Aviram Levy (Italy), Andrea Zaghini (Italy)

The pricing of government-guaranteed bank bonds

Abstract

The paper examines the effects of the government guarantee schemes for bank bonds adopted in the aftermath of the Lehman Brothers demise to help banks retain access to wholesale funding. It describes the evolution and the pattern of bond issuance across countries to assess the effect of the schemes. Then the authors propose an econometric analysis of one striking feature of this new market, namely the significant "tiering" of the spreads paid by banks at issuance, finding that they mainly reflect the characteristics of the guarantor and not those of the issuing bank or of the bond itself.

Keywords: bonds, crisis, guarantees.
JEL Classification: G12, G18, G21, G28, G32.

Introduction

In response to the financial crisis that was triggered by the collapse of Lehman Brothers, in October 2008 the authorities of most industrial and emerging economies instituted schemes to support banks and other financial institutions, including both stand-alone actions directed at individual distressed institutions and system-wide support programs. These measures included reinforced deposit insurance to ward off bank runs, capital injections to strengthen banks' capital base, explicit guarantees on liabilities to help banks retain access to wholesale funding, and purchases or guarantees of impaired "legacy" assets to reduce banks' exposure to large portfolio losses. The aim of this massive intervention was to avoid widespread failures and to restore normal financial intermediation.

In particular, governments provided explicit guarantees against default on bank debt and other non-deposit liabilities, which helped banks to maintain access to medium-term funding at a reasonable cost, offsetting the drying-up of alternative sources (such as securitization) and the widening of spreads. The schemes varied from country to country in terms and conditions, as did the amount of funds pledged, but there were some basic common characteristics: the eligible instruments (newly issued senior unsecured debt), the eligible institutions (primarily domestic banks), a per-head limit on the amount of each participant's issue, fees for the access, and the specified time window for availability[1].

The adoption of debt guarantee programs was internationally coordinated and synchronized. Bond issuance quickly became a key source of bank funding, and a new segment of the fixed income market, of non-negligible size, was formed. As of end-June 2010, almost 1500 bonds totalling the equivalent of more than €1000 billion had been issued in G10 countries by roughly 180 financial institutions.

The purpose of this paper is twofold. First, we describe the evolution of this new segment of the corporate bond market, highlighting some key characteristics and weaknesses; second, we propose an empirical investigation of the investors' pricing of guaranteed bonds, which appears to be strongly clustered on a country basis.

In particular, an econometric analysis of more than 500 bond issues indicates that to a large extent the differences between the spreads paid by individual banks at launch reflect the characteristics of the sovereign guarantor (such as its rating or the timeliness of payments in case of issuer default), whereas bank-specific factors (credit risk) and issue-specific factors (volume and maturity) play only a minor role. We estimate that government creditworthiness (measured by sovereign rating and credit default swaps (CDS)) accounts *per se* for one third of the spread paid by the "weakest" issuer. Including the other country-specific factors, the guarantor accounts for around two thirds of the spread. This suggests that "weak" banks from "strong" countries may have had access to cheaper funding than "strong" banks from "weak" countries.

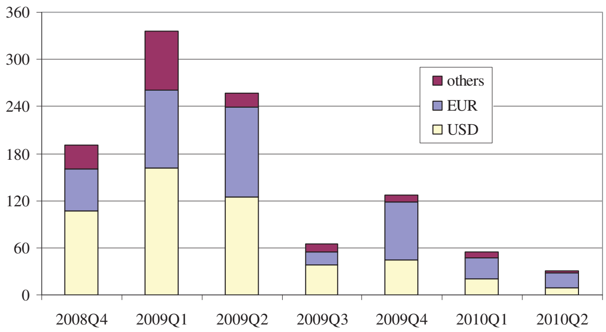
The paper is organized as follows. Section 1 describes the evolution and the patterns of guaranteed bond issuance across countries, with a view to assess the effectiveness of the guarantee schemes in resuming bank funding, and proposes an estimate of the saving on the cost of issuing debt which derives from the sovereign guarantee. Section 2 focuses on a striking feature of the guaranteed bond market, namely the significant "tiering" of spreads at issuance paid by banks, and provides an econometric analysis of this phenomenon. Section 3 allows for robustness analysis and the final section draws some conclusions.

[1] Other possible restrictions concern the bonds' maturity and currency of denomination. For a detailed account of debt guarantee programs and a thorough description of the financial sector rescue plans implemented in advanced economies, see Panetta et al. (2009).

1. Main market characteristics

Since autumn 2008, the issuance of government-guaranteed bank bonds has been substantial all around the world, giving banks an important source of funding. Whereas in October and November 2008 the volume was relatively modest, as only European banks were issuing, between December 2008, when the US and Australian financial institutions started to issue, and June 2009 the total issuance picked up and the US dollar became the main currency of denomination (Figure 1). Issuance in euros remained stable, while the share of other currencies (sterling, yen, Australian dollar) rose sharply in the first half of 2009.

