS premia and expected default frequencies



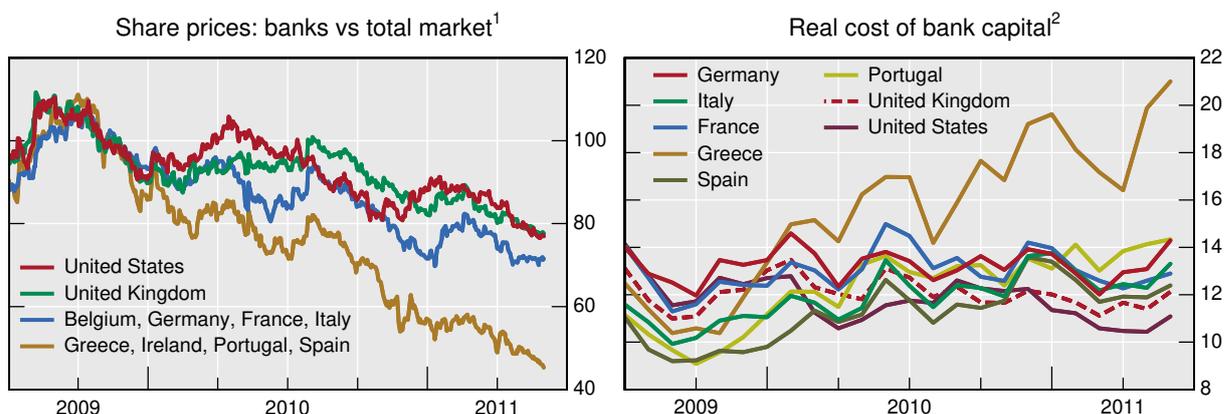
¹ Three-month moving average of the exponentially weighted moving average between daily changes in the banking CDS index for each country shown and daily changes in the average of the sovereign CDS of Greece and Ireland. The banking CDS index for each country is constructed as a simple average of each bank's CDS. The decay factor is equal to 0.96. ² For each country, the median value (in basis points) of the EDFs of the banks in the respective KMV country index.

Sources: Bank of Italy; CMA; Datastream; FTSE, Institutional Brokers' Estimate System (I/B/E/S); Moody's KMV; Reuters.

Banks' share prices have underperformed the broader market across advanced countries since late 2009, and in most cases have fallen in absolute terms (Graph 12). The underperformance has been greatest for banks headquartered in the euro area countries affected by sovereign debt concerns. Banks in other euro area countries have performed only a little worse than those in the United States and the United Kingdom. The cost of equity is estimated to have increased slightly for euro area banks, and is little changed for banks in the United Kingdom and the United States.

Graph 12

Banks' share prices and cost of capital



¹ Ratio of the bank share price index to the total market index, dividends reinvested. Daily data; 31 October 2009 = 100. ² Averages of banks' cost of capital obtained with different models (a cyclically adjusted earnings yield, a beta model and dividend discount models). End-of-month data, in per cent.

Sources: Bank of Italy calculations; Datastream; FTSE; I/B/E/S.

Box A

The impact of sovereign risk on the cost of bank funding

The empirical literature does not provide indications on the size of the impact of sovereign risk on the cost of bank funding. This box examines whether the characteristics of the sovereign play a role in addition to the traditional determinants of the cost of issuing bonds for banks (ie the characteristics of the bank and the bond, and market conditions; see Elton et al (2001)).

The analysis is based on a sample of 534 unsecured fixed-rate senior bonds from 116 banks in 14 advanced countries. All issues took place in 2010, when concerns about the conditions of sovereigns were acute. For these bonds, the following cross-sectional regression was estimated:

$$Spread = a_0 + \sum_j a_j D_j^{BANK} + \sum_k a_k D_k^{BOND} + \sum_i a_i D_i^{GOV} + \sum_z a_z D_z^{MKT-COND} + \varepsilon \quad (1)$$

where *Spread* is the spread at launch between the bond yield and the swap rate on the contract of corresponding maturity, D^{BANK} are binary dummies for each of the characteristics of the issuer (rating, CDS spread, size), D^{BOND} are dummies for bond characteristics (issue size, maturity, currency, rating), D^{GOV} are dummies for the sovereign (rating, CDS spread) and $D^{MKT-COND}$ are dummies for market conditions (quarter of issue).

Because the dummies are constructed in such a way that all coefficients have negative signs, the intercept represents the hypothetical spread of the most expensive bond issue – ie the spread that a bank would pay if its sovereign had a low rating and high CDS premium; if the bank had a high CDS premium, low rating and small size; if the maturity of the bond was long, etc (Table A1). The layers in Graph A1 (representing estimated coefficients) show the contribution of each variable to the spread; in other words, each layer can be seen as the saving a bank would achieve if the worst case characteristics foreseen by the intercept were removed.^①

Table A1 and Graph A1
Breakdown of the spread at launch of bank bonds by contributing factors

Dependent variable: spread at launch ¹					Amount of spread reduction on a hypothetical bank bond
Method: least squares					
Variable	Coefficient	Std.Error	t-Statistic	Prob.	
Constant	360.5	16.593	21.724	0.000	
Sovereign rating high	-59.8	17.617	-3.396	0.001	
Sovereign CDS low	-62.5	13.025	-4.800	0.000	
Bank rating high	-28.6	14.118	-2.023	0.044	
Bank CDS low	-17.2	10.857	-1.588	0.113	
Total asset high	-17.6	9.576	-1.835	0.067	
Issue rating high	-47.5	13.444	-3.534	0.000	
Euro denomination	-73.3	8.786	-8.346	0.000	
Short maturity	-95.2	8.959	-10.628	0.000	
<i>R-squared</i>	0.43				
<i>Included observations</i>	534				

¹ The precise definitions of the equation dummy variables are as follows: “sovereign rating high” is 1 if the sovereign is AAA; “sovereign CDS low” is 1 if the CDS is below 45 basis points; “bank rating high” is 1 if the bank is AAA; “bank CDS low” is 1 if the CDS is below 82 basis points; “total asset high” is 1 if total assets in 2010 are above 850 million; “issue rating high” is 1 if the rating is AAA or AA+; “euro denomination” is 1 if the bond is denominated in euros; “short maturity” is 1 if the maturity is less than 12 months.

Source: Author’s calculations.

The main insight from this analysis is that in 2010 a large part of the spread at launch on bank bonds (on average 30%, or 120 basis points) reflected the conditions of the sovereign. This percentage increases to 50% for the countries for which the concerns over public finance conditions were most pronounced. The characteristics of the issuing bank contribute less than 20% of the spread for the entire sample and about 10% for the weak countries.

Box A (cont)

In order to examine whether sovereign characteristics also affect the spreads of bank bonds in “normal” times, the regression was rerun using data for 2006, when investors did not perceive significant risks for either banks or sovereigns. Results (unreported) suggest that, in normal times, the characteristics of the sovereign have virtually no effect on the cost of bank funding, which instead is closely related to issue-specific and bank-specific factors.

^⓪ For example, the dummy for bank ratings in regression (1) equals 1 if the bank rating is AAA, and 0 otherwise. Hence, the estimated coefficient of this dummy is the reduction of the spread at issue for AAA-rated banks relative to lower-rated banks. The coefficients of the other right-hand-side binary dummies have similar interpretations. The regression implicitly assumes that the causality goes from the sovereign to banks. Robustness tests were performed.

3. Transmission channels

This section examines the channels through which sovereign risk may affect the cost and availability of funding for banks. The focus is on the channels that specifically affect the banking system, neglecting those that affect all sectors of the economy. For example, we do not consider the effect of any recession triggered by fiscal consolidation, as the fall in demand would affect all economic sectors. We identify four main channels whereby a deterioration in sovereign creditworthiness may make bank funding more costly and difficult to obtain. First, there are direct effects on bank balance sheets and profitability through their holdings of sovereign debt and their derivatives positions with sovereigns. Second, there is a reduction in the value of the collateral that banks can use to obtain wholesale funding and central bank refinancing. Third, sovereign downgrades tend to flow through to lower ratings for domestic banks. Fourth, there are reduced benefits from implicit and explicit government guarantees. These effects can be triggered or reinforced by the international transmission of tensions. Other potential channels, which are less evident in our analysis due to data constraints or because they may not be having significant effects, are discussed briefly.

3.1 Asset holdings

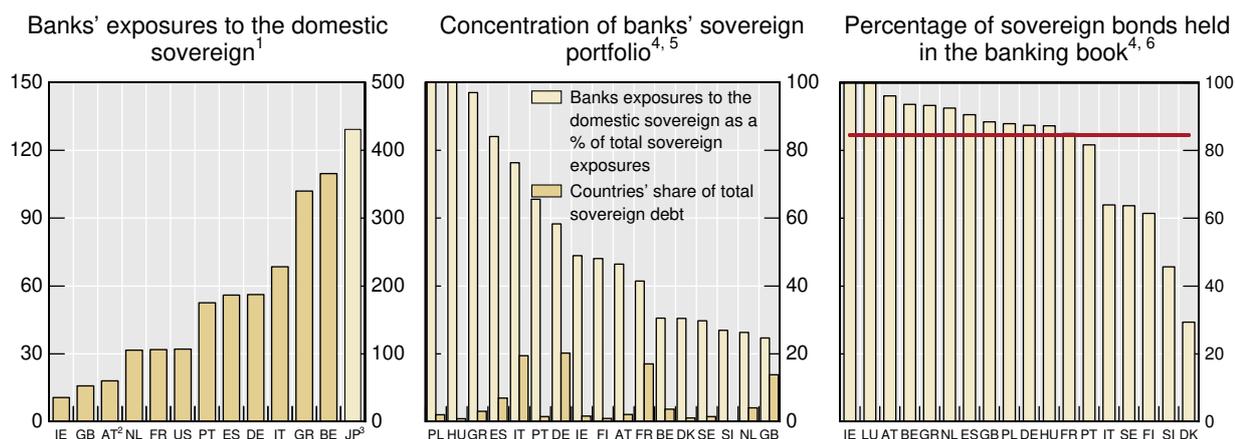
Increases in sovereign risk may affect banks through their direct holdings of sovereign debt. Losses on sovereign portfolios weaken banks’ balance sheets and increase their riskiness, with adverse effects on the cost and availability of funding. The extent of the impact depends on whether the securities are carried on the balance sheet at market value (that is, held in the trading, available-for-sale or fair value option books) or at amortised cost (assets in the held-to-maturity banking book). In the first case, a fall in the value of sovereign bonds has direct and immediate effects on banks’ profit and loss statements, and on their equity and leverage. In the second case, accounting principles imply that losses are recorded only when the securities are impaired (eg when a sovereign restructuring or default becomes likely); nonetheless, these exposures may affect bank funding conditions prior to this occurring, to the extent that investors become concerned about the solidity of the bank.¹⁶

¹⁶ When a bank’s riskiness increases, creditors get concerned about their position in the case of default of the bank, when the bank’s assets would be realised at market value. Here, creditors will look through the accounting conventions, assessing the solidity of the bank based on its assets at market value, even if they are in the banking book.

Exposure to the domestic sovereign

In advanced economies, banks often have sizeable exposures to the home sovereign, and generally have a strong home bias in their sovereign portfolios (Graph 13, left and centre panels).¹⁷ Holdings of domestic government bonds as a percentage of bank capital tend to be larger in countries with high public debt. Among the countries severely affected by the sovereign crisis, banks' holdings are largest in Greece and small in Ireland. Across EU countries, most of the exposure (85% on average) is held in the banking book, somewhat limiting the immediate impact on banks of changes in the market price of sovereign bonds.

Graph 13
Banks' exposure to the domestic public sector



AT = Austria; BE = Belgium; CH = Switzerland; DE = Germany; DK = Denmark; ES = Spain; FI = Finland; FR = France; GB = United Kingdom; GR = Greece; HU = Hungary; IE = Ireland; IT = Italy; JP = Japan; LU = Luxembourg; NL = Netherlands; PL = Poland; PT = Portugal; SE = Sweden; SI = Slovenia; US = United States.

¹ As a percentage of banks' equity. Data are from national central banks, as of end-2010, and are on a locational basis, for banks *resident* in each country. The definition of bank equity is an accounting one, which differs across countries and from the measure of Tier 1 capital used in subsequent graphs. The data for Netherlands banks are sourced from the CEBS EU-wide stress tests. ² As at end 2009. ³ The value for Japan is shown on the right-hand scale. ⁴ Data on banks' exposures are from the CEBS EU-wide stress tests, as of end-March 2010, and are on a globally consolidated basis, for banks *headquartered* in each country. The share of the national banking system covered by banks included in the EU stress tests is low for some of the smaller countries. Data on countries' share of total sovereign debt are from Bolton and Jeanne (2011). ⁵ The lighter bars show banks' exposures to their home sovereign, as a percentage of their total exposures to the 17 European sovereigns shown in the graph. The darker bars show each country's share of outstanding sovereign debt issued by the same 17 countries. ⁶ Holdings of domestic and foreign bonds. The horizontal line shows the average.

Sources: Bolton and Jeanne (2011); CEBS EU-wide stress tests; central banks' data.

Exposure to foreign sovereigns

Banks also hold sizeable amounts of debt issued by foreign sovereigns. BIS data suggest that banks' exposure to the public sector in all foreign countries ranges from 75% of Tier 1 capital for Italian, US and German banks to over 200% for Swiss, Belgian and Canadian banks (Graph 14). Exposure vis-à-vis the countries most severely affected by the sovereign debt tensions is significantly smaller, but sometimes non-negligible – for instance, German, French and Belgian banks' exposures are around 20% of their Tier 1 capital.¹⁸

¹⁷ In EU countries, banks' exposures to their home sovereign as a share of their total exposures to all EU sovereigns is much higher than the weight of the home country's outstanding debt in a hypothetical market portfolio comprised of sovereign debt issued by all EU countries.

