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Sovereign and Banking Sector Debt: Interconnections through Guarantees

by

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Sovereigns effectively provided the function of guarantor-of-last resort in response to the 2008/09 banking crisis, and recent bank funding challenges have led to renewed calls for explicit sovereign bank debt guarantees. The present paper focuses on the interconnections between the values of sovereign and bank debt that arise through sovereign guarantees for banks. We develop a valuation framework based on concepts of contingent claims analysis. In particular, we investigate the value of insurance of risky bank debt when the sovereign providing the guarantee can itself be risky. The framework is in principle applicable both to explicit and implicit guarantees and it is applied here to a measure of implicit external (mostly from the sovereign) support for the debt of a cross-section of 100 large European banks. Consistent with the model, the implicit support is higher, the lower the bank's stand-alone creditworthiness and the higher the sovereign's creditworthiness. These results have implications for pricing sovereign bank debt guarantees, be they provided individually by each sovereign for its domestic banks or by several sovereigns jointly. In the former case, stronger sovereigns should charge higher premiums for their bank debt guarantees for a given bank risk if the aim is to avoid creating distortions to competition. In the latter, they should receive greater allotments of premium incomes even where the share of the guarantees provided are identical among sovereigns.

JEL Classification: E44, G13, G21, G28, H81.

Keywords: sovereign debt, financial guarantees, implicit guarantees, contingent claims analysis, risky guarantors.

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OECD work on financial sector guarantees

OECD work on financial sector guarantees has intensified since the 2008 global financial crisis as most policy responses for achieving and maintaining financial stability have consisted of providing new or extended guarantees for the liabilities of financial institutions. But even before this, guarantees were becoming an instrument of first choice to address a number of financial policy objectives such as protecting consumers and investors and achieving better credit allocations.

A number of reports have been prepared that analyse financial sector guarantees in light of ongoing market developments, incoming data, discussions within the OECD Committee on Financial Markets. The reports show how the perception of the costs and benefits of financial sector guarantees has been evolving in reaction to financial market developments, including the outlook for financial stability. They are available at www.oecd.org/daf/fin.

- Financial safety net interactions
- Deposit insurance
- Funding systemic crisis resolution
- Government-guaranteed bank bonds
- Guarantees to protect consumers and financial stability

As part of that work, the Symposium on "Financial crisis management and the use of government guarantees", held at the OECD in Paris on 3 and 4 October 2011, focused on bank failure resolution and crisis management, in particular, the use of guarantees and the interconnections between banking and sovereign debt. Conclusions from the Symposium are included at the back of this article. This article is one of nine prepared for presentation at this Symposium.

- Managing crises without guarantees: How do we get there?
- Sovereign and banking debt interconnections through guarantees
- Costs and benefits of bank bond guarantees
- Impact of banking crises on public finances
- Fault lines in cross-border banking: Lessons from Iceland
- The macro-prudential authority: Powers, Scope and Accountability
- Effective practises in crisis management
- The Federal Agency for Financial Market Stabilisation in Germany
- The new EU architecture to avert a sovereign debt crisis

I. Motivation

The financial crisis has put a sharp spotlight on the use of government-supported guarantees as a policy tool to support financial stability. Together with the provision by some public authorities of additional capital and by central banks of additional liquidity for banks, these measures meant that the sovereign effectively provided the function of the 'guarantor of last resort' (Schich, 2009) in response to the banking crisis of 2008/09. The immediate concern was financial stability and these policies were helpful in stabilising markets and institutions.

But guarantees – even if not triggered – are not costless. For the guarantor, they create contingent liabilities, and these liabilities can represent a significant burden. In fact, perceptions of the creditworthiness of some sovereigns have been markedly affected, in an adverse way, by the extent of perceived explicit and implicit support that the sovereign is seen as providing for its banking sector. As a result, the values of sovereign guarantees have suffered. Also, mispriced guarantees create distortions to competition and incentives and produce moral hazard.

While many of the explicit emergency guarantees have been withdrawn already, recent tensions in bank term funding markets have led to renewed calls for the creation of explicit government-supported arrangements for guaranteeing bank debt. Some proposals foresee that the bank debt guarantees be provided jointly by several sovereigns or specific international institutions or facilities, noting that the value of the guarantees that currently could be provided by some weak sovereigns alone would be insufficient to reassure investors of the quality of their domestic banks' debt.

The present paper focuses on the interconnections between the value of sovereign and banking debt that are created through sovereign guarantees for the banking sector. It explores the interrelationships between sovereign and banking sector debt, developing a valuation framework based on concepts of contingent claims analysis (section II). [1] In particular, it investigates the value of insurance of risky bank debt when the sovereign providing a guarantee can itself be risky. The conceptual approach developed here applies in principle to both explicit and implicit guarantees, and the paper reports the results of an empirical application of the framework to data on external (mostly government) support for the debt of a cross-section of large European banks (section III). Section IV discusses selected policy implications and section V concludes.

II. The conceptual framework

1. Motivation for the model

All debt is risky. This principle is generally acknowledged in the modelling of the debt of private entities, including banks, and of debt issued by sovereigns in emerging economies, but is more likely to be downplayed or even overlooked in the case of sovereign debt or debt guarantees in more advanced economies. However, as Gray, Merton, and Bodie (2007) contend, the ability of the sovereign to pay off its debt or to make good on guarantees on private sector debt can play a major role in the valuation and risk assessment of private sector debt instruments.

Merton (1974) developed a framework for the valuation of risky debt of a single issuer, which has been applied and extended in various ways in the finance literature. The Merton (1974) approach, for instance, forms the theoretical basis for the well-known

KMV ratings, as indicated in Crosbie and Bohn (2003). The framework is particularly helpful in the case of banks, which tend to have thin capital margins (high leverage) and thus a propensity for large proportional equity losses in response to changes in asset value. See, for instance, Kealhofer (2002) for an application of KMV methods to banks.

We are concerned in this article with the valuation and risk assessment of bank debt guaranteed by a sovereign. Thus, our model is designed to include two sources of risk, as well as the correlation between them. In that sense we follow the theoretical lead of Gray, Merton, and Bodie (2007), though in that paper they only model explicitly one source of risk. Other earlier work has extended Merton's (1974) approach to two sources of risk. For example, Johnson and Stulz (1987) calculate the value of a debt guarantee provided by a risky guarantor under the assumption that the latter has no debt outstanding. Lai (1992) proposes an approximate closed-form expression for the value of such a guarantee, also under the assumption that the guarantor has no debt, and provides numerical results in the case in which the guarantor has nonzero debt.

Our approach is a general extension of the Merton (1974) model to two sources of risk, possibly correlated, using a bivariate counterpart to Merton's univariate stochastic assumptions. The resulting form of the model does not lend itself to closed-form expressions for the value of guaranteed debt, so we generate numerical values from a calibrated version of the model. Since the empirical distributions of financial asset returns have been shown to be prone to leptokurtosis or "fat tails," we also consider the effects of such stochastic properties on the robustness of our results.

Subsection 2, which follows, presents technical details of the model and subsection 3 provides numerical valuation results and sensitivity analysis.

2. Model

Our model includes two agents operating in a single-country setting, a bank and the sovereign, and both issue risky debt. For valuation purposes, we consider the debt of each agent on a standalone basis, but our main focus is on the debt of the bank under the assumption that the sovereign provides a financial guarantee. We look at the bank's debt from the perspective of an investor in the bank, with or without a guarantee. As to the guarantor, our assumption here is that the sovereign's own liabilities are senior to its guarantee of bank debt. Thus, the guarantee does not directly affect the value of the sovereign's direct debt issuance. Other assumptions are possible and could induce changes in the valuation of sovereign debt, but we leave those alternatives for future research.

We compute the value of debt for each entity using contingent claims pricing. For the bank, we consider both the stand-alone value and the value if there is a guarantee from the sovereign. For simplicity, we consider a one-period model in which debt is issued at time 0 and matures at time 1. The assets of the bank and the sovereign evolve as a bivariate continuous-time Wiener process, which is a direct extension of Merton (1974). The distribution of time 1 assets is bivariate lognormal, which leads to straightforward numerical calculations, though not in general to closed-form solutions.