In the second half of 2009, funding markets progressively reopened reflecting a return to more stable conditions and an increase in investors' appetite for risk; up to June 2010, issuance of non-guaranteed bank bonds picked up significantly in many countries suggesting a return towards normalization of bank funding patterns[1]. However, several banks continued to rely, at least partially, on government-guaranteed bonds, with guaranteed issuance activity increasing again in the last quarter of 2009 before falling off significantly only in the first half of 2010.



Note: Billions of euro.
Source: Bloomberg

Fig. 1. Guaranteed bonds: quarterly issuance by currency

In part, the drop in the guaranteed issuing activity in 2010 reflects changes in the availability of programs. In fact, following the easing in bank funding at the end of 2009, many government-guaranteed schemes, including those in the United Kingdom and France, were allowed to expire. Others, such as in the United States, extended but in a significantly curtailed version, which were expired at the end of 2010. In Australia the government closed the scheme on March 31, 2010 and New Zealand did it on April 30, 2010.

Most of the guaranteed issuance was accounted for by just a few countries. The United States leads in volume with almost 250 billions of euro (Table 1), in part because guarantees are automatic for all US banks and all bonds issued, unless the bank explicitly opts out. Robust guaranteed issuance (above €100 billions) was also recorded in Germany, the United Kingdom, France and Australia. Another group of countries (the Netherlands, Spain, Ireland, Sweden, Denmark and Austria) issued amounts in the range between 18 and 61 billions of euro; while in the other countries issuance was smaller.

As far as the number of issuers is concerned, the US, Denmark and Spain stand out for the high number of banks. In Denmark, a general guarantee was adopted in favor of all unsubordinated and unsecured debt, covering the majority of commercial banks and savings banks. While in Spain the large number reflects the fragmentation of the savings bank sector. By contrast, relatively few German banks issued guaranteed bonds, although the total volume of issuance was substantial. Australia had the highest number of bond issues (311), followed by the US (191), Ireland (174) and the United Kingdom (165). As for issue characteristics, national average size differs significantly, mainly reflecting the investor class at which the bonds were targeted: €3.9 billion in Germany, €1.7 billion in France, around €1 billion in Austria, Belgium, the Netherlands, Portugal and the US, and below €1 billion in the other countries.

Table 1. Bond issuance in individual countries

Country	Total issuance[1]	Number of issuers	Bonds issued	Average size of bonds[1]	Average maturity at issuance[2]	Take-up rate[3]	Rollover ratio[4]	Average fee[5]
Australia	110	20	311	0.4	40	na	1.6	101
Austria	20	6	21	1.0	38	27	1.7	102
Belgium	4	1	4	1.0	23	21	0.9	na
Denmark	32	40	177	0.2	28	Na	1.1	na
France	128	2	77	1.7	33	48	1.3	53
Germany	184	11	47	3.9	27	46	0.2	91
Greece	9	3	6	1.4	33	30	0.2	na
Ireland	61	10	174	0.4	30	100	0.5	na

[1] There are also other possible reasons explaining the drop in guaranteed issuance. Among them the desire to keep the time span of government intervention as short as possible and, informally, the concern that bank bonds might compete with government bonds (most countries actually limited guarantees to bonds with a maximum maturity of 3 years). As a consequence a large amount of bonds will expire in 2012 (around €400 billion, representing more than 40 per cent of all bond issuance), suggesting that funding problems may well arise in that year.

Table 1 (cont.). Bond issuance in individual countries

Country	Total issuance[1]	Number of issuers	Bonds issued	Average size of bonds[1]	Average maturity at issuance[2]	Take-up rate[3]	Rollover ratio[4]	Average fee[5]
Netherlands	47	6	38	1.2	46	24	0.7	85
New Zealand	6	7	22	0.3	40	na	na	na
Portugal	4	5	5	0.9	36	22	0.3	99
Spain	40	35	95	0.4	37	40	0.9	107
Sweden	18	*5*	71	0.3	40	14	0.9	78
United Kingdom	147	14	165	0.9	30	54	0.8	114
United States	248	42	191	1.3	33	14	0.5	100

Notes: [1] Billions of euro equivalent; [2] Months; [3] Ratio of actual issuance to amounts pledged by authorities; [4] Ratio of new (guaranteed) bond issuance to expiring debt; [5] Basis points.
Source: Bloomberg, BIS, Dealogic, European Commission.

As we can see from the third last column of Table 1, the take-up rate (i.e., the ratio of actual issuance to the amounts pledged by authorities) is relatively low on average: for 8 of the 15 countries it is below 30 per cent. On the low side we find the US and Sweden (14 per cent), whereas the United Kingdom and especially Ireland recorded much higher take-up rates (54 and almost 100 per cent, respectively). However, an important difference which clearly affects the take-up rate regards the optionality of participation in the schemes. In the US, as already mentioned, financial institutions participate automatically unless they opt out; if they do not opt out, then all their senior unsecured liabilities will be insured by the FDIC (*Federal Deposit Insurance Corporation*). In contrast, in Europe participation is optional for each single issue.