¹⁸ These exposures data show a worst case scenario, where Spain is also severely affected by sovereign tensions. Over recent months, Spain seems to have decoupled somewhat from Greece, Ireland and Portugal. Data for German banks are on an immediate borrower, rather than an ultimate risk basis.

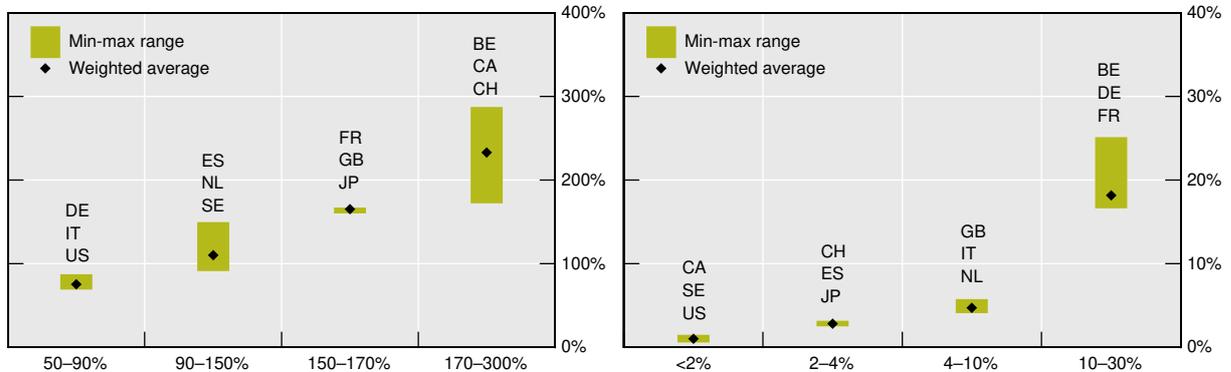
Graph 14

Banks' exposure to foreign sovereigns¹

As a percentage of the home country banks' Tier 1 capital

Vis-à-vis all countries

Vis-à-vis Greece, Ireland, Portugal and Spain



BE = Belgium; CA = Canada; CH = Switzerland; DE = Germany; ES = Spain; FR = France; GB = United Kingdom; IT = Italy; JP = Japan; NL = Netherlands; SE = Sweden; US = United States.

¹ Bank nationalities are grouped in "buckets", based on the size of their exposure as a percentage of Tier 1 capital. Data are as at December 2010, on an ultimate risk basis, except for German banks, which are on an immediate borrower basis. German banks' Tier 1 capital is on a locational basis.

Source: BIS consolidated banking statistics.

Financial markets seem to be broadly aware of the risks stemming from these direct exposures to foreign sovereigns.¹⁹ Bank nationalities that have larger claims on the public sectors of Greece, Ireland, Portugal and Spain as a percentage of their Tier 1 capital have seen their CDS premia co-move more closely with the sovereign CDS premia of those four countries (Graph 15, left-hand panel).²⁰

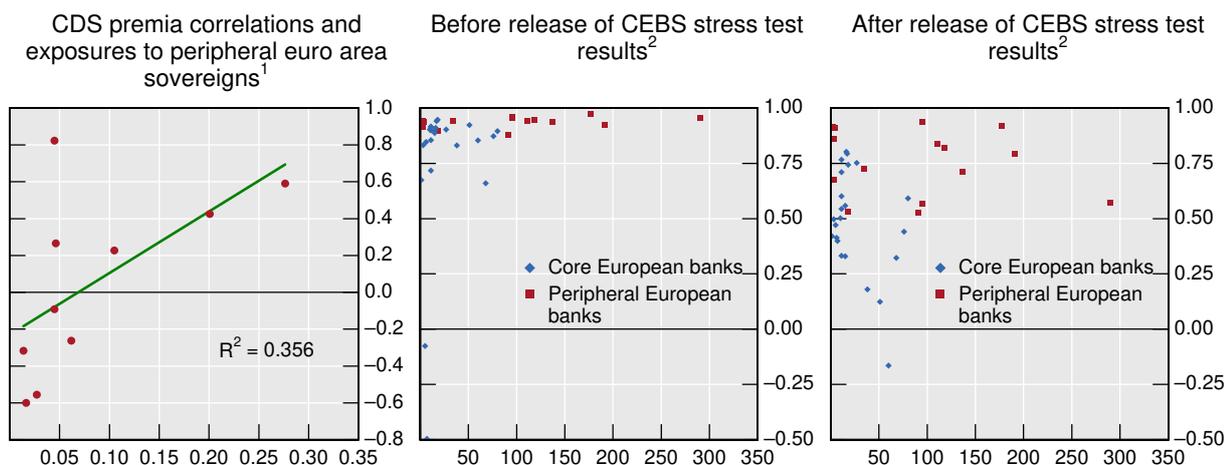
Uncertainties about the size of banks' exposures to specific sovereigns can amplify funding pressures. During the six months prior to the publication of the results of the CEBS stress tests in July 2010, the CDS premia of individual EU banks were strongly correlated with the sovereign CDS of Greece, Ireland, Portugal and Spain, regardless of the bank's actual exposure to those sovereigns (Graph 15, centre panel). After the bank-level data were released, the correlation between bank and sovereign CDS more closely reflected individual banks' actual exposure to the weaker sovereigns, decreasing significantly for some banks with little exposure (Graph 15, right panel; see also Box B: *The impact of sovereign bond holdings on bank risk*).

¹⁹ See for example the analyses by Citigroup Global Markets (2011) and Goldman Sachs (2011).

²⁰ This result should be regarded cautiously, given the limited number of observations on which it is based.

Graph 15

Bank CDS premia correlations and exposures to sovereigns in peripheral Europe



¹ For each country, the horizontal axis shows the banking sector's consolidated claims on the public sectors of Greece, Ireland, Portugal and Spain as a percentage of Tier 1 capital, averaged for the period Q1 2009–Q4 2010. Data for Belgian and German banks are on an immediate borrower basis rather than an ultimate risk basis. The vertical axis shows the correlation between the average five-year CDS premium for selected large banks, weighted by the banks' total assets, and the CDS premia of Greek, Irish, Portuguese and Spanish sovereign debt, weighted by GDP, for the period between 1 January 2009 and 31 March 2011. ² Each point represents a European bank. The horizontal axis shows the bank's exposure to peripheral European sovereigns as a percentage of Tier 1 capital. The vertical axis shows the correlation between bank CDS and a GDP-weighted average of sovereign CDS of Greece, Ireland, Portugal and Spain, calculated using daily data between 1 January 2010 and 30 June 2010 for the centre panel, and between 23 July 2010 and 31 October 2010 for the right-hand panel.

Sources: CEBS; Markit; BIS consolidated banking statistics.

Exposures through OTC derivatives transactions

Banks also have direct, on-balance sheet exposures to sovereigns through their market-making role in over-the-counter (OTC) derivatives markets. Sovereigns often use OTC derivatives to adjust the interest rate or the currency composition of their outstanding debt.²¹ Banks are key counterparties in these transactions, and hence are exposed to sovereign risk whenever the mark-to-market value of the derivative position is negative for the sovereign and positive for the banks. Banks record derivatives transactions that have a positive market value at a lower than face value on their balance sheets to reflect this inherent counterparty risk (this is referred to as the credit valuation adjustment – CVA).²²

Increases in sovereign risk result in higher CVAs and a reduction in the market value of banks' derivatives transactions, and are reported as mark-to-market losses on their income statement. The impact on banks is exacerbated by the fact that sovereigns (and other highly rated entities) often use unilateral credit support annexes (CSAs), meaning that they do not post collateral to offset mark-to-market losses on derivatives, but will receive collateral on their mark-to-market gains. This negatively affects banks in two ways. First, banks' mark-to-market claims on sovereigns are uncollateralised, increasing their CVA risk. Second, if banks hedge their derivatives positions with sovereigns using offsetting trades with other entities

²¹ Anecdotal evidence suggests that sovereigns' derivative positions are sizeable. However it is impossible to quantify the global value of these derivative positions, as only a very small number of sovereigns (including Denmark and Sweden) publicly disclose data on their positions.

²² The CVA is the difference between the value of a derivative position (not taking into account counterparty credit risk) and the value of the same derivative position adjusted for counterparty credit risk. The default probability of a given counterparty is typically assessed using market measures of default risk such as bond spreads or CDS premia.

that are covered by bilateral CSAs, then banks can face additional funding strains as they need to post collateral in one transaction without receiving any reciprocal collateral in the corresponding hedge transaction. Banks sometimes hedge themselves against sovereign risk by buying CDS protection or short-selling government bonds, but depending on the liquidity in these markets, this can push up sovereign risk premia and cause further CVA losses.

Box B

The impact of sovereign bond holdings on bank risk

To assess whether sovereign exposures affect investor perceptions of bank risk (and hence bank funding costs), we examined how the publication of banks' holdings of government securities as part of the EU-wide stress test affected banks' CDS premia in the days surrounding the publication date (23 July 2010). On that occasion, 91 banks released detailed information on their exposure vis-à-vis 30 EU sovereigns. This very granular information was not previously available.

For the 52 banks whose CDS were available, the change in each bank's CDS premium was regressed on a proxy of the "surprise" at the bank's combined holdings of Greek, Irish and Portuguese (GIP) government bonds generated by the release of information on sovereign portfolios.^① The inclusion of this proxy is motivated by the fact that banks' CDS premia likely already incorporated an (imprecise) estimate of their sovereign exposures before the publication of the tests. Thus, it can be argued that the change in spreads following the stress test was influenced by the surprise component embedded in the information released on the publication date.

Results suggest that a larger surprise exposure vis-à-vis the GIP sovereigns is associated with wider CDS premia. In particular, it is estimated that a surprise factor corresponding to 1% of bank capital was associated with a 0.5–2% smaller reduction (or larger increase) in the CDS premium after the test, depending on the specification of the equation and the time window chosen for the event study.^② This result is consistent with previous evidence on the potential adverse effects of banks' sovereign exposures. Gennaioli et al (2010) find that government defaults cause larger contractions in the credit supply in countries where banks have larger holdings of public debt. Borenstein and Panizza (2009) show that sovereign defaults are associated with banking crises, as weakened bank balance sheets can lead to bank runs.

^① The "surprise" proxy is defined as the difference between each individual bank's actual exposure to GIP sovereigns as a percentage of its Tier 1 capital (from the CEBS stress tests), and that bank nationality's aggregate exposure to GIP sovereigns and the private sector as a percentage of aggregate capital (from the BIS consolidated banking statistics). This second term represents the information available to markets before the stress tests.

^② This analysis is complicated by the release of the updated Basel III rules on 26 July 2010, the next working day after the release of the EU stress test results. The 0.5% value is based on a one-day event window, while the 2% value reflects a three-day event window. The regressions include bank- and country-specific controls.

3.2 The collateral/liquidity channel

Sovereign securities are used extensively by banks as collateral to secure wholesale funding from central banks, private repo markets and issuance of covered bonds, and to back over-the-counter (OTC) derivative positions. Increases in sovereign risk reduce the availability or eligibility of collateral, and hence banks' funding capacity, through several mechanisms. First, when the price of a sovereign bond falls, the *value* of the collateral pool for institutions holding that asset automatically shrinks. If the asset was already posted in specific transactions, mark to market valuation of collateral could trigger a margin call. A downgrade could even exclude a government's bonds from the pool of collateral eligible for specific operations or accepted by specific investors (eg foreign money market or pension funds).

Second, the *haircuts* applied to sovereign securities could increase.²³ The major determinants of haircuts are collateral valuation uncertainty, market liquidity and credit risk (CGFS (2010)). Sovereign bonds typically perform well on these dimensions, and so have small haircuts. But in periods of sovereign stress, market operators might apply non-negligible haircuts even to sovereign debt. Moreover, as sovereign bond haircuts often serve as a *benchmark* for those applied on other securities, the impact on bank funding conditions could be magnified through changes in haircuts on other securities.²⁴

Central bank funding

Provision of central bank liquidity (such as through open market operations) is typically conducted through repurchase agreements or secured transactions. In the Eurosystem's refinancing operations, 20% of transactions are secured by government bonds (Graph 16, left panel).²⁵ This share likely reflects the fact that a wide range of collateral instruments are eligible with the central bank and that banks tend to use sovereign bonds in private repos, where only very liquid collateral is accepted.²⁶ In the United Kingdom and Japan, 60-80% of open market and standing facility operations are collateralised by government bonds.

In recent months, banks from severely affected countries (Greece, Ireland and Portugal) have increased their use of Eurosystem liquidity and made greater use of domestic government bonds or government-guaranteed bank bonds to collateralise this funding. This was permitted by a modification of the rules on collateral acceptance by the Eurosystem, which suspended the application of the minimum credit rating threshold for securities issued or guaranteed by governments of countries that had obtained international financial support and adopted a fiscal consolidation plan approved by the European Commission and the IMF, in liaison with the ECB (ECB (2010a, 2011)).

Private repo markets

Private repo markets are a significant source of funding for banks. In the United States, outstanding repos reported by primary dealers amounted to 35% of GDP in 2010.²⁷ Treasury, federal agency and government-sponsored enterprise securities accounted for 75% of the total collateral.²⁸ In the euro area, the amount of outstanding repos in June 2010 was equivalent to 75% of GDP, with four fifths of the transactions collateralised by government bonds (ICMA, 2010). In the United Kingdom, Bank of England data indicate that the gilt repo market was equivalent to 35% of GDP in late 2010.