For stand-alone bank debt, the payoff at time 1 is

$$R_B = \begin{cases} L_B & if\ A_B \geq L_B \\ A_B & if\ A_B < L_B \end{cases}, \tag{1}$$

where A_B and L_B are the assets and liabilities (face value of debt) of the bank. The payoff may also be expressed as

$$R_B = L_B - \begin{cases} 0 & if\ A_B \geq L_B \\ L_B - A_B & if\ A_B < L_B \end{cases}, \tag{2}$$

where the second term is equivalent to a put option on the bank's assets with strike price equal to its debt.

In some earlier analyses of sovereign debt guarantees, the sovereign is assumed to be risk free. Here we follow, for example, the theoretical discussion in Gray, Merton, and Bodie (2007) and assume that the sovereign's assets are also subject to risk and that its debt is therefore risky. By analogy to the bank case, the payoff of sovereign debt is

$$R_S = \begin{cases} L_S & if\ A_S \geq L_S \\ A_S & if\ A_S < L_S \end{cases} \tag{3}$$

and it also has a put option interpretation corresponding to (2). Gray, Merton, and Bodie (2007) suggest that we can think of sovereign assets as foreign reserves, net fiscal assets, and other public assets, and that sovereign liabilities may include foreign-currency debt, local-currency debt, base money, and guarantees.

In addition to its direct liabilities, the sovereign may also provide a guarantee on the debt of the bank. In this case, sovereign assets at the end of the period, if they exceed sovereign liabilities, may be used to cover any shortfall of bank assets in covering the face value of bank debt. As noted earlier, we assume that the sovereign's own debt is senior to the bank guarantee. Thus, the payoff for guaranteed bank debt is as summarised in Table 1.

Table 1. Conditional payoffs for bank debt guaranteed by the sovereign

Case	Payoff R_G is	If
1	L_B	$A_B \geq L_B$
2	L_B	$A_B < L_B$ *and* $A_S \geq L_S + L_B - A_B$
3	$A_B + A_S - L_S$	$A_B < L_B$ *and* $L_S \leq A_S < L_S + L_B - A_B$
4	A_B	$A_B < L_B$ *and* $A_S < L_S$

The regions of the (A_S, A_B) plane corresponding to these four cases are illustrated in Figure 1.

If the bank has sufficient assets at the end of the period to pay off all its debt, the assets of the sovereign are not relevant for the repayment of bank debt. If the bank has insufficient assets to cover its debt, the sovereign guarantee essentially provides a collar whereby the investor receives a payoff with a floor of A_B and a ceiling of L_B, as shown in Figure 2.

Figure 1. Regions with different payoffs R_G on guaranteed bank loan

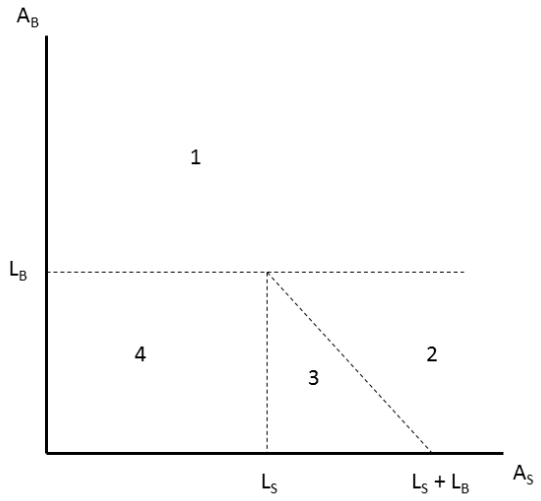
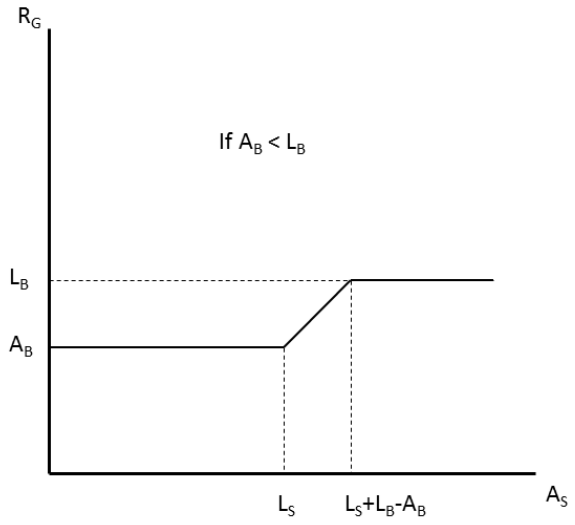


Figure 2. Payoff on guaranteed bank debt when $A_B < L_B$



We price the bank and sovereign debt using the extended Merton (1974) methodology, making the following assumptions.

1. Both the bank and the sovereign have debt outstanding. (In contrast to earlier work in which the sovereign is frequently assumed to have no debt.)

2. Sovereign debt is senior to the bank guarantee.

3. Bank and sovereign assets follow a bivariate Wiener process and their values are jointly lognormal. (In contrast to some earlier work that assumes the sovereign is risk-free.)

4. A closed-form solution for guaranteed debt is not feasible since it involves the sum of lognormal variables. We therefore use numerical integration of the exact bivariate lognormal density.

5. We apply risk-neutral valuation as in Merton (1974).

Box 1 provides technical details of the valuation methodology.

Box 1. Pricing bank and sovereign debt

For risk-neutral valuation purposes, we use the bivariate Wiener process

$$\begin{bmatrix} dx/x \\ dy/y \end{bmatrix} = \begin{bmatrix} r - \frac{1}{2}\sigma_B^2 \\ r - \frac{1}{2}\sigma_S^2 \end{bmatrix} dt + \Sigma dW \tag{4}$$

where *x* and *y* correspond to bank and sovereign assets, respectively, dW is two-dimensional standard Brownian motion, and

$$\Sigma\Sigma' = \begin{bmatrix} \sigma_B^2 & \rho\sigma_B\sigma_S \\ \rho\sigma_B\sigma_S & \sigma_S^2 \end{bmatrix} \tag{5}$$

For example, Σ could be the Cholesky decomposition of $\Sigma\Sigma'$ in (5), that is,

$$\Sigma = \begin{bmatrix} \sigma_B & 0 \\ \rho\sigma_S & \sqrt{1-\rho^2}\sigma_S \end{bmatrix} \tag{6}$$

The joint lognormal density function for asset values at time τ is then:

$$f(x,y) = \frac{1}{2\pi\sigma_B\sigma_S\tau\sqrt{1-\rho^2}} \frac{1}{xy} \exp\left(-\frac{u(x)^2 + v(y)^2 - 2\rho u(x)v(y)}{2\left(1-\rho^2\right)} \right) \tag{7}$$

where $u(x) = \left(\log(x) - \left(r - \frac{1}{2}\sigma_B^2\right)\tau\right) \Big/ \sigma_B\sqrt{\tau}$ and $v(y) = \left(\log(y) - \left(r - \frac{1}{2}\sigma_S^2\right)\tau\right) \Big/ \sigma_S\sqrt{\tau}$.