Another way of measuring banks' reliance on the guarantees is to consider which banks came closest to their "ceiling" for guaranteed issuance. Although national rules differ, the generally agreed principle in G10 countries is that each individual bank is allowed to issue guaranteed bonds as long as it aims at rolling over its expiring (non-guaranteed) debt. The indicator we look at is the "rollover ratio" for individual banks, i.e., the ratio, over the whole period, of new (guaranteed) bond issuance to expired debt[1]. The ratios differ significantly between banks and countries. Data show that for banks with bonds maturing over the period from October 2008 to June 2010, the country median rollover ratio ranges from 0.2 to 1.7 (second-last column of Table 1).

All governments providing guarantees on bank liabilities charge a fee for the insurance. However, the mechanism for determining the fees differs across countries. While the US authorities charge a flat fee, which depends only on the maturity of the bond, in Europe the cost of the guarantee is also based on each bank's CDS spread over a given time window. An implication of the different pricing mechanism in the two regions is that the European market-based fee can be seen, at least to some extent, as a tax levied on banks according to risk (guarantors are likely to break even, and may even profit). In contrast, the US flat-fee system has been characterized as a subsidized system, in which the government and "strong" banks subsidize "weak" banks. However, apart from France which levies a fixed guarantee fee of only 20 basis points on top of the median CDS over a pre-defined time window, the variation across countries is relatively limited: the average fee ranges from 78 basis points in Sweden to 114 in the UK (see the last column of Table 1)[2].

To quantify the implicit "subsidy" provided to banks by government guarantees on their debt, we have estimated the interest savings that banks have been making thanks to issuing under the government scheme instead of directly to the market. Since banks had also incurred a cost for the public guarantee, we proceeded as follows. For each bond issued with the government guarantee over the restricted period from October 2008 to June 2009 we tried to locate an analogous non-guaranteed bond on the secondary market – issued by the same bank, in the same currency, with comparable residual life to maturity. We then compared the guaranteed bond yield to maturity (YTM), augmented by the fee paid by banks to government, with that of the comparable non-guaranteed bond.

[1] Note that the proposed measure has an upward bias because the database used (Dealogic) includes only international bonds: to the extent that a bank's expired bonds were domestic, it will understate the denominator of the rollover ratio.

[2] More in detail, in the US the rate for FDIC-insured depository institutions for maturities of one year or more is a flat fee of 100 basis points. In contrast, the United Kingdom and euro area countries follow the ECB guideline, which recommends, in the case of a bond with maturity over one year, a flat fee of 50 basis points augmented by each bank's median five-year CDS spread observed over a specified time window (January 2007–August 2008). Australia, which is the fourth largest issuer of guaranteed bonds after US, UK and Germany, slightly differs in that it applies a rating-related fee (which goes from 70 basis points for a AAA rating to 150 basis points for a BBB-rated or unrated bank).

Table 2. Net subsidy implicit in guaranteed bond issuance

Bank	Total guaranteed issuance[1]	Total saving over bond's life	Average saving per quarts	Saving in % of Q2 profits	Sample size as a % of guaranteed debt
USA					
JPMonrgan Chase	40659	2261	200	7.3	49.8
Citigroup	44600	4737	434	9.9	55.8
Bank of America	44500	5857	450	14.0	44.9
Goldman Sachs	21835	2650	216	6.3	59.1
Wells Fargo	9500	838	68	2.1	50.0
Morgan Stanley	23769	3149	280	1.88	55.7
Total	184862	19492	1638	9.6	52.6
UK					
Royal Bank of Scotland	37230	144	16	4.8	44.7
Barclays	17636	437	41	3.4	47.8
Lloyds	47234	824	65	1.6	17.2
TOTAL	102099	1406	121	2.2	36.6
The Netherlands					
Fortis	9352	339	17	2.0	26.7
ING	10153	467	23	32.4	56.8
Lease plan	5935	104	13	42.7	24.4
Total	25440	910	53	5.6	36.0

Note: for the US values in millions of dollars; for the UK and the Netherlands values in millions of euro. [1]Total issuance between October 2008 and June 2009.

The saving on the whole amount of outstanding guaranteed debt is shown in Table 2 as the share of 2009Q2 profits reported by several financial institutions in the US, the UK and the Netherlands. The absolute amount of saving is significant: for the six largest US banks the average saving per quarter amounts to $1.6 billion, or roughly 10 per cent of the exceptionally high profits of the second quarter of 2009[1]. Over the life of the guaranteed bonds (slightly less than 3 years on average), the total saving comes to nearly $20 billion. For two of the three largest Dutch issuers (ING and LeasePlan), the average saving per quarter is equal to between 30 and 40 per cent of 2009Q2 profits. For the UK banks, for which the difference between the guaranteed and non-guaranteed spread at launch is much smaller, the average saving is also less, ranging between 1.6 and 4.8 per cent of profits. Unsurprising as these findings are, they do raise concerns on the efficiency effects of the programs, which in practice may subsidize large and complex financial institutions, the very ones that many hold responsible for the crisis (Roubini and Richardson, 2009). Moreover, these banks may be less likely to use the funds they have raised thanks to the guarantees to increase the availability of credit to the real economy.

All in all, government guarantees are considered to have been successful in allowing banks to tap the markets and rollover their maturing debt. In particular, there is a consensus among policy makers and practitioners that guarantees have been useful, either because guaranteed bonds have more than offset a decline of non-guaranteed debt, or because rescue schemes have provided indirect help to the banks' ability of raising funds without guarantees by reducing their "funding liquidity risk", i.e., the risk that the bank cannot rollover its debt (IMF, 2010; Panetta et al., 2009).