The private repo market is very sensitive to changes in the perceived riskiness of the collateral. Only 1½% of transactions were collateralised by Greek, Irish and Portuguese government bonds during the six months to December 2010, less than half the share in 2008 and 2009. This reflected sharp falls in the use of Greek and Irish collateral (Graph 16, centre panel). The share of collateral other than government bonds issued in those countries also

²³ Haircuts are the difference between the value of the pledged collateral and the cash loaned.

²⁴ The impact of sovereign shocks on banks via funding liquidity can be reinforced if this triggers "liquidity spirals". See Brunnermeier and Pedersen (2009).

²⁵ In the euro area, there is substantial variability across countries, with the shares ranging from 5 to 98%.

²⁶ Cheun et al (2009) compare the ECB, Federal Reserve and Bank of England collateral framework.

²⁷ This funding source is more important for dealers than for commercial banks. The above estimate includes double-counting of repos and reverse repos. Hordahl and King (2008) estimate that in mid-2008 the size of the whole market, including data reported by bank holding companies, was around \$10 trillion (or 70% of GDP).

²⁸ Based on the tri-party repos segment. This is a type of repurchase agreement for which a third party, called the clearing bank, provides intermediation services to the cash investor and the collateral provider. See Copeland et al (2010).

declined. In mid-2010, market participants were reluctant to lend to banks from countries affected by sovereign tensions against collateral made up of their home sovereigns, as these transactions entailed “two highly correlated risks” (ECB 2010c). Market tensions have also affected haircuts on euro area government bonds; for instance, in November 2010 LCH.Clearnet, a leading clearing house, increased the haircuts on Irish government bonds to 45%, and in April 2011 it raised haircuts for Portuguese sovereign bonds. These haircuts have subsequently been increased further, and were 75% and 65% respectively in June.

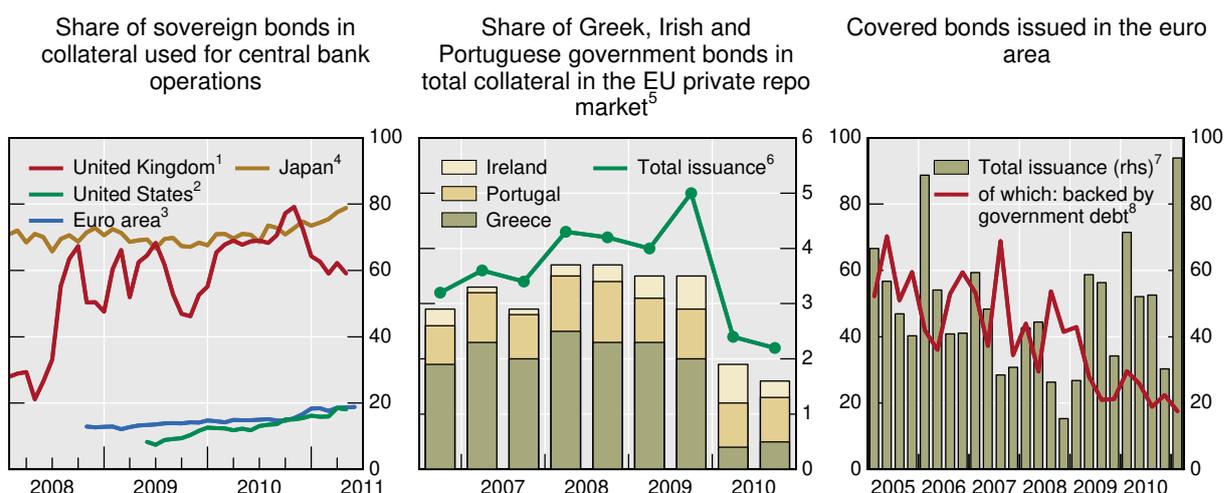
Covered bonds and OTC derivatives

Sovereign debt is widely used by banks as collateral in covered bond issuances. In 2008 and 2009, one third of the gross issuance of covered bonds in the euro area was backed by government debt. For wholesale covered bonds – two thirds of the total – the share of issuance backed by sovereign bonds had halved to 20% by late 2009, and has remained around that level since then. This move mainly reflected a relative increase in the issuance of mortgage-backed bonds from “core” euro area countries, which account for 70% of total issuance in the euro area. Greek, Irish and Portuguese banks typically do not issue sovereign-backed covered bonds on the wholesale markets.

Public sector bonds also have a role in OTC derivatives transactions: as of end-2010, government securities accounted for \$150 billion, or 17% of total delivered collateral (ISDA (2011)); this share is little changed from that recorded at the end of 2008 and 2009.

Graph 16

Use of sovereign bonds in wholesale markets



¹ In per cent. Share of gilts, UK Treasury bills and Bank of England Bills in total sterling collateral. ² In per cent. Share of US Treasury, agency and agency-guaranteed securities in discount window collateral pledged by all depository institutions, including those without any outstanding loans. ³ In per cent. Share of government bonds in total submitted collateral in Eurosystem refinancing operations. ⁴ In per cent. Share of government securities and government-guaranteed bonds in total submitted collateral in Bank of Japan refinancing operations. ⁵ In per cent. ⁶ All securities (both government and non-government) issued in Greece, Ireland and Portugal. ⁷ In billions of euros. Comprises only wholesale issuance. ⁸ In per cent.

Sources: ICMA survey, December 2010; Dealogic; central banks.

3.3 Sovereign ratings and bank ratings

Sovereign ratings are important for banks in two respects. First, sovereign downgrades have direct negative repercussions on the cost of banks' debt and equity funding.²⁹ This effect works via the channels described elsewhere in this report.

Second, owing to strong links between sovereigns and banks, sovereign downgrades often lead to downgrades of domestic banks. In particular, sovereign ratings generally represent a ceiling for the ratings of domestic banks.³⁰ As at end-2010, only 2% of domestic rated banks (three out of 172) across seven non-AAA European countries had a rating (from any of the three major rating agencies) that was higher than that of their respective sovereign.³¹ Rating downgrades generally cause banks to pay higher spreads on their bond funding, and may also reduce market access. Moreover, institutional investors that are restricted to investment grade bonds could be forced to liquidate their holdings of bank bonds if their ratings fall below this threshold. Rating triggers in derivatives contracts can also lead to margin calls on a bank that is downgraded.³²

Table 1
Domestic bank rating changes in countries downgraded during the crisis¹
(August 2007–May 2011)

	Greece	Ireland	Japan	Portugal	Spain	Total ³
Number of sovereign downgrades	14	14	1	11	5	45
of which: <i>after 1 Nov 2009</i>	12	10	1	10	4	37
Average share of banks that were downgraded following a sovereign downgrade ²	83%	58%	0%	67%	29%	64%
of which: <i>after 1 Nov 2009</i>	92%	62%	0%	71%	26%	68%
Average number of rated banks in the sample	5	4	39	6	38	9
of which: <i>after 1 Nov 2009</i>	5	4	39	6	45	10

¹ Data refer to foreign currency long-term rating changes by Fitch, Moody's and Standard & Poor's. Domestic banks are defined as banks whose ultimate parent company has its domicile in the same country as the sovereign. ² Average number, across rating agencies, of banks' rating downgrades that occurred within six months from the sovereign rating downgrade, as a percentage of the number of all banks that were rated when the sovereign rating change occurred. ³ The total is a weighted average across countries, with the weights equal to the number of sovereign downgrades for each country.

Sources: Bloomberg; authors calculations.

²⁹ Aretzky et al (2011) show that news on sovereign ratings affected bank stock prices in Europe during 2007–10. They also find that rating downgrades near speculative grade have systematic spillover effects across countries, possibly because of rating-based triggers used in banking regulation, OTC contracts and investment mandates. Kaminsky and Schmukler (2002) find that sovereign ratings and outlooks in emerging markets generate cross-country contagion and affect both bonds and stocks; effects are stronger during crises. Correa et al (2011) find that, over the past 15 years, sovereign downgrades in advanced countries and emerging economies had a significant effect on banks' equity financing costs: on average, a one-notch downgrade reduced bank equity returns by 2 percentage points in advanced countries, and by 1 percentage point in emerging economies.

³⁰ Non-sovereign entities can exceed the rating of the sovereign if they have a superior capacity to service debt and a reasonable chance of enduring a sovereign default. This is rare. See Fitch Ratings (2008).

³¹ The share rises to 12% if all rated banks (domestic and foreign) are considered, as the sharp downgrades of the Greek and Irish sovereigns have generally not affected foreign-owned banks in those countries, likely because of expectations of support from their foreign parents.

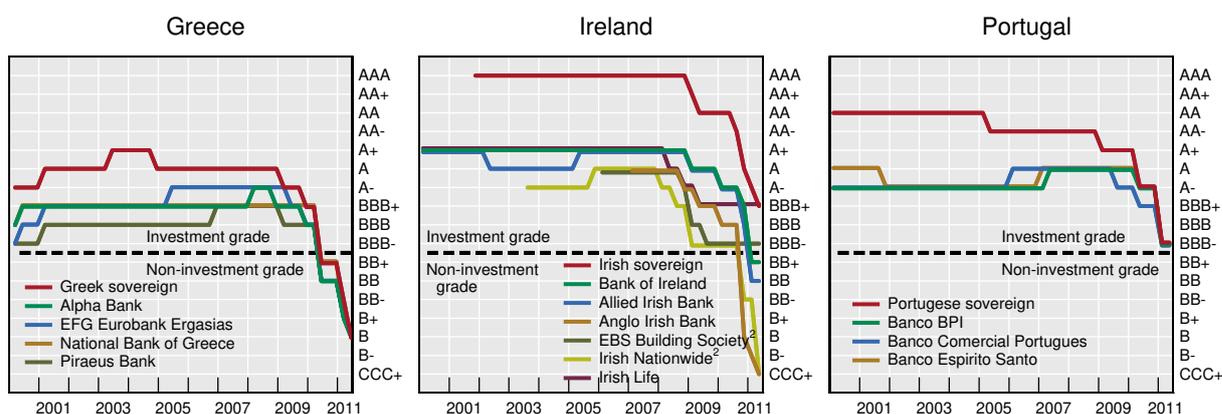
³² See SEC (2003) and Sy (2009) for an analysis of the role of credit ratings in capital markets.

The dependence of banks on sovereign ratings has been evident during the financial crisis. Since August 2007, 64% of domestic banks have had their credit ratings lowered within the six months following a sovereign downgrade (Table 1).³³ This relationship is strongest in countries where the sovereign has been downgraded significantly and hence has pressed down on the ratings of the domestic banks.

In the European countries at the centre of the sovereign debt tensions, all *major* domestic banks are rated at or below the respective sovereign, and there is a clear relationship in the development of the sovereigns' and the banks' ratings in the past two years (Graph 17). However, country-specific developments differ somewhat. For Greece and Portugal, rating agencies have linked their downgrades of major banks to the sovereign's declining creditworthiness.³⁴ In Ireland, the rating downgrades of banks were driven by low expected profitability and increasing funding pressures. Sovereign support initially had a stabilising effect on the banks, but eventually the growing fiscal impact brought into question the sovereign's creditworthiness, leading to sovereign downgrades. Thereafter, the downward pressure on the banks' ratings intensified due to the perceived decreasing ability of the sovereign to provide support.³⁵ In all three countries, sovereign downgrades have been associated with sharp increases in bank CDS premia and large falls in their share prices.

Graph 17

Long-term foreign currency ratings of sovereigns and banks in Greece, Ireland and Portugal¹



¹ The ratings are "issuer" ratings. All ratings are from S&P, unless stated otherwise. ² Fitch rating.

Source: Bloomberg.

3.4 Effects of government guarantees on bank funding

Systemic banks have traditionally had an implicit government guarantee which has lowered the cost of debt funding.³⁶ After the collapse of Lehman Brothers, advanced economies also provided explicit guarantees to banks.³⁷ However, the worsening of sovereign fiscal positions

³³ These numbers actually underestimate the impact of sovereign downgrades, because for several recent sovereign downgrades, the six-month time window has not yet expired.

³⁴ See Moody's (2010a, 2011) and Standard & Poor's (2010a,b).

³⁵ See Moody's (2010b) and Standard & Poor's (2010c).

³⁶ Alessandri and Haldane (2009) analyse the long-term increase of the safety net provided by the public sector to banks in advanced economies and focus on the time-consistency problem for authorities when dealing with crises, i.e. the "tendency to talk tough but act weak".

³⁷ Implicit and explicit guarantees reduce the cost of, and improve banks' access to, funding. They also share several drawbacks. First, they distort competition, as long as "weak" banks enjoying a guarantee from a "strong" sovereign can access cheaper funding than "strong" banks backed by a "weak" sovereign (see Panetta et al (2009)). Second, they encourage moral hazard and excessive risk-taking (see Gropp et al

could reduce the value of both implicit and explicit guarantees. Moreover, regulatory changes will weaken implicit guarantees in the future (see Box C: *Impact of regulatory changes on implicit government support for banks*).