The payoff at time τ of stand-alone bank debt is given by (1) and its value is obtained from the marginal distribution $f_B(x) = \int_0^\infty f(x,y)dy$ implied by (7):

$$V_B = e^{-r}\left[\int_{L_B}^\infty L_B f_B(x)dx + \int_0^{L_B} x f_B(x)dx \right] \tag{8}$$

The payoff at time τ of sovereign debt is given by (3) and its value is similarly obtained from the marginal distribution $f_S(y) = \int_0^\infty f(x,y)dx$ implied by (7):

Box 1 (cont'd). Pricing bank and sovereign debt

$$V_S = e^{-r}\left[\int_{L_S}^{\infty} L_S\, f_S(y)dy + \int_0^{L_S} y\, f_S(y)dy\right] \tag{9}$$

For bank debt guaranteed by the sovereign, the payoff at time τ is given by Table 1 and its value is obtained from the bivariate distribution (7) as

$$\begin{aligned} V_G = e^{-r}\Bigg[&\int_0^{\infty}\int_{L_B}^{\infty} L_B\, f\left(x,y\right)dxdy + \int_{L_B+L_S-x}^{\infty}\int_0^{L_B} L_B\, f\left(x,y\right)dxdy \\ &+\int_{L_S}^{L_B+L_S-x}\int_0^{L_B}\left(x+y-L_S\right) f\left(x,y\right)dxdy + \int_0^{L_S}\int_0^{L_B} x f\left(x,y\right)dxdy\Bigg] \end{aligned} \tag{10}$$

The four double integrals in equation (10) of that box correspond to the respective four rows of Table 1 and four regions in Figure 1.

3. Sensitivity of bank debt guaranteed by the sovereign to changes in variable or parameter values

To analyse the characteristics of the proposed model and examine its implications for debt guarantees, we provide numerical results based on the following calibration of model parameters. Parameters in the illustrations assume the following base case values unless otherwise noted. We take the time period loosely to represent one year and the riskless interest rate to be 3 per cent on a per-period compounded basis. The value of bank assets is 100 at time 0 and the face value of bank liabilities, payable at time 1, is 95. Although these values seem to indicate that the bank has formally a 5 per cent capital ratio, when discounting and risk are taken into account, the true value of the capital ratio is closer to 12 per cent.

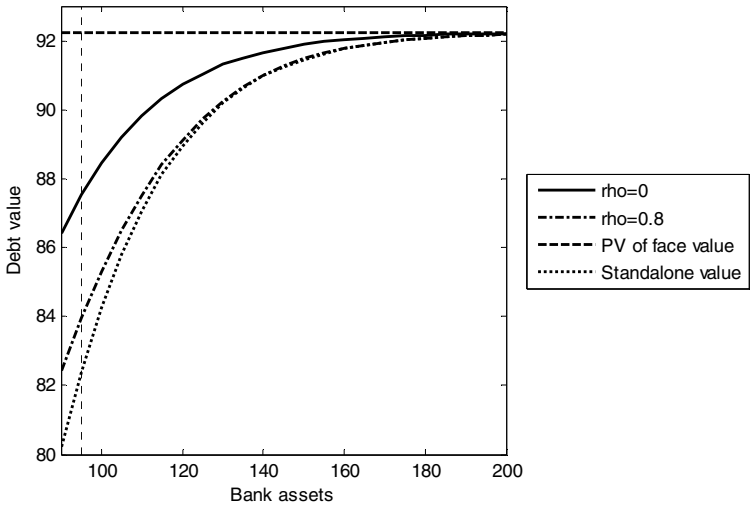
We take time 0 sovereign assets to be 200 and the face value of sovereign liabilities to be 180. The volatility of asset returns is 0.3 for both the bank and the sovereign. For the correlation of bank and sovereign asset returns, which we denote as "rho", we look at two cases, zero and 0.8. A higher correlation tends to undercut the value of the sovereign's debt guarantee, since the sovereign's financial position would tend to be unfavourable when a potential bank default occurs.

Figure 3 shows the value of bank debt as a function of the initial value of bank assets, as the latter varies from 90 to 200, with all other parameter values fixed at the base case levels. The vertical dotted line indicates the base case face value of liabilities. Debt values are presented under four different sets of assumptions. An upper bound is given by the present value (PV) of face value, which corresponds to the assumption that the debt is riskless (dashed line). This value is independent of initial bank assets. A lower bound is provided by the standalone value of the debt, which assumes that there is no guarantee from the sovereign or any other source (dotted line).

When there is a guarantee from the sovereign, the value of the guarantee depends on the correlation between bank and sovereign assets, as noted earlier. When the correlation is high (rho= 0.8), the uplift in bank debt value provided by the guarantee is very modest, as indicated by a comparison of the standalone value and the guaranteed value (dash-dot line). A much more substantial effect on the value of the guarantee occurs when the correlation is zero, in which case the financial state of the guarantor is independent from

that of the bank and the sovereign may be in good shape to cover the payment of bank debt when the bank is in a default state.

Figure 3. Sensitivity of bank debt value to changes in initial bank assets



Source: Authors' calculations.

Note that, in all but the riskless case, the sensitivity of the value of debt to bank asset value (the bank asset "delta") is substantially larger for lower asset values. This sensitivity approaches zero as the initial value of bank assets grows well beyond the base case value of 100. This nonlinearity means that the value of debt becomes more volatile as the condition of the bank deteriorates.

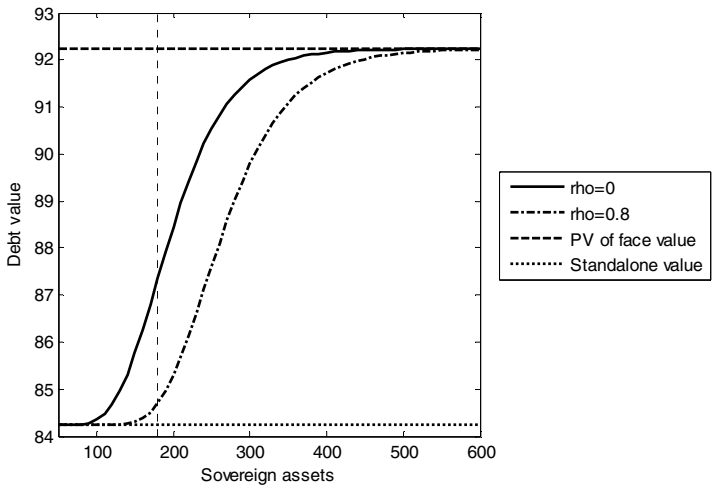
We next perform a similar exercise by letting the initial value of sovereign assets vary from 50 to 600, with the value of bank assets and all other parameters at their base case levels. Results appear in Figure 4. Once again we show the upper and lower bounds given by the present value of face value and the standalone value, respectively, which in this case are both independent of sovereign asset value and appear as horizontal lines. The vertical dotted line represents the base case face value of sovereign liabilities.

As in the case of the sensitivity to bank assets, sensitivity to sovereign assets grows nonlinearly from the lower to the upper bound. However, the nonlinearity in this case is different in that bank debt value is less sensitive when sovereign assets are low as well as high. Sensitivity is much higher in an intermediate range of sovereign asset values. In practical terms, this means that changes in the financial condition of the sovereign have little import for bank debt both when the sovereign's financial condition is very strong (the guarantee makes bank debt close to riskless) and very weak (the guarantee is close to worthless). In the intermediate range, it is clear again that the uplift provided by the sovereign is less if the assets of the two agents are more highly correlated.

From a real-world empirical point of view, we are very interest in the uplift that a sovereign guarantee can provide for bank debt, which we examine in Figure 5. This three-dimensional figure shows the uplift in the value of bank debt, that is, the difference between the guaranteed and standalone values as a function of both bank and sovereign assets. The correlation is zero in the figure. The shape of the function is qualitatively the

same if the correlation is higher (for example, 0.8), but the numerical values of the uplift are lower.