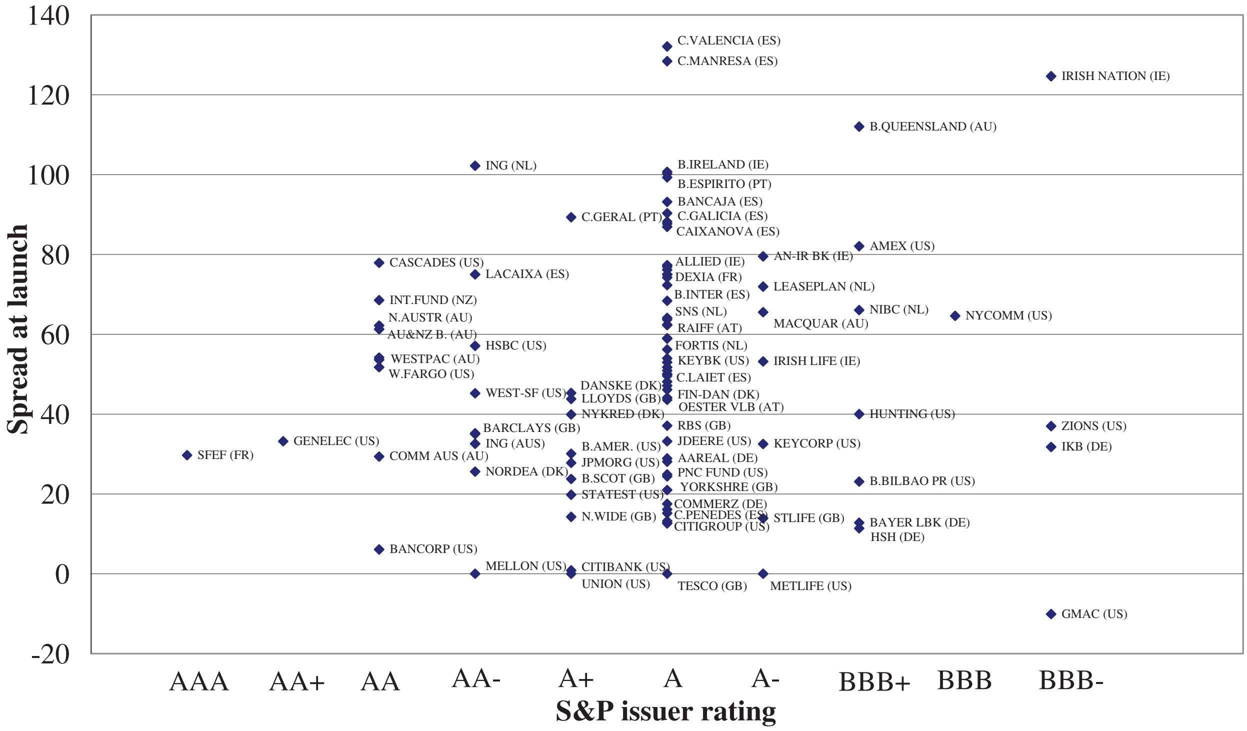
2. An empirical analysis of the tiering of spreads

This section examines the spreads that banks issuing guaranteed bonds paid to investors at launch and provides an econometric estimate of the main causal factors for the spreads[2]. A striking feature of the guaranteed bond market is its significant "tiering" (i.e., clustering in groups) of spreads at issuance. Two issues stand out. First, the spreads at launch are not monotonically related to bank ratings. In some cases, better-rated banks in some countries pay larger spreads than weaker banks in other countries. Figure 2 shows how wide the range of spreads can be. For example, for A-rated banks the range is over 120 basis points (from around zero for some US banks to well over 100 for two Spanish banks). Second, the spreads seem to reflect the nationality of the banks quite closely. For instance, Portuguese banks (Banco Commer-

[1] Note that for Morgan Stanley, which recorded close to zero profits in that quarter, the government subsidy of $280 million made the difference between loss and profit.

[2] Our goal is not to explain the evolution of secondary market spreads of bank bonds but rather the "primary market" pricing of these securities, that is the cost for the issuer. Analyses of the evolution of corporate spreads are provided by Collin-Dufresne et al. (2001), Elton et al. (2001) and Driessen (2005) among others.

cial Português, Banco Espírito Santo (rated A) and Caixa Geral de Depósitos (rated A+) paid much larger spreads at launch (90-100 basis points over the swap rate) than German banks such as Commerzbank (rated A), Bayerische Landesbank and HSH Nordbank AG (both rated BBB+), which paid less than 20 basis points. In fact, the guaranteed bonds issued by the Portuguese banks were rated AA, whereas the rating of the bonds issued by German banks was AAA just because of the guarantors' different sovereign ratings. These numbers may well explain why the Spanish Banco Bilbao (rated AA) chose to issue guaranteed bonds in the US and not in Spain, relying on its Puerto Rico branch (rated BBB+) and paying a spread of only 23 basis points.



Sources: Bloomberg, Dealogic.