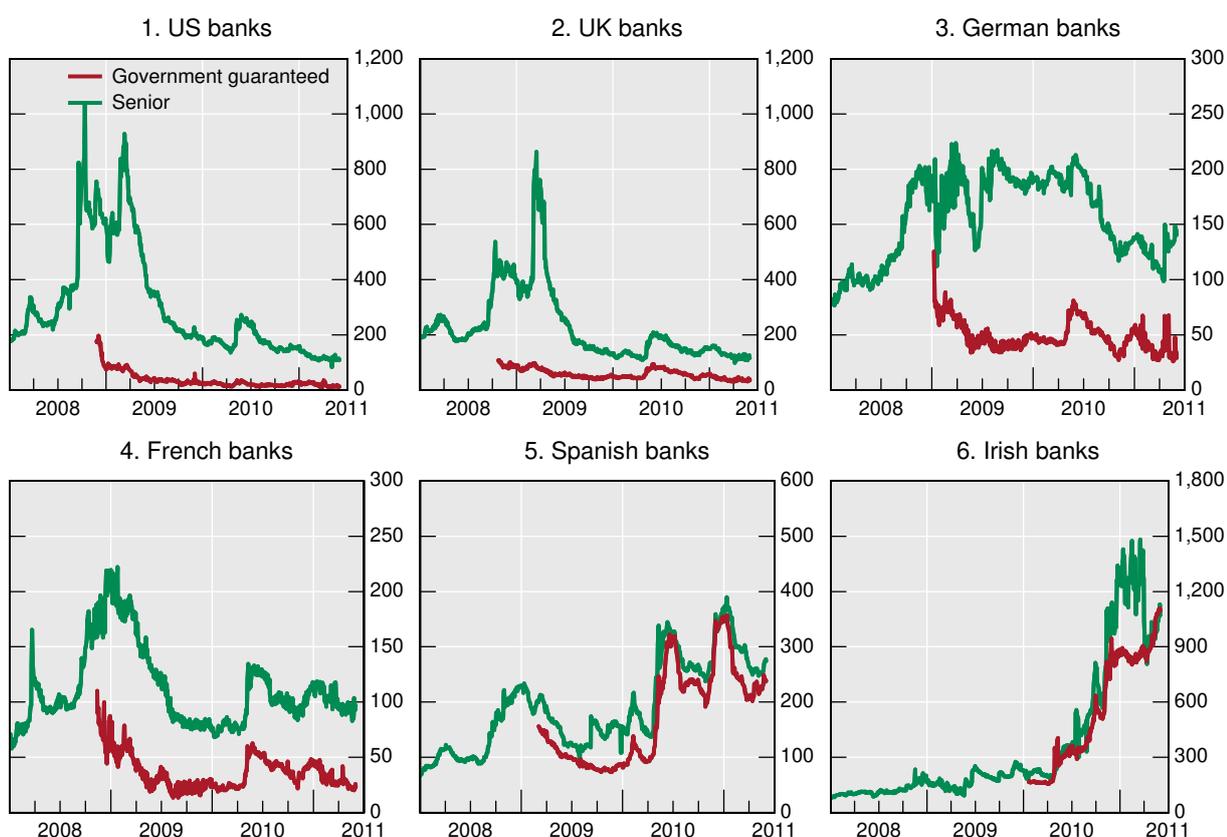
Explicit guarantees

Starting in October 2008, governments provided explicit guarantees against default on bank bonds to help banks retain access to wholesale funding. By December 2010, more than 200 banks in 16 advanced economies had issued close to €1 trillion equivalent of guaranteed bonds. The cumulative issuance is equivalent to 5% of advanced economies' GDP, whereas the pledged guarantees amount to 11% of GDP. These guarantee schemes allowed banks to resume their bond funding and lowered its cost.³⁸

Graph 18

Yield spread between banks' government-guaranteed and non-guaranteed bonds¹

Unweighted average of the option-adjusted spreads for selected banks in each country, in basis points



¹ Daily data. The spreads reported in the graph may understate the value of explicit government support as banks' senior bonds often benefit from implicit support. Banks included in the guaranteed bond index may differ from those included in the senior bond index. The data for Irish banks are based on a very small sample.

Sources: Bank of Spain; Bloomberg; JPMorgan Chase; BIS calculations.

(2010)). Third, they represent a burden for taxpayers, as they create contingent fiscal liabilities (see Baglioni and Cherubini (2010)). The two guarantees differ in terms of their cost for banks (implicit guarantees are free, explicit ones are fee-based), their duration (permanent and temporary, respectively) and their accessibility (implicit guarantees benefit only some banks, such as systemically important institutions, public banks or stakeholder banks, whereas explicit ones are based on a general scheme accessible to all banks).

³⁸ Ejsing and Lemke (2009) show that guarantee schemes reduced banks' funding costs at the expense of sovereign funding costs. Panetta et al (2009) and Levy and Zaghini (2010) show that banks' funding costs fell, with yields on guaranteed debt mainly reflecting the creditworthiness of the government rather than the bank.

An indicator of the value of explicit guarantees is the spread between the yields on a bank's government-guaranteed and non-guaranteed senior bonds (Graph 18). In triple-A countries such as the United States, Germany, France and the United Kingdom, the spread is typically large (between 70 and 130 basis points in 2010). In contrast, in Spain and Ireland the gap between the two yields has usually been much narrower, at 0–50 basis points.

Implicit guarantees

A proxy of implicit government guarantees to banks is the difference between the “issuer rating” (the overall rating, which takes into account the likelihood of government or group support if a bank is in trouble) and the standalone rating, which reflects only the bank's intrinsic strength (Moody's (2007)).³⁹

Table 2
Implicit government support for banks

As at 7 June 2011

Country	Change in bank rating since end-2007 (in notches) ¹			Change in bank rating since end-2009 (in notches) ¹			Current level of external support (notches)
	Stand-alone rating	External support	Overall Rating	Stand-alone rating	External support	Overall Rating	
France							
- Large banks ²	-2.0	1.3	-0.7	0.0	-0.3	-0.3	3.8
- Other commercial banks ³	-0.7	0.3	-0.3	0.0	0.3	0.3	2.7
- Small stakeholder banks ³	-1.0	0.0	-1.0	0.8	-0.8	0.0	4.0
Germany							
- Large banks ²	-2.0	0.0	-2.0	-1.0	-1.0	-2.0	2.0
- Other commercial banks ³	-4.8	3.3	-1.5	-0.7	-0.5	-1.2	5.3
- Small stakeholder banks ³	-2.6	1.8	-0.8	-0.9	0.5	-0.4	5.4
Greece – large banks²	-11.7	0.3	-11.3	-10.3	0.0	-10.3	2.0
Italy – large banks²	-1.8	1.0	-0.8	-1.0	0.6	-0.4	3.0
Ireland – large banks²	-9.0	-1.3	-10.3	-0.3	-8.0	-8.3	0.3
Portugal – large banks²	-4.3	-1.3	-5.7	-2.0	-2.7	-4.7	1.7
Spain							
- Large banks ²	-1.0	0.0	-1.0	0.0	0.0	0.0	2.0
- Other commercial banks ³	-4.3	1.0	-3.3	-0.6	-1.9	-2.4	1.9
- Small stakeholder banks ³	-4.3	1.2	-3.1	-0.8	-1.0	-1.8	2.3
United Kingdom							
- Large banks ²	-4.0	1.7	-2.3	0.0	0.0	0.0	3.5
- Other commercial banks ³	-3.3	1.3	-2.1	-0.7	0.3	-0.5	2.7
- Small stakeholder bank ³	-3.5	2.3	-1.1	0.8	-0.2	0.7	2.8
United States – large banks²	-3.5	1.8	-1.6	0.2	-0.2	0.0	2.5

¹ An increase (decrease) in the number of notches indicates an upgrading (downgrading) of the bank. ² Number of “large banks” (by assets) included for each country: United States: six; Italy: five; United Kingdom and France: four; Ireland, Portugal and Greece: three; Germany and Spain: two. ³ Number of “other commercial” and “stakeholder” banks included in the sample: six and 13, respectively, for Germany; four and four for France; six and 10 for the United Kingdom; seven and 20 for Spain.

Source: Authors' calculations based on Moody's and Bloomberg.

³⁹ An alternative proxy of implicit support is the spread between subordinated and senior bank debt (the rationale is that in case of default, the government would protect senior bondholders). For the countries examined, this proxy provides indications similar to those reported in the text, although differences emerge in some cases.

Box C

Impact of regulatory changes on implicit government support for banks

Traditionally, large and complex financial institutions have enjoyed implicit government support and an artificially lower cost of funding. This reflects investors' expectation that, if the entity became financially distressed, the government would step in to prevent a bankruptcy, given the potentially disruptive flow-on effects to other financial institutions and the legal and operational complexities involved in their resolution.

Regulatory reforms which have recently been adopted or are being discussed target the sources of the "too big to fail" problem and will thus affect implicit government guarantees to banks. Some measures aim at limiting the size and the systemic relevance of financial institutions.¹ Others – the *Orderly Liquidation Authority* in the Dodd-Frank Act, the European Commission's *Framework for Bank Recovery and Resolution* and the German Bank Restructuring Act – are intended to facilitate the resolution of a failing bank or bank holding company (through "living wills" and pre-insolvency procedures for distressed banks) thus reducing the need for a bailout. Moreover, if government support is unavoidable, they minimise the burden of such a resolution for taxpayers by shifting the cost to the bank's creditors. Some tools allow regulators to impose losses on certain classes of creditors (so-called "bail-in regimes" and contingent capital); others permit the ring-fencing of assets to the benefit of chosen classes of creditors, including through some form of "bridge bank" mechanism.²

The adoption of these regulatory changes will likely reduce implicit guarantees, to the extent that they are considered credible by investors. As a first reaction, rating agencies would strip the external support from overall issuer ratings, implying a generalised downgrade of banks. As a consequence, the cost of debt funding may increase³ and the spread between subordinated and senior bond yields would narrow. However, this increase in costs would likely be offset by improved market discipline and reduced excessive risk-taking by banks, as well as the efficiency gains brought by more even competition.

¹ The Dodd-Frank Wall Street Reform and Consumer Protection Act in the United States contemplates stronger prudential standards for systemically important banks and non-banks, including the possibility for regulators to force a sale of activities or prevent the acquisition of stakes or assets of another company whenever this is deemed necessary to prevent excessive systemic risk. The Vickers Report in the United Kingdom envisages internal firewalls to ring-fence retail activity from investment and wholesale bank activity, together with higher capital ratios for systemically important banks. The Financial Stability Board is considering higher capital ratios for systemically important financial institutions.

² The Dodd-Frank Act curtails the ability of the Federal Deposit Insurance Corporation to provide open financial assistance to banks, inter alia by requiring that unsecured creditors bear losses up to the amount they would have suffered in case of liquidation of the bank. The EU framework for bank recovery and resolution considers options that imply either the writedown or the conversion into equity of all senior debt necessary to ensure the bank's return to solvency, or a requirement for banks to issue a fixed volume of statutory bail-in debt.

³ Surveys among institutional investors suggest that the iTraxx Senior Financials CDS Index would increase by 50 to 60 basis points (JPMorgan Chase (2010)).

The perceived level of implicit support for large banks in major advanced economies has generally risen since the onset of the financial crisis. It is one to two notches higher than at end-2007 in the United States, the United Kingdom, France and Italy, and is unchanged in Germany and Spain (Table 2). This has partly cushioned a significant worsening of banks' standalone ratings. Since the onset of sovereign debt tensions in late 2009, implicit support

for large banks has been little changed. The existence of significant implicit government support to banks is consistent with the findings of the empirical literature.⁴⁰

However, in the euro area countries severely affected by sovereign risk concerns, implicit government support for large banks has declined by up to eight notches since end-2009. Moreover, the *current level* of implicit government support to banks in these countries is generally lower than the implicit support being provided by stronger sovereigns.

Governments are also now providing significant implicit support to non-systemically relevant medium-sized and smaller banks. As at early June 2011, the implicit support for these banks in four large EU economies was in the order of two to five notches. This is similar to the implicit support provided to large banks.

3.5 International spillovers

Due to the close links among the financial markets of advanced economies, distress of one sovereign can spill over to other sovereigns and banks. Key channels – in addition to banks' direct holdings of foreign sovereign debt, which is discussed in Section 3.1 – are banks' cross-border interbank exposures and banks' claims on non-financial entities in countries affected by sovereign tensions.

Global interbank exposures are large for banks in most advanced economies, particularly banks in the core euro area countries (where they are between one and three times banks' Tier 1 capital). Some European banks, such as those in Germany, France and Belgium, have sizeable exposures to banks in countries severely affected by sovereign tensions (Graph 19).⁴¹

Contagion may also be induced by banks' claims on non-bank private entities in countries hit by sovereign tensions. However, this effect is more indirect and may only emerge over longer time horizons. These claims can be sizeable – for banks from the major advanced countries, claims on non-bank private residents in Greece, Ireland, Portugal and Spain were around one quarter of their Tier 1 capital in June 2010, with a higher share for banks in core European countries and the United Kingdom.