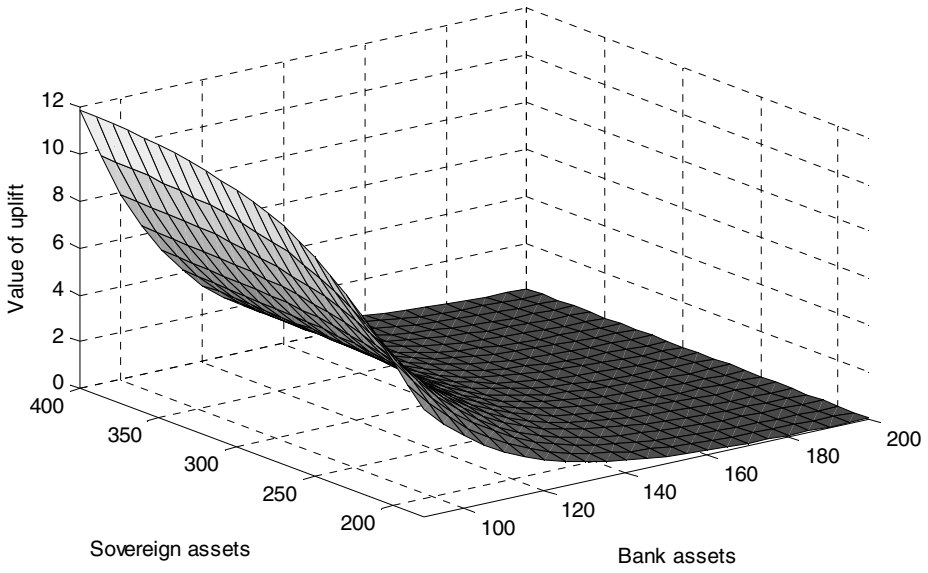
Figure 4. Sensitivity of bank debt value to changes in initial sovereign assets



Source: Authors' calculations.

Figures 3-4 show that the value of guaranteed bank debt is positively related to the values of both bank and sovereign assets. In contrast, we see in Figure 5 that while the uplift is also positively related to sovereign assets, it is negatively related to bank assets. Intuitively, a sovereign in better financial condition is better able to support bank debt, whereas a bank in worse financial condition stands to gain more from a guarantee than one in better shape. We see in Section III that this type of relationship holds empirically when debt values are proxied by ratings from the credit agencies.

Figure 5. Sensitivity of value of uplift to changes in initial bank and sovereign assets



Source: Authors' calculations.

The sensitivities of bank debt to other parameters of the model are largely straightforward. For instance, the value of guaranteed bank debt responds positively to increases in the scale of the sovereign if the financial condition of the sovereign (ratio of assets to liabilities) is held fixed. That is, a large country can take better care of a small bank than when the sizes are reversed.

Higher volatility of sovereign assets means that the guarantee is riskier, decreasing the value of bank debt correspondingly. Higher volatility of bank assets also has in general a negative effect on the value of bank debt, but non-monotonic relationships have been observed by, for example, Stulz and Johnson (1985) and Lai (1992) when the asset return correlation is close to -1 or when the ratio of bank to sovereign volatility is either very large or very small. We find limited evidence of these results if we start from our base case calibration.

The effect of changes in asset correlation is generally as indicated in Figures 3-4 and discussed earlier, even if the correlation is negative. Lower correlation provides a kind of diversification effect and enhances the value of the guarantee and the value of bank debt.

III. Empirical analysis: Implicit sovereign support for large European banks

1. The data: Credit rating uplifts due to assumed external support

The model described in the previous section implies that the uplift in the value of bank debt due to a sovereign guarantee is a positive function of the level of sovereign assets and a negative function of the level of bank assets. Conceptually, this implication applies regardless of whether the guarantee is explicit or implicit, as long as the latter is known. We test these implications using data on the assumed external support for a sample of 100 large European banks. In particular, our data consist of Standard & Poor's estimates of the standalone credit profile and the credit rating uplift due to assumed external support in the case of the 100 largest European banks rated by that agency, as published in April 2011 (Standard & Poor's, 2011a). Similar data on rating uplifts have been used recently in a growing number of studies to proxy the extent of implicit guarantees to banks (see *e.g.* CGFS, 2011; Packer and Tarashev, 2011).

For some time now, credit rating agencies have rated banks by explicitly factoring in an estimate of the external support that the bank under consideration receives, either from its parent or from public authorities. In fact, rating agencies provide two types of ratings for a bank. First, an "issuer credit rating" (ICR) that factors in the possibility and likelihood of external support that the bank under consideration receives from its parent or public authorities, when needed. Second, an "intrinsic strength" or "stand-alone" rating (SACP) that abstracts from such support. The difference between the two types of ratings is referred to here as UPLIFT. Thus,

Stand-alone credit rating (SACP) + credit rating uplift (UPLIFT) = issuer credit rating (ICR).

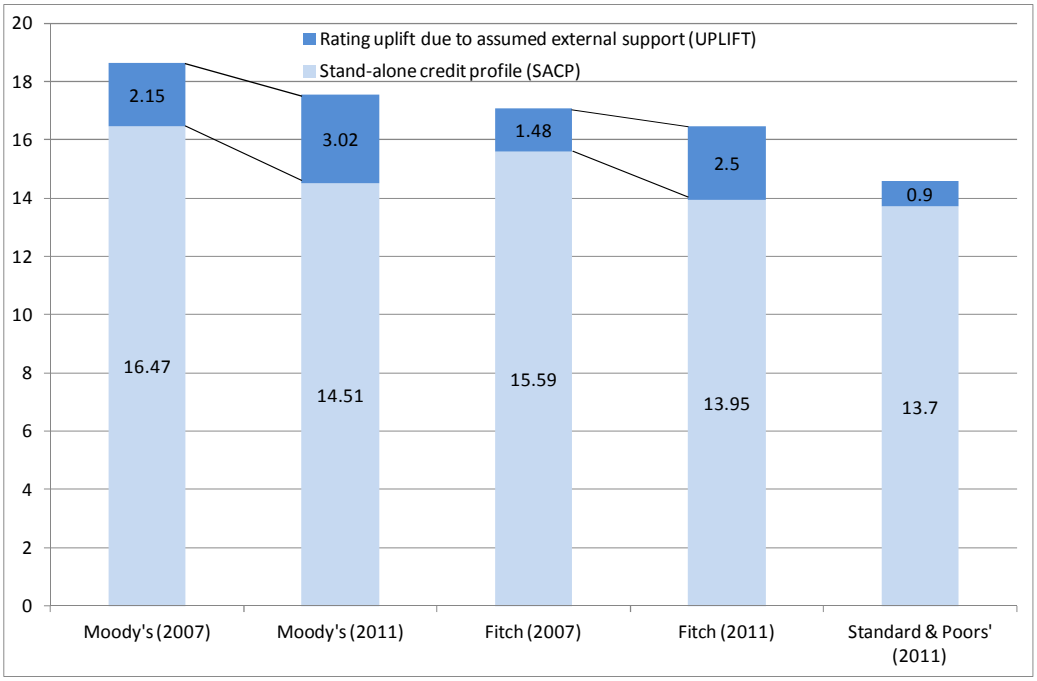
In our sample, the difference between these two ratings, that is, the credit rating UPLIFT, is typically either zero or positive, but it can also be negative. Out of 100 banks, 46 enjoy a positive UPLIFT. Two banks, both from the United Kingdom, are characterised by a negative UPLIFT.[2] Note that standalone ratings abstract not just from sovereign guarantees but also from other external effects, such as guarantees and drags from a parent company.

A positive UPLIFT reflects the existence of explicit or perceived implicit support from either the parent or the government, or other favourable factors such as access to central bank liquidity and emergency liquidity support. Whatever the specific form that the external support might take, it effectively facilitates the issuer's servicing of its debt, and is thus functionally equivalent to an implicit guarantee for that debt. By far the most important element is the assumed support from the government and, therefore, this difference is now commonly used as an empirical measure of the extent of explicit or implicit support from the government (see *e.g* CGFS, 2011 and Packer and Tarshev, 2011).

In our sample, the average issuer SACP in numerical values)[3] is 13.70, while the average UPLIFT is 0.90. Thus, the average ICR is 14.60. The data are shown in Figure 6, together with broadly similar data from Moody's and Fitch for 2007 and 2011 (see notes to the Table). Given the differences in samples and methods used, the estimates are not strictly comparable across agencies. They show nonetheless that, over time, UPLIFT is negatively related to SACP, which is consistent with our model.