Fig. 2. Dispersion of spreads at launch on guaranteed bonds (basis points)

In theory, the dispersion of the premium paid on guaranteed bonds could reflect several factors. First, it may be due to the characteristics of the issuer, such as rating or legal form (i.e., bank vs. non-bank). Second, it could reflect the characteristics of the bonds, such as issue volume (a proxy for liquidity) or maturity. Finally, it could reflect the characteristics of the guarantor, such as rating or the reimbursement procedure in case of default (i.e., the time before investors are refunded).

In order to disentangle these factors, we run the following cross-sectional regressions on 534 guaranteed bonds issued in the period from October 2008 to June 2010 for which data on the spread over the asset swap at launch are available:

$$Spread = \alpha_0 + \sum \alpha_j D_j^{BANK} + \sum \alpha_k D_k^{ISSUE} + \sum \alpha_i D_i^{GOV} + \sum \alpha_z D_z^{MKT.COND.} + \varepsilon \quad , \qquad (1)$$

where D_j^{BANK} is a dummy characterizing the issuer (rating, CDS spread, frequency, sector); D_k^{ISSUE} _ dummies representing the characteristics of the bond (volume, maturity, currency, rating); D_i^{GOV} is a dummy associated with the guarantor and the guarantee program (rating, CDS spread, guarantee size, resources committed, promptness of reimbursement); D_z^{MKT} is a dummy about the market conditions (time dummies). Table 3 reports the exogenous variables considered in the regressions and their breakdown into dummies[1].

[1] For continuous variables, we created three dummies that take the value of 1 if the observation is respectively in the first, fourth, or second/third quartile and zero otherwise. For non-continuous variables, the dummy determination was judgmental and reflected the possible values of each variable. For instance, the sovereign rating was broken down into two categories: one for rating of AAA, and one for ratings below AAA.

Table 3. Breakdown of exogenous variables

Variable	Dummies	Breakdown
Issuance volume	3	Low, medium, high
Maturity	3	Low, medium, high
Currency of denomination	3	Euro, US dollar, other currencies
Rating of bond issue	2	AAA, not AAA
Issuer rating	4	BBB, A, AA, AAA
Issuer sector	2	Bank, non-bank financial institution
Issuer CDS spread	3	Low, medium, high
Bond issuer frequency	2	Once, more than once
Sovereign CDS	3	Low, medium, high
Sovereign rating	2	AAA, not AAA
Size of bond guarantees pledged by government	2	Low, high
Total resources committed by government (% to GDP)	3	Low, medium, high
Timeliness of payments in case of default	3	Fast, medium, slow
Market conditions	4	2008H2; 2009H1; 2009H2; 2010H1

Table 4 presents the results from a first OLS regression in which the spread is a function of all potentially relevant variables. Note the signs of the statistically significant coefficients. As far as country characteristics are concerned, as expected, a sovereign rating of AAA favors a reduction of the spread at launch, as does a low sovereign CDS. A large commitment of resources to guarantee bond issuance by banks also reduces the initial spread. However, a larger share of GDP allocated to the overall rescue packages widens the spread, perhaps because it signals a systemic weakness of the country's financial system or, in extreme cases, even adverse implications for the public sector. Prompter repayment in case of default is associated with a lower spread, again as expected.

Table 4. OLS regression results-all variables

Variable	Coefficient	Std. error	t-statistic
Constant	139.5 ***	10.956	12.736
Rating Gov AAA	-37.2 ***	6.704	-5.547
Sovereign CDS LOW	-11.9 **	5.768	-2.059
Commitment HIGH	16.2 ***	5.179	3.119
Bond scheme HIGH	-9.9 **	4.488	-2.202
Good timeliness	-16.8 **	7.124	-2.360
Issuance currency euro	-5.9	5.380	-1.094
Issuance currency USD	-3.7	4.726	-0.791
Maturity LOW	-9.1 *	4.784	-1.892
Volume HIGH	-7.8 *	4.179	-1.859
Issuance rating HIGH	1.1	3.937	0.290
Rating issuer AA	3.0	4.595	0.659
Rating issuer AAA	-5.4	10.072	-0.539
Issuer is a bank	-0.4	4.388	-0.099
CDS HIGH	7.9 *	4.502	1.762
Single issuance	-0.3	5.713	-0.057
2CD9H2 & 2D1DH1	-26.2 ***	4.759	-5.506
R-squared	0.28		
Included observations	534		

Note: *,**,*** denote statistical significance at 90%, 95% and 99%, respectively.

As regards the features of the issue, shorter maturities and larger volumes make for smaller spreads, while currency of denomination and the rating of the issue are not statistically significant. The characteristics of the issuer suggest that riskier banks (i.e., banks with larger CDS premia) pay more at launch. This could reflect the fact that a default inevitably causes a loss to the bondholders (say, because of the administrative costs of getting their funds back), so that the market assessment of the issuer is not irrelevant even when there is a full government guarantee. However, all other features (rating, legal form, whether the bank issued once or more times) are not significantly different from zero. Finally, the time dummy tracking the issuance period suggests that market conditions were more favourable in the second half of 2009 and in the first half of 2010.