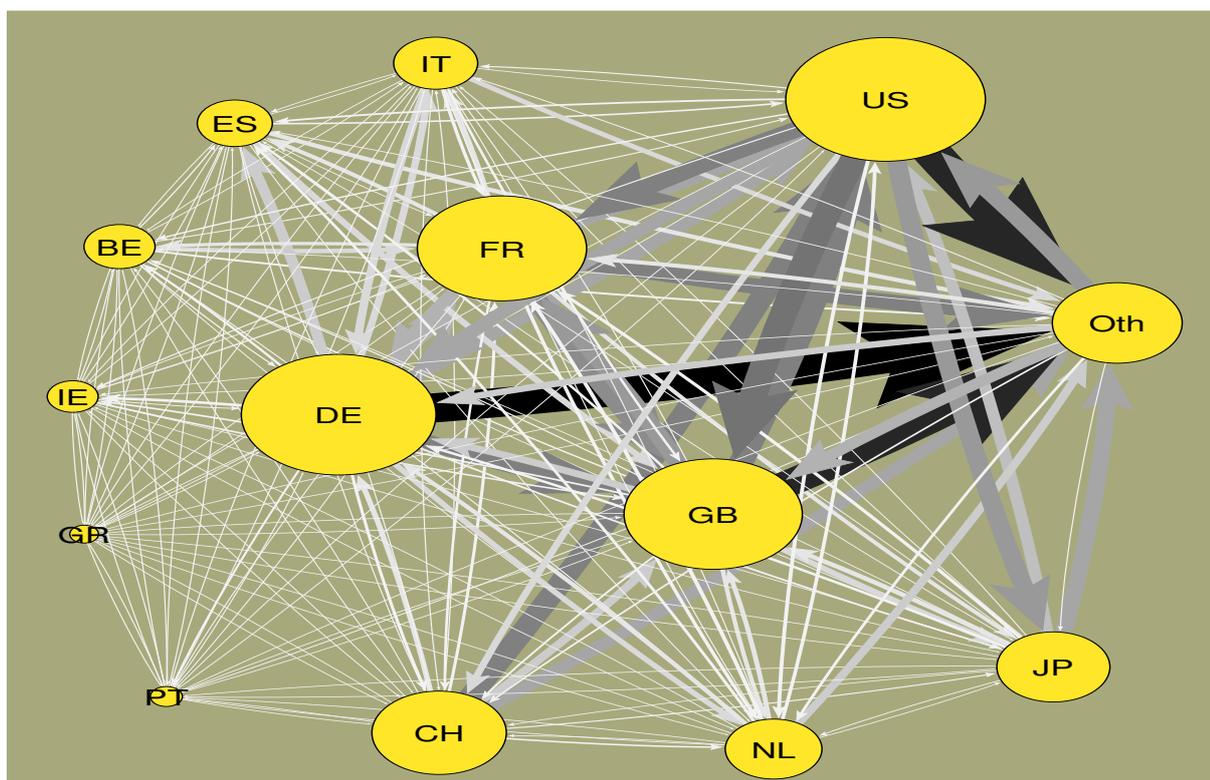
Market participants seem to take into account these potential indirect exposures when assessing bank risk. Bank nationalities with larger exposures to either banks or the non-bank private sector in peripheral Europe have CDS premia that co-move significantly with the sovereign CDS of those countries (Graph 20).⁴²

⁴⁰ The Vickers Report (2011) suggests that government support cheapened UK bank funding by “considerably in excess of £10bn per year” in 2007–09, with the upper estimate equal to £57 billion per year (80 basis points of the £7 trillion of UK bank liabilities). Baglioni and Cherubini (2010) find that the contingent liability borne by EU governments owing to the implicit bank guarantees has risen sharply since the crisis, in some countries reaching a large portion of GDP. Haldane (2010) finds a sharp increase in the implicit subsidies for large UK banks between 2007 and 2009. Baker and McArthur (2009) estimate that large US banks receive sizeable subsidies from implicit government support. Angelini et al (2009) analyse the euro interbank market and find that, since 2007, price conditions for large borrowers have become more favourable than for other banks, probably reflecting a “too big to fail” implicit guarantee. Furfine (2001) found that, after the collapse of Long-Term Capital Management, the cost of funding for large and complex financial institutions declined significantly.

⁴¹ The Bank of England (2010) cites interbank exposures as a source of risk for UK banks, which have relatively small exposures to vulnerable euro area sovereigns, but large exposures to euro area financial institutions.

⁴² These results should be regarded cautiously, given the limited observations on which they are based.

Graph 19
Linkages between banking nationalities¹

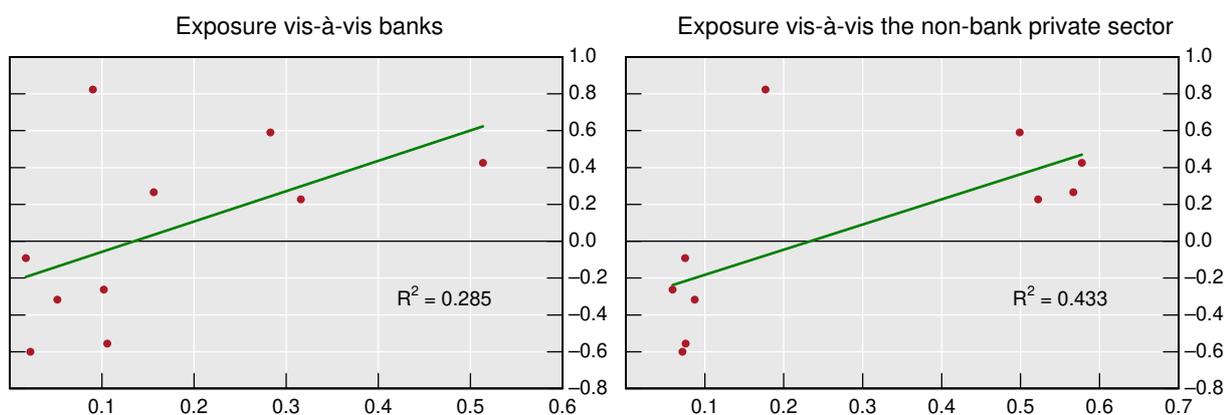


BE = Belgium; CH = Switzerland; DE = Germany; ES = Spain; FR = France; GB = United Kingdom; GR = Greece; IE = Ireland; IT = Italy; JP = Japan; NL = Netherlands; PT = Portugal; US = United States; Oth = other countries.

¹ Data are as at end-December 2010. The size of each circle is proportional to each bank nationality's share of total interbank claims on all other banking systems. It is based on consolidated data, so exposures through subsidiaries are included in those of the home office. The thickness of the arrows from bank nationality A to bank nationality B is proportional to the size of the interbank claims between those two bank nationalities. Data for Belgian and German banks are on an immediate borrower basis rather than an ultimate risk basis.

Sources: BIS consolidated banking statistics (ultimate risk); authors' calculations.

Graph 20
CDS premia correlations and exposure to peripheral Europe



The horizontal axis shows consolidated claims on peripheral European banks as a percentage of Tier 1 capital (left-hand panel) and consolidated claims on the peripheral European non-bank private sector as a percentage of Tier 1 capital (right-hand panel). This is an average for the period Q1 2009–Q4 2010. The vertical axis shows the correlation for each bank nationality, between the average five-year CDS premium for selected large banks, weighted by the banks' total assets, and the CDS premia for sovereign debt issued by Greece, Ireland, Portugal and Spain, weighted by GDP, for the period between 1 January 2009 and 31 March 2011.

Sources: Markit; BIS consolidated banking statistics.

Lastly, the international transmission of sovereign tensions could also occur via contagion among sovereigns that are perceived to be vulnerable. This channel has arguably played a non-trivial role in the recent sovereign debt crisis in the euro area, but a thorough discussion of cross-sovereign contagion risk is beyond the scope of this report.⁴³

3.6 Risk aversion channel

Sovereign tensions may cause a rise in investors' risk aversion, which in turn may increase the premia demanded on banks' securities and reduce banks' funding availability. It may also cause a generalised decline in asset prices, which can trigger losses for banks. In principle, heightened risk aversion influences investors in financial and non-financial companies alike, but the effects could be larger for banks, as they are more leveraged than non-financial firms.

We compare the risk aversion of investors in bank securities with that of investors in non-bank securities by comparing the risk aversion implied in options written on a main European bank stock index with that implied by options on (low-risk) German government bonds (Graph A4.4).⁴⁴ Since January 2009, these two indicators of risk aversion have displayed a similar profile, though the level of risk aversion is, of course, lower for government bonds. A similar result emerges when risk aversion on European bank stocks is compared with that for the US and euro area general stock markets. This suggests that the effects on banks from an increase in risk aversion caused by the sovereign crisis have been similar to that on other sectors of the economy.⁴⁵

3.7 Impact on banks' non-interest income

Sovereign tensions may negatively affect banks' fee and trading income. First, higher sovereign risk is typically associated with greater investor risk aversion and lower asset prices and financial market transactions, which could reduce trading and investment banking revenues. Second, sovereign risk potentially reduces the market value of the investment portfolios which banks manage on behalf of customers, thus squeezing the associated fees. This effect may be exacerbated by investors rebalancing their portfolios towards low-risk assets, which have lower management fees.

Analyses of the recent trends in non-interest income of listed banks in the United States and selected European countries are, however, inconclusive. Non-interest income (as a percentage of assets) declined for banks in some countries that were severely affected by sovereign debt concerns (Greece and Ireland), but rose for Portuguese banks and was little changed for Spanish banks. This partly reflects data constraints – these trends likely emerge only slowly, and the available sample of semiannual data is short. A further complication is that banks may have deliberately changed their business models in response to the sovereign crisis, for example, by scaling back their trading operations.

⁴³ For empirical analysis of the crisis period, see IMF (2010), Sgherri and Zoli (2009) and Aretzky et al (2011).

⁴⁴ Risk aversion is computed by comparing the risk-neutral probability density function (PDF) implied in options prices with the corresponding historical density at the end of each month. The risk-neutral PDF and risk aversion are computed using the approach in Jackwerth (2000). We use the options with the nearest-to-deliver date written on the Dow Jones STOXX 600 Bank Index (for European banks), the Dow Jones EURO STOXX Index and Standard & Poor's S&P 500 Index (for European and US equities, respectively), and the options written on German bund futures (for the risk-free asset).

⁴⁵ Similar results emerge when we examine risk aversion for investors in bank and non-bank securities using CDS premia. We compare the correlation between the EU sovereign CDS indices and CDS indices for: (i) large euro area corporates; (ii) large euro area banks; (iii) euro area banks (excluding those in Greece, Ireland and Portugal); and (iv) banks domiciled only in Greece, Ireland and Portugal. Results show that the correlation with sovereign CDS indices has increased in a similar fashion for all sectors since end-2008, suggesting the absence of a bank-specific factor.

3.8 Crowding-out effects on banking sector debt issuance

The rise of sovereign issues may crowd out private debt issuance by increasing the cost or reducing the availability of funding. This effect is not limited to the banking sector, but could be more relevant for banks, given their sizeable funding needs.

Assessing the extent of crowding out is no easy task, and we cannot draw any firm conclusions in this report. Ultimately, its importance depends on several factors, including private sector funding requirements, whether investors view government bonds as substitutes for bank debt, and the overall supply of global savings. Nonetheless, based on recent developments, we cannot rule out the risk that increased government bond issuance may crowd out bank bond issuance. First, the deterioration in the creditworthiness of some sovereigns may have changed the risk-return profile of their debt, making it more of a substitute for bank and corporate debt in investors' portfolios and increasing the likelihood of crowding-out. This is consistent with the strong positive correlation between CDS premia for EU sovereigns and banks during 2010. Second, since 2008 the increased sovereign issuance across advanced countries has been associated with a fall in the bond issuance by financial firms (though to some extent this reflects reduced demand for funds due to the slowdown in economic activity).

3.9 Hedging strategy of sovereign exposure with the iTraxx Financial Index

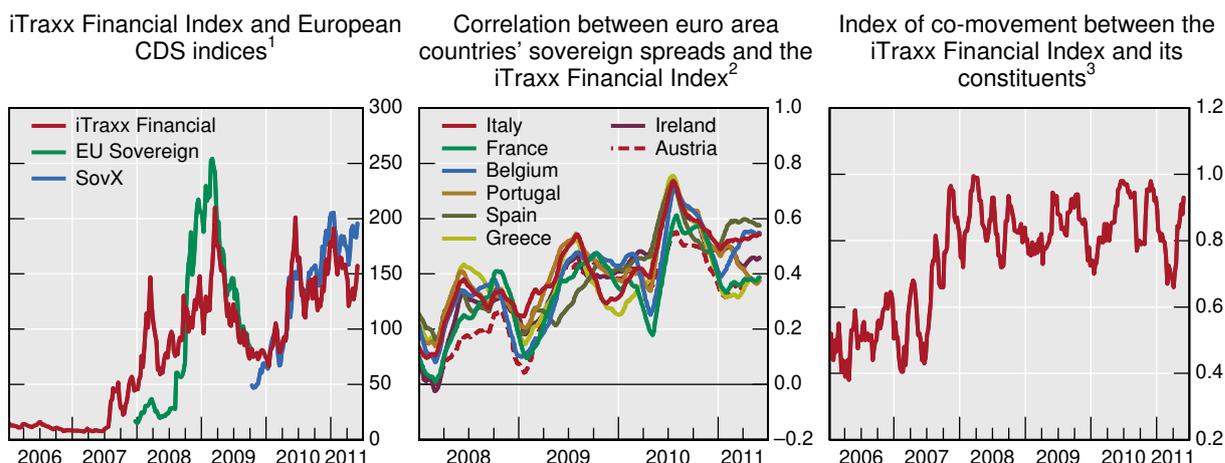
According to market commentaries, investors' hedging strategies may have contributed to tightening the link between sovereign risk and bank funding conditions. They assert that the iTraxx Financial Index is being used as a proxy hedge for sovereign risk due to the lower liquidity in the SovX index and individual sovereign CDS contracts. And once the iTraxx Financial Index moves, its constituents (CDS of individual banks) also move, as inconsistencies between the index and the single names are arbitrated away.⁴⁶

A rigorous test of this hypothesis is beyond the scope of this report. However, since late 2009, sovereign and financial CDS indices have co-moved closely (Graph 21). Moreover, since early 2008, the credit risk of individual euro area countries – for which the spread between each country's 10-year bond and the German bund is a proxy – has shown an increasing correlation with the iTraxx Financial Index, and the level of correlation (for both weak and strong countries) has at times been quite high. The single-name CDS included in the iTraxx Financial Index have also been co-moving closely with the index itself, suggesting that banks' idiosyncratic factors are playing only a small role in their price dynamics.

⁴⁶ See JPMorgan Chase (2010). The iTraxx Financials is an index of the 25 most traded single-name CDS written on European financial institutions. DTCC data show that the net notional amount of outstanding CDS contracts on the iTraxx Financial Index at end-February 2011 was \$48 billion, while the equivalent amounts for Portugal, Greece, Ireland and the SovX index were \$8 billion, \$6 billion, \$4 billion and \$12 billion, respectively.