Figure 6. Changes in stand-alone and all-in ratings of large international banks

Numerical equivalents of average stand-alone ratings and rating uplifts



Notes: The Figure provides numerical approximations of stand-alone credit profiles and credit rating uplifts due to assumed external support, according to estimates by credit rating agencies. Credit ratings are translated into numbers, with AAA or Aaa equal to 20, AA+ or Aa1 equal to 19, and so forth. The data shown for Moody's and Fitch (obtained from Packer and Tarashev, 2011) are equally-weighted averages of individual country averages for six European countries (Germany, France, Italy, Spain, Switzerland, United Kingdom) and four non-European countries (Australia, Canada, Japan, United States). The data shown for Standard & Poor's (obtained from Standard & Poor's, 2011) are averages of individual bank stand-alone credit profiles and rating uplifts for a sample of the 100 largest banks rated by that agency.

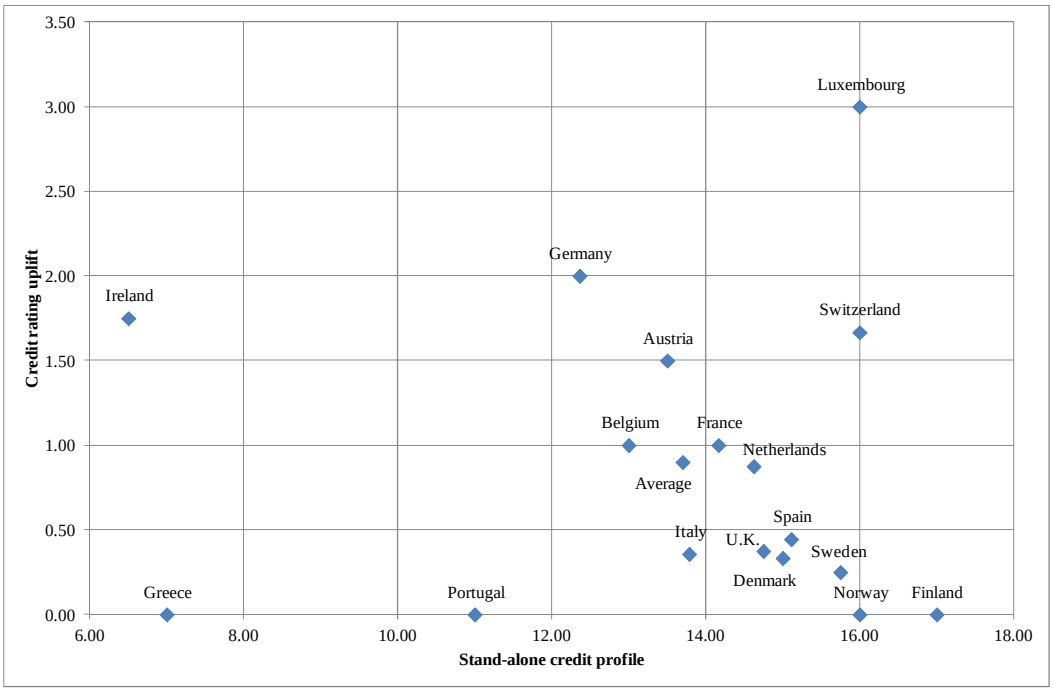
Source: Authors' estimates based on Standard & Poors' (2011) and Packer and Tarashev (2011).

2. Differences in implicit support assumptions across countries

Figure 7 shows the averages of SACP and UPLIFT per country in our sample. The figure illustrates that the average UPLIFT of bank debt ratings differs from one country to another. In some countries, the average uplift is equal to zero (Greece, Portugal, Norway, and Finland), in others it is at least a notch and a half (Ireland, Germany, Austria, Switzerland, and Luxembourg), while elsewhere the uplift is positive but smaller than one and a half notch.

Figure 7. Stand-alone credit profile and rating uplift

Country averages, 100 largest European banks rated by S&P, as of April 2011



Source: Authors's estimates based on Standard & Poors' (2011).

Based on these two dimensions, one could define a country's banking sector as falling into one of four categories, defined by whether the bank is "relatively weak" or "relatively strong" and whether it enjoys "strong sovereign support" or "limited or no sovereign support". An arbitrary criterion is used here for simplicity for each of the two dimensions, namely an intrinsic strength rating of 12 (that is, the equivalent of "BBB"), and an uplift of 1.25 notches. Applying these criteria to our sample, Table 2 shows how the four different areas are populated by the countries under consideration. While providing some additional insight, the classification should be viewed with caution, as it is based on country *averages* and refers to a specific point in time, whereas individual banks exhibit substantial differences (see *e.g.* Appendix 1). We explore these differences further in the next sub-section.

Table 2. Assumptions about standalone ratings and strength of support

Country averages, 100 largest European banks rated by S&P, as of April 2011

	Relatively weaker banking sector, *i.e.* average stand-alone credit profile equal to or below BBB	**Relatively stronger banking sector**, *i.e.* average stand-alone credit profile above BBB
Strong sovereign support, *i.e.* credit rating uplift exceeding 1.25 notches	Ireland	Austria, Germany, Luxembourg, Switzerland
Limited or no sovereign support, *i.e.* credit rating uplift below 1.25 notches	Greece, Portugal	Belgium, Denmark, Finland, France, Italy, Netherlands, Norway, Spain, Sweden, United Kingdom

Notes: BBB is equivalent to 12 notches.

Source: Authors' assessments of data shown in Figure 7 and assumptions given above, based on data from Standard & Poors' (2011).

3. Individual issuer "credit uplift" and the role of the sovereign

The relationship between the uplift and the identity of the sovereign is further analysed using simple OLS cross-section regressions based on the 100 observations of our sample.[4] We first estimate a linear regression of UPLIFT on SACP with a dummy variable for each of the sovereigns, and then eliminate the country with the median coefficient estimate (Spain) from the subsequent regression specification. Instead, a constant term is added to capture the median. This specification implies that the estimated coefficients for the sovereign dummies indicate the relative contribution of the respective sovereign to the UPLIFT of the issuer, compared to the median. The results are shown in Table 3.

For many countries, the estimated dummy coefficient is not significantly different from zero, which means that the country-specific uplift is similar to that for the median. The estimated country-specific UPLIFT is significantly higher, however, in the case of Germany, Luxembourg, and Switzerland, with the estimated dummy variable coefficients in the latter two being significant at the 1 per cent level. By contrast, the country-specific UPLIFT is significantly lower in the cases of Greece and Portugal, at the 1 and 5 per cent level, respectively.

As regards the intrinsic strength of banks, SACP, the estimated coefficient is negative as suggested by the model described in section II. The estimated coefficient is also highly significant: relatively weaker banks tend to benefit from a greater UPLIFT than do relatively stronger banks.

In another regression exercise, the sovereign credit rating, henceforth referred to as SCR, is included in the specification instead of the sovereign dummy variables.[5] The results are shown in Table 4. The estimated coefficient for that variable is positive and highly significant. That is, the UPLIFT tends to be greater, the better the sovereign credit rating. This finding is also consistent with the model implications. The coefficient estimate for SACP remains similar in value as in the previous regression, and it is also significant at the 1% level. The two variables explain close to 30 per cent of the variation in the dependent variable, which appears considerable given the simplicity of the empirical model.[6]

Table 3. Regression of UPLIFT on stand-alone credit rating and country dummies

Country dummy for Spain excluded

Variable	*Coefficient*	*Std. Error*	*t-Statistic*	*Probability*
Constant	4.04***	0.88	4.58	0.00
Issuer stand-alone credit rating (SACP)	-0.24***	0.05	-4.40	0.00
Country dummies:				
Austria	0.67	0.78	0.86	0.39
Belgium	0.05	0.78	0.07	0.95
Denmark	-0.14	0.66	-0.21	0.84
Finland	0.01	1.05	0.00	1.00
France	0.33	0.44	0.75	0.45
Germany	0.90*	0.47	1.92	0.06
Greece	-2.37***	0.74	-3.21	0.00
Ireland	-0.74	0.76	-0.98	0.33
Italy	-0.40	0.43	-0.94	0.35
Luxembourg	2.77***	1.05	2.65	0.01
Netherlands	0.31	0.48	0.65	0.52
Norway	-0.23	1.05	-0.22	0.82
Portugal	-1.42**	0.64	-2.24	0.03
Sweden	-0.04	0.60	-0.07	0.94
Switzerland	1.43***	0.44	3.26	0.00
United Kingdom	-0.16	0.48	-0.32	0.75
R-squared	0.45	Mean dependent var		0.90
Adjusted R-squared	0.34	S.D. dependent var		1.22
Std. error of regression	0.99	Log likelihood		-131.07

Notes: ***,**, and * denote significance at the 1, 5, and 10 per cent level, respectively.
Source: Authors' estimates.