Table 5. OLS regression results (significant variables)

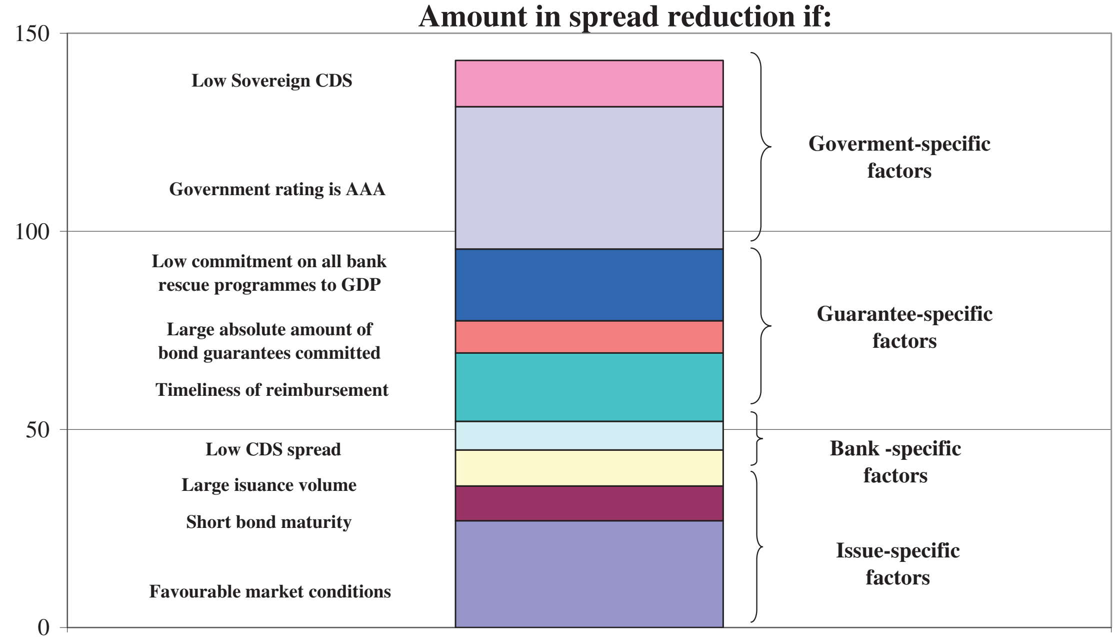
Variable	Coefficient	Std. error	t-statistic
Constant	136.3 ***	9.411	14.478
Rating Gov AAA	-36.0 ***	6.306	-5.701
Sovereign CDS LOW	-11.6 **	5.481	-2.126
Commitment LOW	-13 1 ***	4.791	-3.775
Bond Scheme HIGH	-8.1 **	4.023	-2.017
Higjh timeliness	-17.2 ***	6.717	-2.567
Maturity LOW	-8.7 *	4.711	-1.853
Volume HIGH	.9 i **	4.012	-2.271
CDS LOW	-7.3 *	4.400	-1.649
2ПВ Q2AQ3	-27.0 ***	4.502	-5.993
R-squared	0.27		
Included observations	534		

Note: *, **,*** denote statistical significance at 90%, 95% and 99%, respectively. Dependent variable: Spread at launch

In a second regression we focus only on the explanatory variables that were significant in the first round, and the variables are constructed so as to have all negative signs[1]. The results, shown in Table 5, confirm the previous ones and a graphical representation is given in Figure 3. The height of the bar is the sum of all the regression coefficients (143 basis points) except

[1] This procedure turned out to be equivalent to the step-wise method, which selects only the most relevant from the pool of all possible regressors. In particular, both step-wise and swap-wise procedures have been used, and they pointed to the same regressors selected in Table 5 even when the number of regressors to be included in the equation is left free.

the intercept[1]. The layers of the bar show the contribution of each variable to the overall spread (represented by the regression coefficients of Table 5). Each layer can thus be seen as the estimated saving an issuer would achieve if one of the "worst case" characteristics foreseen by the intercept were removed.



Note: Results are derived from the regression results reported in Table 6. The bar shows how many basis points of the estimated spread can be attributed to country-specific, bank-specific and issue-specific factors.

Fig. 3. Spread decomposition from OLS regression analysis

The main insight to emerge from our results is that the largest factors in the spread relate to the characteristics of guarantor and guarantee, not those of issuer or issue. The rating and the CDS of the sovereign state alone account for 47 basis points (one third of the entire possible spread reduction). If we also add the GDP ratio of the public resources committed to all rescue measures, the sheer amount of resources pledged to the bond guarantee scheme, and the "practicalities" of the reimbursement scheme (i.e., the promptness of payment in the event of default), the country-specific factors increase to 80 basis points (64% of the possible total). The characteristics of the issuer contribute by just 7 basis points, in case of a "good" CDS, to the possible reduction of the spread at launch, while the combined contribution of issue-specific factors is 18 basis points: an issuer could reduce the spread by issuing the bond in a large volume (9 basis points) and by choosing shorter maturities (9 basis points). Finally, a further 27 basis points could be saved by issuing the bond under favourable market conditions[2].