Graph 21

Relationship between sovereign and financial CDS indices



¹ In basis points. The iTraxx financial index is made up of single-name CDS written on major European financial institutions; the EU Sovereign is the Thomson Reuters Western Europe Sovereign CDS Index; SovX is the Markit Western Europe Sovereign CDS Index. ² This represents the three-month average of the exponentially weighted moving average between the government bond yield differential with respect to the corresponding German bund and the iTraxx Financial Index, based on daily data; the decay factor is 0.96. ³ The index of co-movement shows the two-month average of the co-movement in weekly sign changes in the single-name CDS premia of the iTraxx Financial Index constituents and the index itself; it ranges from 0 (the average CDS moves in the opposite direction to the index) to 1 (the average single-name CDS moves in the same direction as the index).

Sources: CMA; Markit; Thomson Reuters.

4. Discussion of results and conclusions

Since end-2009, financial markets have repriced the credit risk of sovereign issuers. Although current sovereign spreads may well reflect some market overreaction, elevated sovereign risk premia are likely to become a persistent feature of the financial landscape, at least until advanced economy governments implement credible fiscal policies to make debt paths sustainable again.

A full insulation of bank risk from sovereign risk is unlikely to be feasible. Nonetheless, banks and public authorities face the challenge to set up the conditions for managing these interrelated risks efficiently, so as to avoid panics and herd behaviour and contribute to financial stability. In particular, it is paramount to minimise the risk of a vicious circle between the conditions of public finances and those of banks, with the deterioration in banks' funding conditions adversely affecting the creditworthiness of the sovereign (through the provision of public support or through an impairment of financial intermediation negatively affecting the real economy) which in turn may negatively affect bank funding conditions. Here, regulatory changes have an important role to play.

This section reiterates the main findings of the report, and discusses how banks might adjust their operations to this new environment of elevated sovereign risk, along with some associated policy issues.

4.1 Bank funding structure and transmission channels: main findings

The rise in sovereign risk since late 2009 has increased the cost and adversely affected the composition of bank funding. The extent of the impact on banks has been broadly in line with the perceived deterioration in the creditworthiness of the home sovereign, suggesting that investors are focusing on banks' jurisdictions as well as their creditworthiness. Banks in Greece, Ireland and Portugal have found it difficult and costly to raise wholesale debt and deposits, and have been relying on Eurosystem liquidity. Wholesale funding costs have risen

(although to a lesser extent) for other European banks, which have generally retained market access. Banks located in major non-European advanced economies have experienced only modest changes in wholesale funding costs.

We identify four main channels whereby a deterioration in sovereign creditworthiness may adversely affect banks' funding. First, losses on banks' sovereign portfolios weaken their balance sheets, making funding more costly and difficult to obtain. Bank exposures to the domestic sovereign are typically quite large. For some banking systems, exposures to foreign sovereigns are non-negligible.

Second, a deterioration in a sovereign's creditworthiness reduces the value of the collateral that banks can use for wholesale funding and to obtain liquidity from the central bank. In the current period, the direct impact of this channel has been contained, owing to the small size of countries hit by sovereign tensions and the stabilising effect of central bank funding, which has allowed banks to obtain funds using illiquid collateral.

Third, sovereign rating downgrades almost always flow through to lower ratings for domestic banks, as banks are more likely than other sectors to be affected by sovereign distress. As banks' credit ratings decline, their wholesale funding costs rise, and their market access may diminish.

Lastly, a deterioration in the creditworthiness of the sovereign reduces the funding benefits that banks derive from implicit and explicit government guarantees. So far, the market assessment of the value of government guarantees has not diminished for the major advanced economies, presumably reflecting investor perceptions that the public sector's increased willingness to support banks (for fear of systemic events) prevails over any reduction in their capacity to provide support. However, for the euro area countries directly hit by tensions, credit ratings data suggest that there has been a reduction in implicit bank support since late 2009.

Other channels are also examined, but their effects are more difficult to assess. These include: (i) a decrease in the risk appetite of investors for bank securities due to weak public finance conditions; (ii) the adverse impact of a deterioration of sovereign risk on banks' fee and trading income; (iii) the possibility that a rise of sovereign financing needs will crowd out bank debt issuance; and (iv) investors' hedging strategies tightening the link between bank risk and sovereign risk.

The international dimension is also relevant. Sovereign tensions in one country tend to spill over to banks in other countries, either through banks' direct exposures to the distressed foreign sovereign, or indirectly, as a result of cross-border interbank exposures or possible contagion across sovereign debt markets.

4.2 Implications for banks

Changes in banks' operations (on both the assets and liabilities sides of their balance sheets) may help mitigate the negative consequences of a rise in sovereign credit risk.

On the asset side, until recently, investors have paid little attention to diversifying their portfolios of government bonds of advanced countries, as these bonds were considered virtually riskless. This situation has changed: some sovereign securities have already lost their risk-free status, while others may do so in the future. Looking forward, banks' risk management systems will likely take fully into account sovereign risk and its correlation with the risk on private sector claims. This may result in banks further diversifying the country composition of their sovereign portfolio to contain their overexposure to the home sovereign. This strategy may be relatively easy for banks in the euro area, where a wide range of

sovereign debt is eligible for banks' liquid asset holdings and as collateral in central bank and private repo transactions.⁴⁷ For domestically focused banks in other countries – where only one sovereign is issuing paper in the home currency – it may imply, in addition to currency risk, a trade-off between sovereign and liquidity risk.⁴⁸

On the liability side, an increase in sovereign risk may have a particularly negative impact on banks that rely more on short-term funding sources and may therefore be susceptible to sudden withdrawals of funds. Banks can mitigate this risk by increasing their use of more stable funding sources, such as long-duration bonds and retail deposits. However, recent events in some euro area countries show that, during periods of severe sovereign stress, even retail deposits can see large-scale withdrawals. Under the Basel III framework, banks will also be holding more capital, which is the most stable source of funding.

Moreover, going forward, banks could put more emphasis on the trade-off between the cost and the stability of funding. To protect themselves against periodic bouts of sovereign risk-induced investor risk aversion, as well as concurrent recourse to capital markets by many issuers, banks may further diversify the timing of their issuance and avoid the clustering of maturing debt. Large cross-border banks might also diversify their debt issues across different jurisdictions through their subsidiaries. These strategies may imply a shift away from banks' current practice of issuing debt when spreads are low, to a focus on minimising through-the-cycle, "risk-adjusted" issuance costs.

The cross-border dimension of banking requires special attention. Internationally active banks (and their home supervisors) need to track the sustainability of public finances in the foreign countries in which they operate. Any worsening of sovereign risk in the host countries is likely to affect the cost of funding and the economic environment of branches and subsidiaries located there, with possible negative spillovers on the parent banks.

4.3 Possible policy implications

There are also several possible implications for the official sector. First and foremost, the negative spillovers from sovereign risk to bank funding conditions and the extensive role of government securities in the financial system represents yet another reason to step up efforts to maintain sound public finance conditions. The evidence from the recent euro area sovereign crisis (and also history) confirms that it is impossible to fully insulate the banking system from a distressed domestic sovereign. Moreover, increasing international financial integration and the close links between banks and (domestic and foreign) sovereigns imply that global financial stability depends on fiscal conditions in each individual country.⁴⁹ In the current climate, advanced country governments should try to move as quickly as reasonably possible to implement credible strategies to stabilise or reduce their debt levels. This is key to anchoring market views about sovereign risk and avoiding negative spillovers on banks.

⁴⁷ Most, but not all, sovereign debt in the euro area is accepted as collateral in private repo transactions. The haircuts also differ across sovereign securities.

⁴⁸ This trade-off is likely to be most binding for banks whose operations are concentrated in one country, rather than those with branches and subsidiaries in several jurisdictions, especially if the central bank accepts only domestic sovereign bonds as collateral. Under the Basel II regulatory framework, the standard risk weight on banks' sovereign debt holdings is 0% for both domestic and foreign issuers, provided that the sovereign has a credit rating of AA- or higher. Debt of lower-rated domestic and foreign sovereigns attracts a higher risk weight (20% for A-rated entities, 50% for BBB-rated entities, 100% for B- to BB-rated entities), with the domestic regulator having the discretion to impose lower risk weights on domestic sovereign debt. See BCBS (2006).

⁴⁹ When banking markets are closely integrated, each individual country is de facto responsible for preserving the stability of the entire international financial system. Hence, by maintaining a sound fiscal position, each country provides a public good to all other countries; see Bolton and Jeanne (2011).

Relatedly, there is a need for greater transparency about overall government debt levels in some countries so that policymakers, banks and other market participants can accurately assess the associated risks.⁵⁰ IMF and World Bank efforts to promote timely and cross-country standardised government finance data as part of the G20 Data Gaps initiative should be encouraged.⁵¹

Second, sound supervisory and macroprudential policies are of the essence. It is important to complement the traditional focus on risks at individual financial institutions with an approach which also considers the interaction between the banking sector and government fiscal conditions:

- If governments do not return rapidly to sustainable fiscal trajectories, and the risks on their sovereign debt remain elevated, authorities should closely monitor the interaction of sovereign risk with regulatory policies which provide banks with strong incentives to hold large amounts of government debt. In this new environment, the preferential treatment of government debt (particularly that which is lower-rated) relative to private debt may be less justified.
- Banks also need to have strong capital bases, to reduce the risk of domestic and cross-country contagion through banks' exposure to governments, banks and the private sectors of countries affected by sovereign risk.
- During a sovereign crisis, when uncertainty and risk aversion are high, market participants tend to assume the worst about banks' sovereign debt holdings and curtail funding to banks that are heavily exposed to the affected sovereigns, as well as to those that are not. In such an environment, adequate information flows would improve the situation for the latter banks, without necessarily aggravating the conditions of the former (which may well benefit from a reduction of the uncertainty risk premium). Authorities could ensure that there is sufficient transparency on banks' sovereign exposures, though this should be done on a case by case basis, to avoid undesirable market reactions. This perhaps suggests the use of coordinated, ad hoc disclosures as a macroprudential tool. They would not always need to be part of formal stress tests, which are time-consuming and resource-intensive.

Third, increases in sovereign risk reduce banks' capacity to use government securities as collateral in private repo markets, central bank refinancing, OTC derivatives and covered bonds. Again, there seems to be scope for authorities to mitigate the negative impact on bank funding:

- Bank supervisors and central banks with liquidity surveillance mandates could consider investing additional resources to improve their capacity to conduct (confidential) stress tests that focus on the impact of a sovereign shock on the liquidity position of banks, following practices already in use in some countries.⁵²
- Central banks might consider having flexible operational frameworks that allow them to supply funding to a diverse set of counterparties and accept a broad range of collateral during a crisis, to ease banks' immediate liquidity pressures (CGFS (2008)). Central banks could either be prepared to supply funding in the normal

⁵⁰ For instance, in China, local governments' use of separate "platform companies" to borrow heavily from banks to fund infrastructure projects means that their debt levels are significantly understated (by up to 20-25% of GDP). The central government is addressing this issue (*International Business Times* (2010) and *International Financing Review* (2011)). Moreover, the (negative) restatement of Greece's public finances was one of the initial triggers of the current sovereign debt tensions.

⁵¹ See recommendations 17 and 18 in FSB and IMF (2009).

⁵² See, for example, Nadal De Simone and Stragiotti (2010).

course of business against a wide range of collateral, or be able to adjust their collateral lists quickly in stressed situations. However, this operational flexibility is not costless – it shifts credit risk to the central bank and encourages moral hazard – and so should be used sparingly and only with appropriate safeguards in place. At a minimum, there should be conservative haircuts and concentration limits on the different types of eligible collateral. To further limit the risk of moral hazard, central banks (or the relevant bank supervisors) should consider implementing tighter supervisory and prudential policies to minimise any degradation in banks' management of liquidity risk.

- Sovereign debt management offices might consider changing operational aspects of their OTC derivatives transactions to mitigate the propagation of sovereign risk. Possible options could include increasing their use of central counterparties (CCPs) to reduce their bilateral exposures with banks, or implementing bilateral CSAs with banks to reduce the counterparty credit risks and funding stresses that are associated with unilateral CSAs.⁵³

Lastly, regulatory reforms that have been adopted recently or are being discussed target the source of the “too big to fail” issue. Assuming that they will be successful, these changes will reduce investors' expectations of government intervention and implicit or explicit government support for banks. This may cause a structural increase in banks' funding costs, as investors adjust to the greater risk on their debt. Over the medium to long term, however, the reduction of government support is likely to be positive for the global banking system and for financial stability more generally. First, it should help to increase market discipline and reduce excessive risk-taking by banks, to the extent that creditors, having reduced the expectations of a bailout, more closely monitor banks' behaviour and require adequate risk premia. Second, it should weaken the correlation between bank funding costs and sovereign risk, which would help to mitigate the adverse effects of a deterioration in sovereign creditworthiness. Third, it may result in a more level playing field for banks from different countries, with individual banks' funding costs more closely tied to their own characteristics, rather than the strength of the respective sovereign.

⁵³ Pledging collateral under bilateral CSAs will make the costs to official sector of the derivatives transactions more transparent, but not necessarily increase them, as the greater counterparty risk inherent in unilateral CSAs may be already incorporated into banks' pricing structures.

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Annex 1

Spillovers from banks to sovereigns and possible feedback loops

A weak domestic banking system can negatively affect the strength of the sovereign through two main channels: it drains public resources (through bank bailouts); and it reduces economic growth and amplifies rather than absorbs shocks to the economy. Reinhart and Rogoff (2010) document the large run-ups in countries' public debt-to-GDP ratios after banking crises, with these caused by the direct costs of rescuing financial institutions, and higher deficits due to the subsequent slower economic growth.