Table 4. Regression of UPLIFT on stand-alone credit ratings and sovereign ratings

Ordinary Least Squares

Variable	*Coefficient*	*Std. error*	*t-Statistic*	*Probabilty*
Constant	0.01	0.62	0.01	0.99
Issuer stand-alone credit rating (SACP)	-0.24***	0.04	-5.52	0.00
Sovereign credit rating (SCR)	0.23***	0.04	5.55	0.00
R-squared	0.28	Mean dependent variable		0.90
Adjusted R-squared	0.27	S.D. dependent variable		1.22
Std.error of regression	1.04	Log likelihood		-144.67

Notes: ***,**, and * denote significance at the 1, 5, and 10 per cent level, respectively.
Source: Authors' estimates.

This observation is noteworthy given that neither the stand-alone credit profiles nor the issuer credit ratings are the direct outcome of quantitative models, even if the latter do certainly influence the ratings. In fact, Packer and Tarashev (2011) explain that "ratings are opinions about the creditworthiness of a rated entity, be it a sovereign or an institution. They reflect both quantitative assessments of credit risk and the expert judgment of a ratings committee. Thus, no rating can be unequivocally explained by a particular set of data inputs and formal rules." Against the background of this assessment, it is remarkable that a simple empirical model explains a considerable amount of the variation in the credit rating uplift due to assumed external support.

Quantitatively, the influences of the standalone bank rating SACP and the sovereign rating SCR on UPLIFT are statistically significant but economically somewhat modest in size. For each of the variables, a difference in rating of four notches corresponds to a difference in UPLIFT of a single notch, positive for SCR and negative for SACP.

One potential issue with the above specification is that the sovereign rating, SCR, might be determined simultaneously with the credit rating uplift, UPLIFT. If that were the case, the coefficient reported in Table 4 for SCR would not be a consistent estimate of the true effect of SCR on UPLIFT. To address the issue, we use a sovereigns' gross debt as an instrument for the sovereign credit rating.[7] We use the Generalised Method of Moments to estimate the effect of (a constant and) SACP and SCR on UPLIFT, using (a constant and) SACP and GROSSDEBT as instruments. The results are shown in Table 5. The estimated coefficients of the marginal effect of SACP and SCR are larger in absolute values and continue to be highly significant. In this case, the coefficients are closer to a 2 to 1 relationship between the standalone and sovereign ratings and the UPLIFT effect.

Table 5. Regression of UPLIFT on stand-alone credit ratings and sovereign ratings

Generalised Method of Moments

Instrument specification:
Constant,
Issuer stand-alone credit rating (SACP), and
sovereign gross debt (GROSSDEBT)

Variable	*Coefficient*	*Std. error*	*t-Statistic*	*Probability*
Constant	-2.30	1.45	-1.59	0.12
Issuer stand-alone credit rating (SACP)	-0.40***	0.09	-4.34	0.00
Sovereign credit rating (SCR)	0.48***	0.13	3.59	0.00
Std.error of regression	1.22	Mean dependent variable		0.90

Notes: Standard errors and covariance computed using the White weighting matrix. ***,**, and * denote significance at the 1, 5, and 10 per cent level, respectively.

Source: Authors' estimates.

IV. Policy implications: Pricing sovereign guarantees for bank debt

For a given bank debt issuer, the value of a government debt guarantee differs not just depending on the relationship between the banks' own assets and liabilities, but also on the relationship between the assets and liabilities of the guarantor. The value of a guarantee is given as the difference between V_G and V_B, as defined in equations (10) and (8). Thus, the value of a sovereign bank guarantee depends on the riskiness of the bank and that of the sovereign: The value of a guarantee is higher the stronger the sovereign.

These results have implications for the design of bank debt guarantees provided by individual sovereigns, such as those that were made available in a large number of OECD countries between 2008 and 2010.[8] At that time, governments undertook efforts to adopt fee structures adjusted for the risk of the issuer or the term of maturity and to make public the fee structures employed in an attempt to avoid creating additional competitive distortions. International coordination has been relatively close as regards the conditions for access to, and the fees charged for, government-supported guarantees for unsecured bank bonds. For example, the ECB Governing Council, on 20 October 2008, provided recommendations for the fee-setting structure for such guarantees, which the United Kingdom and euro area countries have followed. These guidelines specify that premiums need to be determined as functions of the borrowers' credit risk alone, independently of the identity of the guarantor. The stated purpose of the recommendations was to harmonise fee setting structures across countries so as to as to preserve the level-playing field among financial institutions and avoid market distortions.

Achieving such harmonised fee structures to limit competitive distortions between borrowers is only helpful, however, to the extent that the quality of the guarantor is identical in all those cases. That has not been the case. In fact, differences in sovereigns' financial conditions and creditworthiness have increased during the financial crisis and are now widely recognised.

Under those circumstances, to avoid competitive distortions in a situation where different sovereigns individually provide guarantees for their banks and banking sectors, the fees charged in exchange need to reflect the sovereigns' own creditworthiness. Stronger sovereigns with more limited own debt need to charge higher fees to their domestic banks than weaker sovereigns to their banks if the aim is to avoid distortions to competition and incentives.

There is a view, however, that requiring sovereigns with more limited debt to charge higher premiums might effectively penalise fiscally "virtuous" countries and their domestic banks.[9] This view seems to be based on the assumption that there are benefits in having domestic banks service the domestic economy, and that a situation in which competition would lead to domestic banks being crowded out by foreign banks would have adverse effects on the quality or quantity of domestic financial intermediation services, thus providing a potential justification for subsidising domestic banks. Whether there is any convincing empirical evidence for such effects is not so clear, nor is it clear whether such effects would be strong enough to justify subsidising banks and committing resources, potentially creating moral hazard. In fact, even if you could neutralise any potential competitive distortions that arise by abstracting from the quality of the guarantor, the question remains as to whether or not a subsidy should be offered. That issue is beyond the scope of the present paper.

There are alternatives to providing sovereign bank debt guarantees while reducing the potential competitive distortions that could arise from the inadequate pricing of such

guarantees in the presence of differences in the quality of sovereigns. One alternative is that any sovereign could provide guarantees not just for their own domestic banks but for any international bank. Obviously, only stronger sovereigns would be in a position to provide such guarantees, while the guarantees that weaker sovereigns could provide would not necessarily add much value to bank debt. The feasibility of such arrangements is also questionable, especially as political and legal issues might prevent sovereigns from guaranteeing the debt of other countries' banking sectors.

Another proposal is for guarantees to be provided jointly by several sovereigns or by specific international institutions or facilities. Such solutions would be helpful to overcome the issue that the credit quality of some weak sovereigns alone is such that investors in bank debt would not be sufficiently reassured. The desirability of such arrangements has been questioned given that their availability may influence incentives on the part of weaker sovereigns to address their own problems and, again, political and legal issues might arise.

While a discussion of these proposals is beyond the scope of the present paper, it is noted here however that the choice of appropriate pricing remains an issue, regardless of whether the guarantees are provided across borders, individually or jointly by several sovereigns. Our conceptual approach, here developed in a single-country setting, can be extended to a multi-country context to address questions regarding the value (and pricing) of joint sovereign guarantees and the value of the individual sovereign marginal contributions to those values.

Finally, our results also shed some light on the discussion of the too-big-to-fail issue. Large interconnected banks that are considered either too big or too interconnected to fail enjoy a funding advantage compared with smaller entities that do not or are not expected to benefit from external support from the government. Obviously, this advantage can be larger the stronger the sovereign is.