3. Extensions and robustness analysis

A simple exercise with this model is to calculate the spread that would have been paid by the banks that chose not to take advantage of the guarantees. For instance, in Italy no bank has issued bonds under the guarantee scheme, but in the first half of 2009 some Italian banks issued traditional, non-guaranteed bonds. In late April 2009 both MPS and Unicredit made €1-billion issues with maturities of 5 and 3 years, respectively. The spread at launch was 205 basis points for the former and 190 points for the latter.

What would the overall cost of issuing have been if these banks had opted for the guarantee scheme? Given that Italy does not have a top sovereign rating, and given the size of the government commitment, and all the other relevant characteristics of both the issue and the issuer included in the model, the regression coefficients suggest that the spread at launch would have been between 49 and 67 basis

[1] By construction, the intercept can be interpreted as the estimated spread of the weakest issuer, namely the spread that a hypothetical bank would pay at launch in the worst case scenario (i.e., if sovereign CDS is high, the guarantor is rated below AAA, government resources committed to all rescue packages are a relatively large share of GDP, the sheer amount of money pledged to the scheme is low, the maturity of the bond is long, issue volume is low, the issuer has a high CDS, repayment in case of default would be slow, and issuance is under adverse market conditions).

[2] As an aside, note that the value of the intercept is less than 7 basis points smaller than the sum of all the coefficients. This would indicate that in principle, under ideal conditions, an issuer could engineer the issue so as to pay at launch a slightly negative spread.

points over the swap rate[1]. In addition, in order to access the guarantee scheme, these banks would have had to pay a fee to the Italian government. Even though Italy follows the ECB guidelines on the pricing of guarantees, on top of the 50 basis points fee an "extra" add-on of 50 basis points is required for issues with maturity of 2 years or more. In addition, given that the median CDS spread over the relevant period was 42 basis points for MPS and 44 basis points for Unicredit, these two banks would have paid an overall fee of 142 and 144 basis points, respectively. The bottom line is that the total cost of the guaranteed bond issue (fee plus estimated spread at launch) would have been 218-236 basis points over the asset swap for MPS and 220-238 for Unicredit, slightly more than the cost of their non-guaranteed issues.

Table 6. OLS regression results for 2006

Variable	Coefficient	Std. error	t-statist!c
Constant	13.2 *	7.706	1.713
Rating Gov AAA	3.9	10.185	0.381
Commitment LOW	-3.0	7.624	-0.392
Bond Scheme HIGH	1.1	5.802	0.183
Issuance currency Euro	-36.3 ***	5.870	-6.264
Issuance currency USD	20.4 ***	6.700	3.040
Maturity HIGH	14 4 ***	5.310	2.706
Volume HIGH	5.2	7.726	0.673
Low issuance rating	3.4	6.673	1.256
Rating issuer AAA&AA+	-9.9 *	5.350	-1.857
CDS HIGH	1.5	7.644	0.199
Single issuance	-3.3	8.350	-0.451
20D6Q1&Q2	-29.2 ***	4.713	-6.187
R-squared	0.35		
Included observations	336		

Note: *, **,*** denote statistical significance at 90%, 95% and 99%, respectively. Dependent variable: spread at launch.

Finally, in order to check the robustness of the econometric estimation, the cross-section equation (1) was estimated for a roughly similar sample of countries in a tranquil period of favourable market conditions. In particular, we used the same set of variables and the same dummy breakdown and ran the regression for 336 bonds issued between January and December 2006 by 79 banks in 13 countries. The results are presented in Table 6, which show, as expected, that the coefficients of the variables associated with the government are non-signi-ficantly different from zero. What does matter to the spread at launch is the rating of the issuer, how the issue is devised (currency of denomination and maturity) and the period of issuance (in the first half of 2006 financial market conditions were more favourable). These results confirm that the market for guaranteed bank debt, in which the pricing of the security reflects the characteristics of the guarantor and not of the issuer, does not behave like "traditional" corporate bond markets because of the distortions introduced by public guarantees.

Conclusions

The financial crisis triggered by the collapse of the US sub-prime mortgage market in the summer of 2007 has been analyzed in the literature mostly from the traditional standpoints of early warning signals and financial stability (Ackermann, 2008; Acharya and Richardson, 2009; Eichengreen et al., 2009; Rose and Spiegel, 2009) or in the context of currency crisis models and international financial contagion (Adrian and Shin, 2008; Hellwig, 2009). The crisis has also been related to the more recent development of securitization (Shin, 2010) and the originate-to-distribute model of bank lending (Purnanandam, 2010)[2]. Against this background, our paper focuses on the effects of one type of rescue measure, namely guarantee schemes for banks' long-term funding. We analyze the new market of government-guaranteed bank debt, which gave banks and other financial institutions an important source of funding when the credit market virtually dried up in the wake of the Lehman default. Government guarantees are considered to have been successful in achieving their main purpose, namely enabling banks to tap bond markets and roll-over their maturing debt, by favoring not only guaranteed but also non-guaranteed issuance. Total bank issuance, regardless of composition, has increased since the fourth quarter 2008, and while this is not itself proof of the effectiveness of guarantees, there is a broad consensus that guaranteed bonds have more than offset a decline in non-guaranteed debt issues (IMF, 2010). In addition, public rescue schemes have indirectly bolstered banks' ability to raise funds without guarantees, by reducing their "funding liquidity risk". Together with other rescue measures, the guarantees have helped avert a "worst case scenario" of chain-reaction debt defaults by major banks.