The first channel through which banks affect sovereign risk is via the official sector's desire to preserve financial stability. The recent financial crisis showed that sudden interruptions of financial intermediation can have very negative implications for the real economy, especially in developed financial systems. This motivates sovereigns to try to support systemically important banks when severe disruptions are faced. But this policy has negative consequences for the sovereign's balance sheet. In addition to supporting banks with liquidity provision, sovereigns also provide capital and guarantees to institutions deemed systemic, and they look to sustain aggregate demand by boosting spending.

A second channel is the role of the banking system in supporting economic growth. Well functioning markets and financial institutions contribute to growth by reducing transaction costs and asymmetric information problems, selecting profitable investment opportunities, mobilising savings and diversifying risks. If banks are weak, this process can be impaired.

Several papers have studied the joint dynamics of credit risk premia of euro area sovereign and bank debt, generally showing that a deterioration in the financing conditions of sovereign issuers is associated with weaker banking systems. The link between financial institutions and sovereigns usually arises, or becomes stronger, when public authorities support their national banks.

Ejsing and Lemke (2009) find that the rescue packages that several euro area governments announced for their banks in October 2008 lowered the risk spreads of financial firms, but pushed up sovereign spreads, as investors perceived a credit risk transfer from the banking sector to the government.

Mody (2009) shows that the public support for Bear Stearns in 2008 created a tangible link between the financial sector and public finances, with financial sector vulnerabilities playing an increasingly central role in US sovereign spreads. Observed weaknesses in financial sector prospects tended to be followed by greater sovereign spreads within a few weeks. Moreover, in individual countries, low growth, financial sector vulnerability and higher spreads tend to occur together. Weakness in the financial sector and the real economy reinforce each other and together generate higher public debt ratios and credit spreads. In turn, the higher risk premia hurt the financial sector and growth prospects.

Gerlach et al (2010) study the bond spreads of euro area sovereigns since the introduction of the euro. They find that, while changes in international aggregate risk are their main determinants, the size and structure of national banking sectors are also important. Countries with large banking sectors, especially those with low equity ratios, experience greater widening in yield spreads when aggregate risk increases.

Annex 2

How previous sovereign crises have affected banks⁵⁴

Sovereign distress and/or default has often gone hand in hand with banking crises. This has been true both for emerging market economies (EMEs) up to the present, and for advanced economies until as late as the 1940s.⁵⁵ Over the past century, a high incidence of global banking crises has generally been associated with a high incidence of sovereign defaults on external debt.⁵⁶

This annex summarises how previous sovereign crises in three EMEs – Argentina, Russia and Turkey – have affected the banking system, and outlines possible lessons for the current period. These countries, while clearly at a different stage of economic development, share some similarities with the euro area countries that are being affected by the current crisis. Common factors include reasonably high and rising sovereign debt levels, a fixed exchange rate, external imbalances and domestic banks with large government debt holdings. In all three countries, the sovereign crisis contributed to a domestic banking crisis.

In Argentina, the banking system was considered among the strongest in Latin America in the late 1990s, with a good supervisory regime, and with foreign-owned banks having a large market position.⁵⁷ But government debt rose steadily during the second half of the 1990s, and banks took a growing share of this debt, with government financing (bonds plus loans) accounting for 20% of total banking assets by the end of the decade. In 2001, the country was in a deep recession, weighed down by weak commodity prices, real exchange rate appreciation (due to Brazil's depreciation in 1999 and a nominal peg against the strong US dollar) and a rigid labour market. Spreads on Argentina's US dollar-denominated bonds were around 800 basis points at the start of 2001, and they drifted higher during the first half of the year. In June 2001, liquidity problems forced the government to swap \$30 billion of maturing external debt for longer-term, high interest rate bonds, substantially increasing its future debt burden. The government again tightened fiscal policy, but the economy and tax revenues continued to shrink. There were sizeable outflows of deposits from banks in July and August. In late 2001, the government restructured its domestic debt and ceased payments on its external debt. Banks' dollar-denominated assets and liabilities (about 70% of total bank assets and liabilities) were converted into pesos at different, non-market exchange rates.⁵⁸ This was a large transfer of wealth from banks to borrowers. These developments resulted in bank losses exceeding the value of their equity capital, and quickly pushed the banking system deeper into crisis.

The Russian economy was being reformed during the mid-1990s, but the government was running large fiscal deficits and tax revenues were weak. In late 1997 and early 1998, the economy was hit by falling commodity prices (particularly oil and gas) and real exchange rate appreciation. The banking sector was vulnerable, as it held sizeable quantities of government paper, financed by foreign currency borrowings. In mid-1998, the central bank raised interest

⁵⁴ This annex draws heavily on the existing literature, including: BIS (1999 and 2002), Barajas et al (2007), Chiodo and Owyang (2002), Correa et al (2011) and Reinhart and Rogoff (2009).

⁵⁵ Among advanced countries, Austria, Germany, Greece and Japan defaulted on their domestic and external debt during the 1930s and 1940s, while the United Kingdom restructured its domestic debt in 1932.

⁵⁶ See Figure 5.3 in Reinhart and Rogoff (2009). In that paper, the authors focus on the channels through which global financial turbulence could prompt sovereign debt crises in emerging markets.

⁵⁷ In 1998, the World Bank Financial Sector Review ranked Argentina's banking system second (to Singapore) among EMEs in terms of bank soundness and the quality of its regulatory and operating environment.

⁵⁸ Banks' assets were converted into pesos at an exchange rate of 1 peso to 1 US dollar, while banks' liabilities were converted into pesos at an exchange rate of 1.4 pesos per US dollar.

rates and intervened repeatedly in foreign exchange markets to preserve the exchange rate peg. As banks suffered deposit outflows, while also needing to meet margin calls on their debt holdings, their liquidity dried up. The central bank provided liquidity support to the banking system. In August 1998, Russia defaulted on its domestic sovereign debt, abandoned the exchange rate band and declared a 90-day suspension of payments by commercial banks to foreign creditors. The default (and the associated economic downturn) contributed to a significant banking crisis – nearly 720 small banks were deemed insolvent, and 18 large banks (representing 40% of banking assets) needed rescuing.

In Turkey, the economy grew reasonably strongly during the 1990s, but throughout this period the government ran large fiscal deficits. Much of the capital inflows went via the banking system to the public sector, and the proportion of public debt held by banks increased. In 2000, fiscal and current account deficits widened sharply, short-term external debt rose to 130% of reserves, and interest rates became highly volatile. The market value of banks' large holdings of government debt began to fluctuate widely. Banks' capital bases were too weak to absorb such swings, and expectations that the government might be forced to rescue the banks increased pressure on the exchange rate. In late 2000 and early 2001, the government floated the lira and accepted two IMF support packages. The large state-owned banks were recapitalised and some medium-sized banks were sold or closed.

In Russia's and Turkey's sovereign crises, banks' access to external financing was severely affected by a marked deterioration in their balance sheets due to their exposures to government debt. Moreover, the deterioration in government finances limited the ability of these sovereigns to support the troubled banks. In the case of Argentina, the forced conversion of banks' foreign currency assets and liabilities into local currency transferred wealth from banks to other sectors, including the government. Rating agencies like Moody's take these government factors into account when assigning country ceiling ratings for foreign currency long-term bank deposits. A downgrade in the rating ceiling limits banks' access to external funding and increases their funding costs. In the case of Argentina, the bank deposit ceiling was downgraded five notches from B2 in September 2000 to Ca in December 2002. In Russia, the deposit rating ceiling dropped seven notches within a year, from Ba3 in February 1998 to Ca in December. The Turkish sovereign crisis had a smaller effect on banks' creditworthiness, with the deposit rating ceiling declining one notch during the crisis.

Moreover, the link between sovereign distress and banking sector performance is not limited to sovereign default episodes. Over the past 15 years, changes in sovereign risk in advanced countries and EMEs, measured by credit ratings, have affected banks' equity financing costs. Sovereign downgrades have had a negative and significant effect on banks' stock returns, with these effects stronger for banks with more explicit (and implicit) government support. On average, a one-notch downgrade reduces bank equity returns by 2 percentage points in advanced countries, and by 1 percentage point in EMEs (Correa et al (2011)).

A noticeable difference between the current sovereign debt crisis and the previous ones is that banks' exposures to the distressed sovereigns are mainly in the form of bonds, rather than loans. This facilitates the spreading of sovereign risk among non-bank investors, rather than concentrating it in the banking system. However, it also speeds contagion, through rapid repricing of risk by markets.

Annex 3

A timeline of key sovereign debt events

Date	Event
29 Sep 08	Irish banks suffer their largest share price fall in two decades (Anglo Irish Bank down 45%, Irish Life & Permanent down 34%, Allied Irish Banks down 16% and Bank of Ireland down 15%).
30 Sep 08	The Irish government enacts legislation that guarantees the six major banks' liabilities (retail, commercial and interbank deposits, as well as covered bonds, senior debt and dated subordinated debt). Irish banks' share prices rebound strongly. Two banks (the Irish subsidiaries of RBS and DanskeBank) are not covered by the Irish guarantee. These banks are subsequently supported by their respective governments.
22 Dec 08	The Irish government injects €5.5 billion into the three largest Irish banks (Allied Irish Banks, Anglo Irish Bank and Bank of Ireland).
15 Jan 09	The Irish government nationalises Anglo Irish Bank.
22 Feb 09	The Irish government announces stringent fiscal stabilisation measures. Government workers stage protests.
21 May 09	Standard & Poor's lowers its outlook on the United Kingdom to negative owing to concerns about the cost of supporting the UK banking system.
16 Oct 09	Greek prime minister George Papandreou discloses the country's severe fiscal problems in his first parliamentary speech.
5 Nov 09	The Greek government reveals a revised budget deficit of 12.7% of GDP for 2009, double the previous estimate.
12 Jan 10	The European Commission publishes a report criticising the Greek budget deficit.
26 Jan 10	Standard & Poor's lowers its outlook on Japan to negative.
11 Feb 10	Eurozone leaders promise to provide financial support to Greece if it reduces its fiscal deficit.
11 Apr 10	Eurozone members agree to a €30 billion support package for Greece. The IMF offers to contribute a further €15 billion, which can be activated at any time by a formal request from Greece.
27 Apr 10	Standard & Poor's downgrades Greece (to BB+) and Portugal (to A-), with Spain downgraded (to AA) on the following day.
2 May 10	The Greek government accepts the €110 billion EU-IMF support package.
3 May 10	The ECB removes the ratings floor on Greek government bonds as collateral in repos.
9 May 10	The European Financial Stabilisation Mechanism is announced. The ECB announces plans to purchase euro area public and private debt securities in the secondary markets to help restore market liquidity. These purchases will be sterilised in order to prevent an increase in bank reserves. Major central banks reintroduce US dollar swap lines (authorised until January 2011).
27 May 10	The Spanish parliament approves a fiscal austerity package.
28 May 10	Fitch downgrades Spain to AA+.
9 Jun 10	The Portuguese parliament approves a fiscal austerity package.
16 Jun 10	Spain's Council of Ministers approves the labour market reform.
17 Jun 10	The European Council announces that the EU bank stress test results will be published.
25 Jun 10	In Italy, union rallies force the government to redraft its fiscal austerity package.
30 Jun 10	The central bank of Spain announces the merging of 39 of the country's 45 savings banks into several institutions, along with an infusion of €11 billion in public funds to reorganise and boost the capital levels of the merged entities.
23 Jul 10	The Committee of European Banking Supervisors (CEBS) releases the results of the EU bank stress tests.
24 Sep 10	The Spanish government approves the 2011 public budget.
30 Sep 10	The Irish government confirms a sharp rise in the cost of rescuing the country's biggest banks, pushing the 2010 budget deficit to over 30% of GDP. Moody's downgrades Spain to Aa1.
18 Oct 10	The French and German governments agree to take steps that would make it possible to impose haircuts on euro area sovereign bonds.
28 Oct 10	A European Council statement makes it clear that other EU governments have agreed to the proposal on government bond haircuts.
12 Nov 10	The finance ministers of several European countries reiterate that burden-sharing on euro area government bonds will apply only to those issued after 2013.
17 Nov 10	LCH.Clearnet (a European clearing house) increases haircuts on Irish government bonds in repo transactions to 30%. On 25 November, haircuts are raised to 45%.
21 Nov 10	The Irish prime minister announces that the government has requested financial support from the European Union and the IMF.

28 Nov 10	The Irish government accepts a €68 billion EU-IMF support package
2 Dec 10	Spain holds a successful debt auction. The ECB continues to purchase government bonds.
15 Dec 10	Moody's puts Spain on review for a possible downgrade.
12 Jan 11	Financial markets become aware that the EU is investigating options for increasing the size and widening the scope of the European Financial Stability Facility (EFSF) so that it can better support euro area sovereigns.
27 Jan 11	Standard & Poor's downgrades Japan to AA-.
12 Mar 11	Euro area governments agree to strengthen the EFSF by allowing it to lend the full €440 billion and buy sovereign bonds in the primary market, provided that the beneficiary country embarks on an austerity programme.
31 Mar 11	The Irish government announces that its banks need an additional €24 billion of capital. Most of this is likely to come from the government, though some may come from private investors such as holders of subordinated bonds.
6 Apr 11	The Portuguese government announces that it has requested financial support from the European Union and the IMF.
3 May 11	The Portuguese government accepts a €78 billion EU-IMF support package.