V. Concluding remarks

Based on a contingent claims model to value sovereign guarantees of bank debt, this paper demonstrates that the value of a guarantee of risky debt depends both on the characteristics of the borrower and the guarantor. For a given bank, the value of a government guarantee for its debt decreases with the bank's creditworthiness and increases with the sovereign's creditworthiness. These implications are consistent with our empirical findings. For a sample of 100 large European banks, we find that a measure of implicit sovereign support is higher, the lower the bank's own stand-alone creditworthiness and the higher the sovereign's creditworthiness.

These results have implications for the pricing of sovereign guarantees for bank debt. In a situation where such guarantees are provided separately by each sovereign to its domestic banks, to avoid creating additional competitive distortions, the fees each sovereign charges its domestic banks for debt guarantees need to reflect the sovereign's own creditworthiness. Stronger sovereigns need to charge higher fees than weaker sovereigns. In a situation where bank debt guarantees are provided jointly by several sovereigns, the allotment of premium income among the participating sovereigns should reflect each sovereigns' creditworthiness. Stronger sovereigns should receive higher shares of premium incomes than weaker sovereigns even for identical amounts of committed or used guarantees.

NOTES

1. The present paper focuses on the valuation of financial sector guarantees, taking into account sovereign and banking debt interconnections. At the April 2011 meeting of the OECD Committee on Financial Markets (CMF), delegates asked that this issue be addressed in the CMF's future work on financial sector guarantees. Related work on the interconnections between bank debt and the sovereign include *e.g.* Panetta et. al. (2009), CGFS (2011) and Campolongo (2011).

2. One is the FCE Bank, which is a captive finance subsidiary of Ford Motor Co, with the subsidiary having a stronger rating than its parent. The FCE Bank is a regulated entity, where the regulatory and legal framework limits the parental influence or the extension of bankruptcy proceedings from the parent to the subsidiary. The subsidiary's business franchise is nonetheless inextricably linked to the fortunes of its (weaker) parent and Standard & Poor's expect that, were the parent to experience severe stress, it would inevitably have an adverse effect on the activity and asset quality of the captive, including through parent-related credit exposures. The other bank with a negative UPLIFT is HSBC Holding Plc, which is a holding company, with its banks being operating subsidiaries. Claims on the holding company are subordinated compared to claims on the operating bank subsidiaries and, therefore, the holding company's ICR is not considered as strong as its SACP.

3. The mapping is as follows: AAA is equivalent to 20, AA+ is equivalent to 19, and so forth. Each change from one to the adjacent credit rating category is henceforth referred to as one "notch".

4. We also considered a sample with 97 observations, where the three observations with just one bank per country (Finland, Luxembourg, Norway) were dropped so as to focus on the variation among issuers within each country. The qualitative results were very similar and the fit of the regressions even higher.

5. The data are from Standard&Poor's (2011b) and the ratings categories are transformed into numerical values in the same way as the data on stand-alone credit profiles and issuer credit ratings of banks.

6. To check whether that results holds even when controlling for country effects, we introduce country dummy variables (except for Spain) again and drop the general constant. The results are similar to those shown in Table 4, while the adjusted R-squared increases. The results are included for reference in Appendix 2.

7. We consider the logarithm of "general government gross financial liabilities, as a percentage of GDP" from the OECD's Economic Outlook Database.

8. For a discussion see *e.g.* Levy and Schich (2010).

9. According to this view, expressed by one delegate at the meeting of the CMF in April 2010, in order to encourage "fiscal virtue", strong sovereigns should be allowed to charge a similarly low premium as other (perhaps weaker) sovereigns, so that the strength of the fiscal and credit risk position is recognised as a worthy achievement.

REFERENCES

Alessandri, P. and A. Haldane (2009), Banking on the State, Bank of England, Based on a presentation delivered at the Federal Reserve Bank of Chicago twelfth annual International Banking Conference on "The International Financial Crisis: Have the Rules of Finance Changed?", 25 September 2009; *http://qed.econ.queensu.ca/faculty/milne/870/Bank%20on%20the%20State.pdf.*

Campolongo, "The potential impact of banking crises on public finances: an assessment of selected EU countries using SYMBOL", OECD *Financial Market Trends*, Vol. 2011/2, October.

Committee on the Global Financial System (CGFS, 2011), "The Impact of Sovereign Credit Risk on Bank Funding Conditions", Report by a Study Group established by the CGFS and chaired by Fabio Panetta of the Banca d'Italia, CGFS Papers No. 43, July; *www.bis.org/publ/cgfs43.pdf* .

Crosbie, P. and J. Bohn (2003), "Modeling Default Risk." Moody's KMV Company.

Fergusson, Kevin and Eckhard Platen (2006), "On the Distributional Characterization of Daily Log-Returns of a World Stock Index", Applied Mathematical Finance 13(1): 19-38.

Gray, D.F., R.C. Merton, and Z. Bodie (2007), "Contingent Claims Approach to Measuring and Managing Sovereign Credit Risk", *Journal of Investment Management*,Vol. 5, No.4, pp1-24.

Johnson, H. and R. Stulz (1987), "The Pricing of Options with Default Risk." Journal of Finance 42(2): 267-280.

Kealhofer, Stephen (2002), "The Economics of the Bank and of the Loan Book." Moody's KMV Company.

Lai, V.S. (1992), "An Analysis of Private Loan Guarantees", Journal of Financial Services Research", 6:223-248.

Levy, A. and S. Schich (2010), "The design of government guarantees for bank bonds: Lessons from the recent financial crisis", OECD Financial Market Trends Vol. 2010/2, July; *www.oecd.org/dataoecd/46/47/45636972.pdf* .

Merton, R.C., (1974) "On the pricing of corporate debt: The Risk Structure of Interest Rates", *Journal of Finance*, 29: 449-470.

Nadarajah, S. and S. Kotz (2004), "Multitude of Bivariate t Distributions", Statistics 38(6): 527-539.

Packer, F. and N. Tarashev (2011), "Rating Methodologies for Banks", BIS Quarterly Review, June; *www.bis.org/publ/qtrpdf/r_qt1106f.pdf.*

Panetta F., T. Faeh, G. Grande, C. Ho, M. King, A. Levy, F. M. Signoretti, M. Taboga, and A. Zaghini (2009), "An assessment of financial sector rescue programmes", BIS Papers, No.48; www.bis.org/publ/bppdf/bispap48.pdf .

Schich, S. (2009), "Expanded Guarantees for Banks: Benefits, Costs and Exit Issues", OECD *Financial Market Trends* Vol. 2009/2, November; *www.oecd.org/dataoecd/53/48/44260489.pdf.*

Stulz, R. and H. Johnson (1985), "An Analysis of Secured Debt", Journal of Financial Economics 14: 501-521.

Standard&Poor's (2011a), Global Credit Portal, RatingsDirect, "Ratings for Europe's Largest 100 Banks Show the Widest Range in Creditworthiness in 30 Years", 18 April.

Standard&Poor's (2011b), Global Credit Portal, RatingsDirect, "S&P European Sovereign Issuance Survey Predicts Borrowing Will Decline in 2011 as Sovereigns Tighten Their Fiscal Positions", 8 April.

Appendix 1

Stand-Alone Credit Profiles and Rating Uplifts for Different Banking Sectors

100 largest European banks rated by S&P, as of April 2011

	Maximum stand-alone credit profile	Minimum stand-alone credit profile	Maximum uplift (in notches)	Minimum uplift (in notches)
Netherlands	AAA	BBB	2	0
Spain	AA	BBB	2	0
France	AA	BB+	5	0
U.K.	AA	BB+	2	-1
Finland	AA-	AA-	0	0
Sweden	AA-	A-	1	0
Switzerland	AA-	BBB+	3	0
Luxembourg	A+	A+	3	3
Norway	A+	A+	0	0
Denmark	A+	A-	1	0
Italy	A+	BBB-	2	0
Germany	A+	BB-	5	0
Austria	A-	BBB+	2	1
Belgium	BBB+	BBB+	2	0
Portugal	BBB-	BBB-	0	0
Ireland	BB-	CCC	2	1
Greece	B+	B+	0	0

Source: Authors' estimates based on Standard & Poors' (2011).