[1] The calculation uses the regression coefficients and deducts from the maximum spread (143 basis points) the following amounts: 0 basis points because of Italy's less than triple-A sovereign rating, 0 points because of a high sovereign CDS, 18 points for the small ratio to GDP of total rescue packages, 8 points for the large sheer size of the guarantee commitment, 7 points because MPS and Unicredit had a low CDS spread, 9 points because the bond has a large issuance volume, 0 points because the bonds are not short term, 0 points since the bonds were issued under favourable market conditions. Since there is no precise information available about promptness of reimbursement, the 17 basis points representing that coefficient determines the range of 76-94 basis points.

[2] For a collection of comments and discussions on the crisis see Felton and Reinhart (2009). Empirical analyses of the effects of the announcement of the intended and implemented rescue measures are provided by Ait-Sahalia et al. (2009) and Fratianni and Marchionne (2009).

At the same time, however, the guarantees might have had a number of undesirable side effects and introduced some distortions in the corporate debt markets. First and foremost is the significant tiering of the issuance spreads paid by banks from different countries. Banks with the same rating but different nationality have paid markedly different spreads at issuance. In some cases, banks with better ratings have paid much larger spreads than worse-rated counterparts. For A-rated banks the range is more than 120 basis points (from 0 for some US banks to over 120 basis points for some Spanish banks).

Our econometric estimates show that to a large extent the differences in spreads reflect some country-specific characteristics (such as the sovereign rating and the promptness of payments in case of default), whereas bank-specific factors (such as credit risk) and issue-specific factors (such as maturity) play only a minor role. This is emblematic of the distortions that may stem from government intervention in a free market "weak" banks from "strong" countries may have access to cheaper funding than "strong" banks from "weak" countries. Such a pricing of risk is inconsistent – at least theoretically – with a "level playing field" and implies an inefficient allocation of resources, in that weak banks can attract more funds than sounder and more deserving banks.

References

1. Acharya V.V. and M. Richardson (2009). *Restoring Financial Stability*, John Wiley & Sons.
2. Ackermann J. (2008). "The subprime crisis and its consequences", *Journal of Financial Stability*, Vol. 4, No. 4, pp. 329-337.
3. Adrian T. and H.S. Shin (2008). "Liquidity and Financial Contagion", *Financial Stability Review*, Banque de France.
4. Aït-Sahalia Y., J. Andritzky, A. Jobst and N. Tamirisa (2009). "How to Stop a Herd of Running Bears? Market Response to Policy Initiatives during the Global Financial Crisis", IMF Working Paper No.204.
5. Collin-Dufresne P., R.S. Goldstein and J. Spencer Martin (2001). "The Determinants of Credit Spread Changes ", *Journal of Finance* , Vol. 56, No. 6, pp. 2177-2207.
6. Deutsche Bank (2009). *Fixed Income Weekly*, several issues, January to May.
7. Driessen J. (2005). "Is Default Event Risk Priced in Corporate Bonds?", *Review of Financial Studies*, Vol. 18, No. 1, pp. 165-195.
8. Eichengreen B., A. Mody, M. Nedeljkovic and L. Sarno (2009). "How the Subprime Crisis went Global: Evidence from Bank Credit Default Swap Spreads", NBER Working Paper No. 14904.
9. Elton E.J., M.J. Gruber, D. Agrawal and C. Mann (2001). "Explaining the Rate Spread on Corporate Bonds", *Journal of Finance*, Vol. 56, No. 1, pp. 247-277.
10. European Central Bank (2009). *EU Banks Funding Structures and Policies*, Frankfurt am Main.
11. Felton A. and C.M. Reinhart (2009). *The First Global Financial Crisis of the 21st Century*, VoxEU.org Publication.
12. Fratianni M. and F. Marchionne (2009). "Rescuing Banks from the Effects of the Financial Crisis", MoFiR WP No. 30.
13. Hellwig M.F. (2009). "Systemic Risk in the Financial Sector: An Analysis of the Subprime-Mortgage Financial Crisis", *De Economist*, Vol. 157, No. 2, pp. 129-207.
14. IMF (2010). *Global Financial Stability Report*, October.
15. King M. (2009). "Time to buy or just buying time? The market reaction to bank rescue packages", BIS Working Paper No. 288.
16. 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 Paper No. 48.
17. Purnanandam, A.K. (2010). "Originate-to-Distribute Model and the Sub-Prime Mortgage Crisis", AFA 2010 Atlanta Meetings Paper.
18. Rose, K.R. and M. Spiegel (2009). "Cross-country Causes and Consequences of the 2008 Crisis: Early Warning", CEPR Discussion Paper Series No. 7454.
19. Roubini, N. and M Richardson (2009). "There's virtue in Geithner's vague bank plan", *The Wall Street Journal*, 19 February.
20. Shin H.S. (2010). "Financial Intermediation and the Post-Crisis Financial System", BIS Working Paper No. 304.