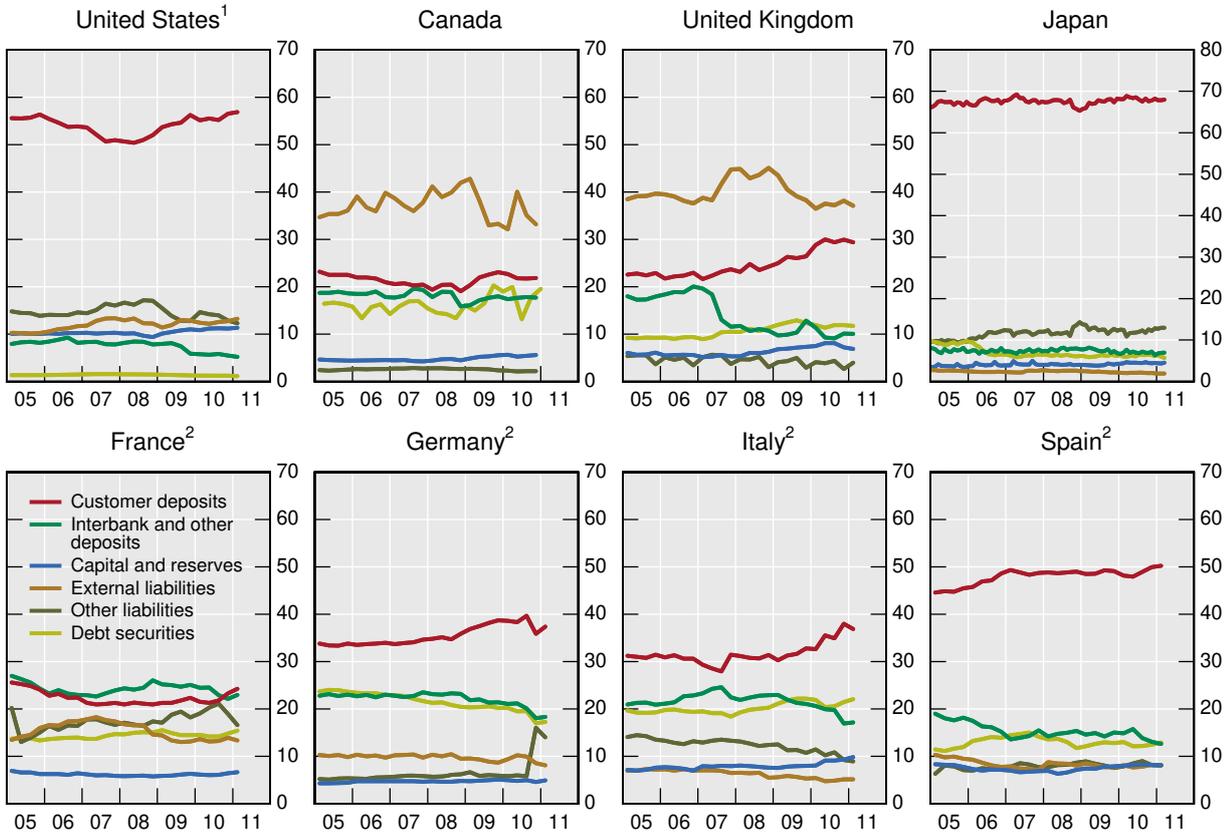
Sources: Federal Reserve Bank of St Louis; Bloomberg; *Financial Times*; Reuters; BIS.

Annex 4 Graphical appendix

Graph A4.1

Composition of banks' liabilities in the major advanced economies

As a percentage of total assets

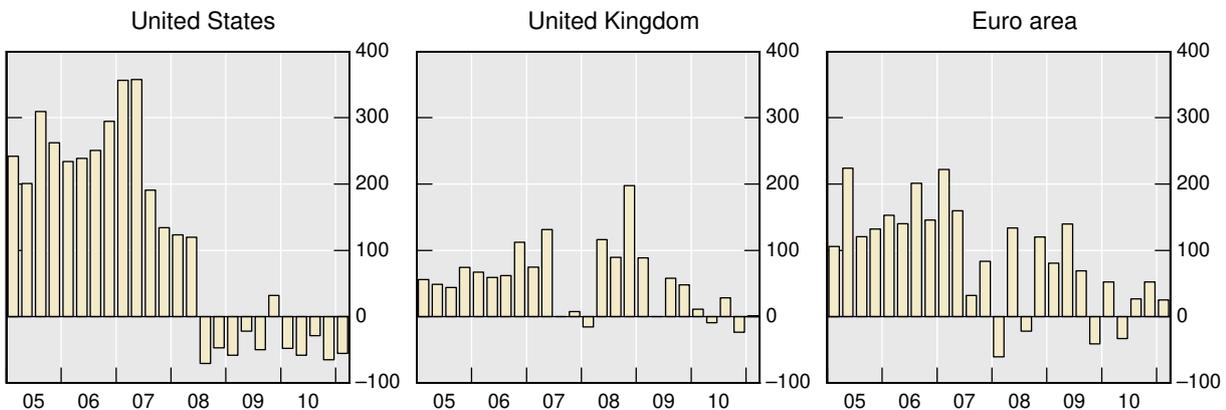


¹ Other liabilities include borrowing from the central bank. ² Data refer to monetary and financial institutions, excluding the European System of Central Banks and shares issued by money market funds. "Interbank and other deposits" includes, but is not limited to, borrowing from the Eurosystem.

Source: Central banks.

Graph A4.2 Banks' net international bond issuance¹

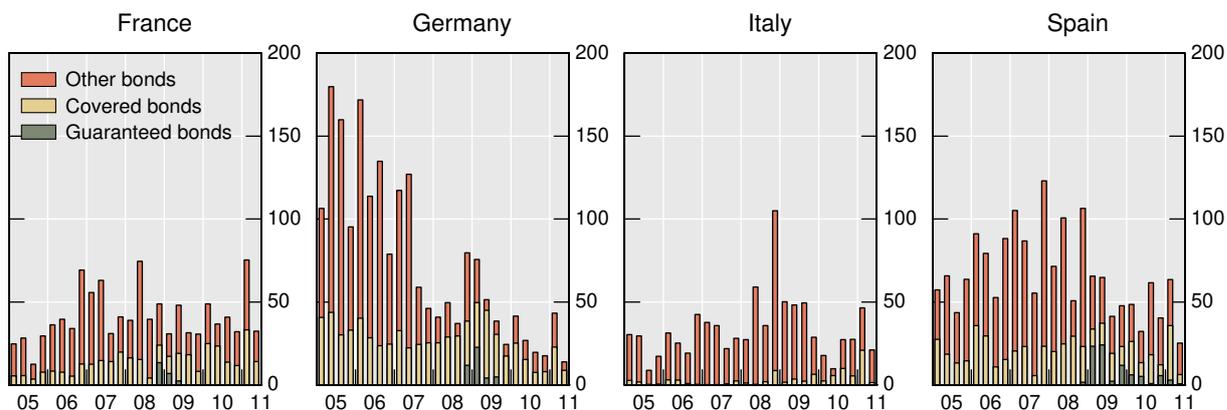
In billions of US dollars



¹ Based on the sector and nationality of the issuer's parent company.

Sources: Dealogic; BIS.

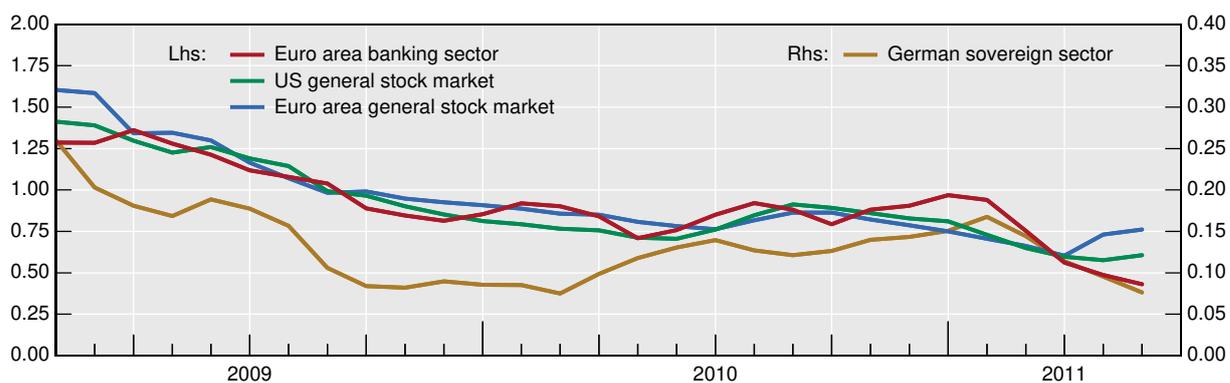
Graph A4.3
Banks' gross bond issuance in selected euro area countries¹
 In billions of US dollars



¹ Based on the sector and nationality of the issuer's parent company. Data for Q2 2011 comprise only issuance in April and May.

Sources: Dealogic; BIS.

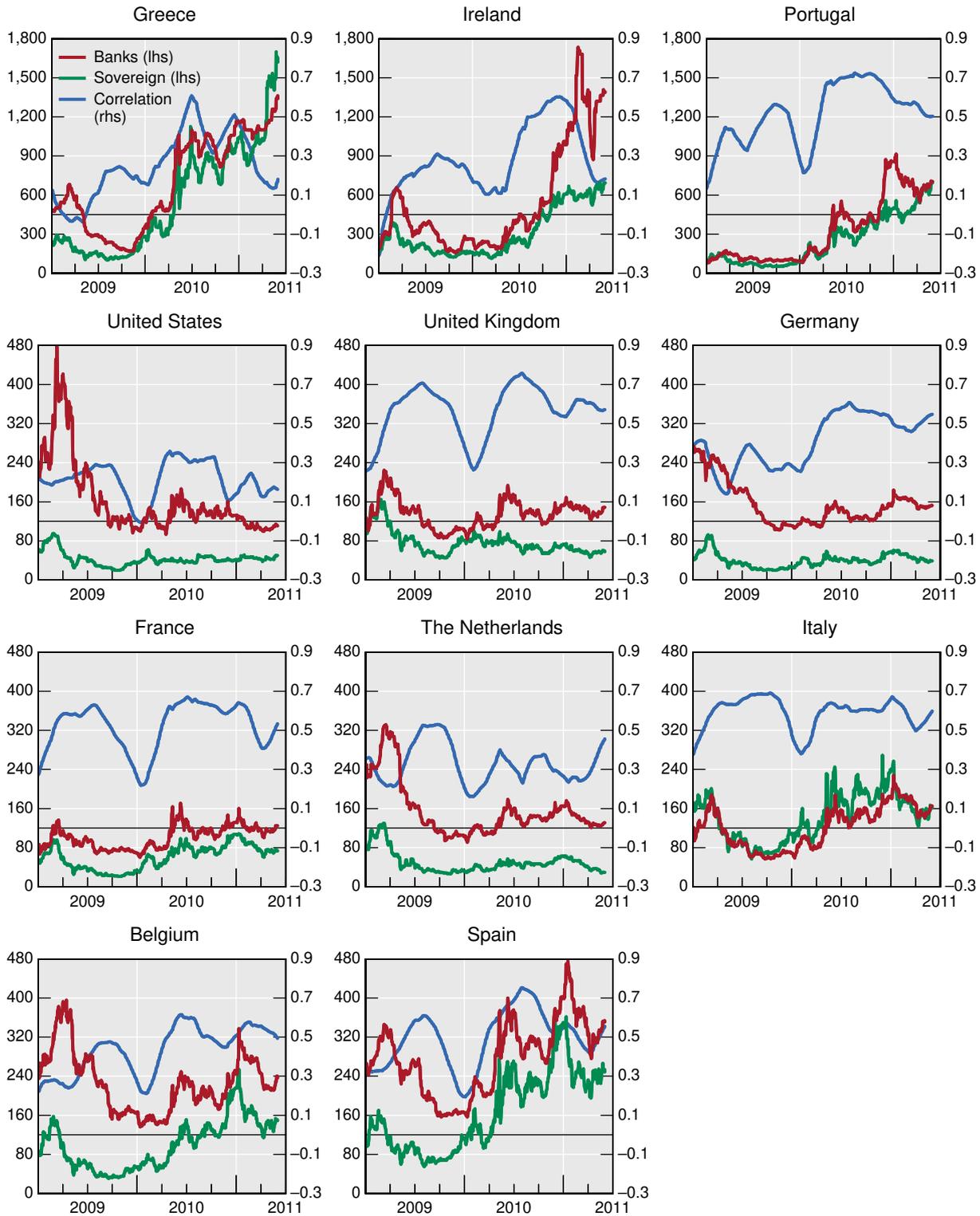
Graph A4.4
Risk aversion indices¹



¹ The risk aversion index is obtained by comparing the historical distributions of the returns on the stock market banking index (German bund futures) with corresponding risk-neutral distribution implied in option prices. A decrease in the risk aversion index shows agents are more willing to bear risks embedded in investments in equities (German government bonds).

Sources: Bank of Italy; Bloomberg.

Graph A4.5
Sovereign and bank CDS premia in selected advanced countries¹
 In basis points



¹ Premia on five-year CDS on senior bonds issued by sovereigns or banks. The correlation index is equal to the three-month moving average of the correlation between changes in the two time series of CDS spreads, calculated on the basis of a GARCH (1,1) statistical model, using daily data.

Source: Datastream.

Annex 5

Study Group members

Institution	Name
Bank of Italy	Fabio Panetta (Chair)
National Bank of Belgium	Cristina Vespro
Deutsche Bundesbank	Martin Wieland
European Central Bank	Siret Vildo
Bank of Italy	Federico Signoretti Antonio Di Cesare Andrea Zaghini
Central Bank of Luxembourg	Francisco Nadal de Simone
Bank of Spain	José-Manuel Marques
Board of Governors of the Federal Reserve System	Ricardo Correa
Bank for International Settlements	Michael Davies (Secretary)

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