Appendix 2

Results of Regression of Uplift on Stand-Alone Credit Rating and Sovereign Credit Rating and Country Dummies

100 observations, country dummy for Spain excluded

Variable	Coefficient	Std. Err	t-Statistic	Prob.
Issuer stand-alone credit rating (SACP)	-0.24***	0.05	-4.40	0.00
Sovereign credit rating (SCR)	0.22***	0.05	4.58	0.00
Country dummies:				
Austria	0.22	0.81	0.28	0.78
Belgium	-0.17	0.80	-0.21	0.83
Denmark	-0.59	0.69	-0.85	0.40
Finland	-0.44	1.06	-0.42	0.68
France	-0.12	0.49	-0.24	0.81
Germany	0.45	0.53	0.85	0.40
Greece	-0.13	0.52	-0.25	0.80
Ireland	0.38	0.60	0.63	0.53
Italy	0.05	0.40	0.12	0.91
Luxembourg	2.32**	1.06	2.19	0.03
Netherlands	-0.13	0.52	-0.26	0.80
Norway	-0.68	1.06	-0.64	0.52
Portugal	0.15	0.54	0.27	0.79
Sweden	-0.49	0.62	-0.79	0.43
Switzerland	0.98**	0.47	2.11	0.04
United Kingdom	-0.60	0.52	-1.16	0.25
R-squared	0.45	Mean dependent var		0.90
Adjusted R-squared	0.34	S.D. dependent var		1.22
S.E. of regression	0.99	Log likelihood		-131.07

Notes: ***,**, and * denote significance at the 1, 5, and 10 per cent level, respectively.

Source: Authors' estimates.

Symposium on "Financial crisis management and the use of government guarantees"[a)]

OECD, Paris, 3 and 4 October 2011

Background

Almost three years after what many observers had considered the peak of this global financial crisis, we are still waiting for normalcy to prevail. Instead, tensions in funding markets have risen very significantly in recent weeks mainly as a consequence of the sovereign debt crisis in Europe. Currently, we find ourselves once again contemplating guarantees, with some observers calling for the creation of explicit government-supported arrangements for guaranteeing bank debt, such as those temporarily put in place by many governments in 2008/09. In this context, the Symposium on "Financial crisis management and the use of government guarantees" held on 3 and 4 October 2011 turned out to be very topical, certainly more topical than policy makers would have wished.

The Symposium was characterised by an open and frank dialogue between policy makers, policy consultants and other academics on the policy response to the financial crisis, the use of guarantees, failure resolution, banking and sovereign debt interconnections, as well as other financial safety net aspects. The mix of participants from academia and the public and private sector, and both from the economic and the legal profession helped participants appreciate some of the institutional details that get lost in much of the public debate on the topic. Numerous policy suggestions were made as to how to improve the use of government-supported guarantees and the design of the financial safety net, so as to improve existing mechanisms to avert future crises or check them at an early stage. One key message was that guarantees can be a powerful policy tool, but that they need to be employed with limits and priced appropriately.

Costs and benefits of the use of government guarantees

The use of guarantees, where they worked well and where they precipitated other problems, were issues that came up throughout the Symposium. Together with measures to enhance liquidity and capital of financial institutions, sovereigns effectively provided the function of the guarantor of last resort for financial claims in response to the global banking crisis. Despite the rather ad hoc nature of some policy measures, the policy response helped avoid the worst outcome, which could have been a series of failures of systemically important financial institutions, with dire consequences for real activity. Despite their associated problems, guarantees have been an important element in preserving liquidity and restoring market functionality, and it would be difficult to manage financial crises without them. Moreover, other forms of intervention are likely to be more intrusive.

Nonetheless, guarantees were not without cost. Further to administrative costs, they created significant contingent potential liabilities for sovereigns, which was compounded by a failure to charge fees commensurate with the risk which created additional costs. The costs of such underpriced insurance included potential distortions to competition and incentives, which give rise to moral hazard and the potential for additional problems down the road.

Pricing government guarantees

In principle, pricing structures should be designed in such a way that the premiums paid by beneficiaries of guarantees reflect the costs that they would have incurred if markets had functioned properly. As it turns out, however, pricing was not always appropriate. For example, the case of Ireland has highlighted the risk of underestimating losses from already existing claims, but where the ultimate extent of losses arising from those claims is uncertain. Guarantees have also been introduced for new liabilities, such as bank bonds, in many OECD countries in an effort to help banks regain access to markets. This effort was generally considered a success. However, fees typically were set as a function of the characteristics of the issue or the issuer and, in practice, were on average broadly flat across countries. In Europe, an effort was undertaken to harmonise fee structures across borders, making them a close function of a measure of the history of credit default swap spreads for the issuer, with the explicit aim being to avoid competitive distortions between banks.

Unfortunately, the costs for banks of issuing such government-guaranteed bonds turned out to be significantly affected by the identity of the guarantor. This is not so surprising, as theory suggests that the market value of a sovereign guarantee is not only a positive function of the weakness of the borrower but also a positive function of the creditworthiness of the sovereign. Thus, to avoid competitive distortions, the strength of the sovereign should be taken into account in the pricing of government-provided guarantees.

Crisis management experiences and changes in the financial safety net

The costs and benefits of guarantees have to be weighed against the alternatives. In Iceland, for example, an all-encompassing guarantee would not have been credible. The more limited guarantee announced together with the resolution approach adopted implied that shareholders were wiped out and that unsecured non-priority creditors bore losses. The link between bank and sovereign credit risk was severed. Whether that approach was available elsewhere is questionable. In fact, extensive guarantees were in many cases introduced precisely because alternative tools for resolving severe problems were either not available or not trusted to work smoothly enough to avoid a systemic fallout. In particular, effective failure resolution mechanisms for some types of troubled financial institutions tended to be absent.

In the meantime, special legislation for dealing with stressed financial institutions has been introduced in many countries, which has successfully addressed some issues. For example, new institutions and legal frameworks have been introduced that facilitate the restructuring of stressed banks and the rescue of systemically relevant parts of banks. Other issues prevail, however, including the issue of how to resolve stressed large financial institutions in a cross-border context. For example, further reforms are needed for cross-border banking activities in the European Single Market, where the issue is to match the European passport for banks with a pan-European safety net including deposit insurance and supervision.

While use of guarantees was a central theme, the Symposium also analysed other aspects of the design of safety nets. There is a need for policymakers to elaborate on the specific roles of the various safety net participants and stakeholders so as to better understand how the financial safety net should work during times of crisis. Moreover, the traditional three-tier safety net, consisting of a lender of last resort, bank deposit insurance, and a (micro-prudential) regulator-supervisor was considered incomplete, which led to calls for the creation of additional players or functions, including:

- a macro-prudential authority, with the power to alter the composition of central bank assets, to adjust capital adequacy and liquidity ratios, and to propose fiscal and structural changes affecting financial intermediaries;
- an institutionalised tiered systemic crisis insurance function, inspired by mechanisms developed for funding resolution of natural or man-made catastrophes. To limit moral hazard, a layered approach with self-insurance as the first layer, private insurance and reinsurance as another layer and the government as a reinsurer of last resort was suggested;
- a bank failure resolution fund, which would be separate from the general government budget and funded through ex ante contributions of financial intermediaries according to their systemic importance, to finance resolution measures that require the rapid availability of funds in systemic crises;
- an institutionalised investor of last resort, which would establish ex ante conditions for providing support and establish credible bounds to the extent of support in systemic crises, thus helping to legitimise future support measures and limit associated moral hazard.

[a)] OECD Secretariat assessment, facilitated by the rapporteur James McCollum. The opinions expressed here do not necessarily reflect the official views of the Organisation or of the governments of its member countries. For further enquiries please contact Sebastian Schich at Sebastian.Schich@oecd.org.