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by Aviram Levy and Andrea Zaghini

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THE PRICING OF GOVERNMENT-GUARANTEED BANK BONDS

by Aviram Levy* and Andrea Zaghini**

Abstract

We examine 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. We describe the evolution and the pattern of bond issuance across countries to assess the effect of the schemes. Then we 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 (credit risk, size of rescue measures, timeliness of repayments) and not those of the issuing bank or of the bond itself. In particular, the creditworthiness of the guarantor (measured by the sovereign rating and CDS) itself accounts for almost a third of the spread paid by the "weakest" issuer.

JEL Classification: G12, G18, G21, G28, G32.

Keywords: banks, corporate bonds, financial crisis, government guarantees.

Contents

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1. Introduction[1]

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 standalone actions directed at individual distressed institutions and system-wide support programmes. 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 securitisation) 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.[2]

The adoption of debt guarantee programmes was internationally coordinated and synchronised. 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-October 2009, almost 1200 bonds totalling the equivalent of €800 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 assessing

[1] We are indebted to Fabio Panetta for invaluable discussions and suggestions. We would like to thank P. Angelini, G. Grande, M. Manna, J. Marcucci and R. Violi for useful comments and Andrea Cardillo for excellent research assistance. The paper does not necessarily reflect the views of Banca d'Italia.

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

whether the guarantees achieved their goal of reviving medium-term funding for banks when other major sources of liquidity were almost completely frozen. Second, we seek to detect possible market inefficiencies, with a special focus on investors' pricing of the 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 CDS) accounts *per se* for over 30 per cent 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. Such a pricing of risk is inconsistent with a "level playing field" and may lead to an inefficient allocation of resources.

The paper is organised as follows. Section 2 describes the evolution and the patterns of guaranteed bond issuance across countries and seeks to assess the effectiveness of the guarantee schemes in reviving bank funding. Section 3 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 4 draws some conclusions.

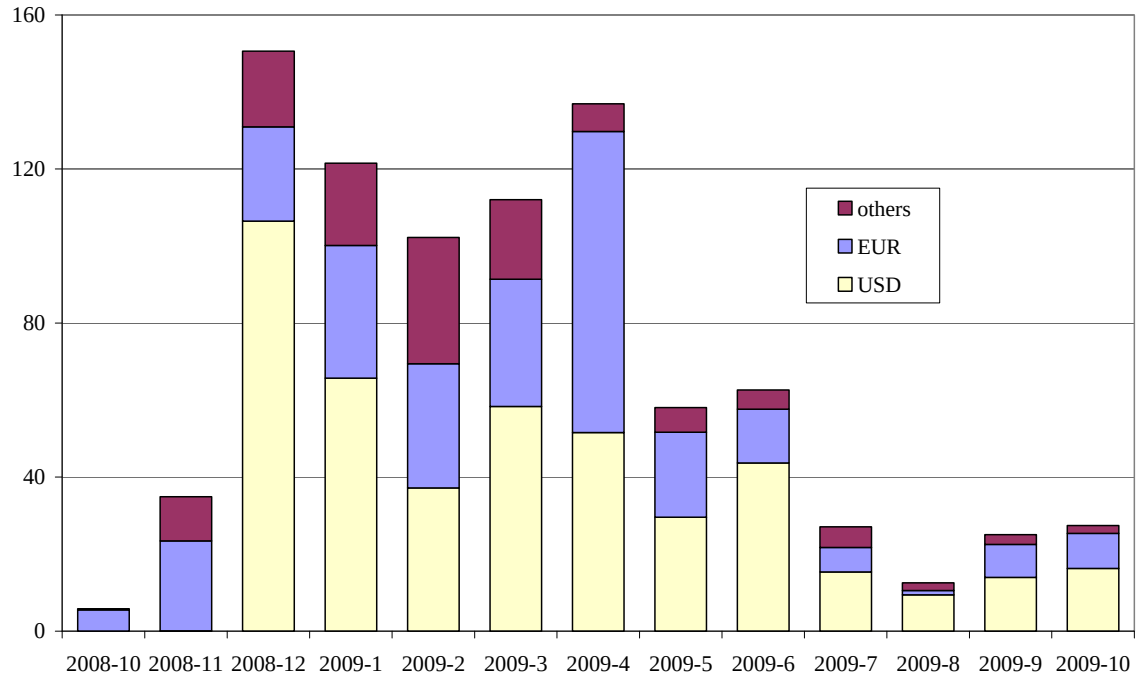
2. Main market characteristics

2.1 Market size and participants

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–November 2008 the volume was relatively modest, as only European banks were issuing, between December 2008, when US and Australian financial institutions started to issue, and April 2009 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 May and June 2009, issuance of these bonds was less buoyant, reflecting a return to more stable market conditions and an increase in investors' appetite for risk. Starting in July issuance shrank considerably.

Figure 1: Guaranteed bond issuance



Note: Billions of euro equivalent.
Source: Bloomberg

For a number of reasons, 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 limited guarantees to bonds with a maximum maturity of 3 years, though some allowed 5-year maturities. Consequently a large amount of bonds will expire in 2012 (around €300 billion, representing 40 per cent of all bond issuance), suggesting that funding problems may well arise in that year.

Most of the guaranteed issuance was accounted for by just a few countries. The United States leads in volume (Table 1), in part because US guarantees are automatic for all banks and all bond issues, unless the bank explicitly opts out. Robust guaranteed issuance was also recorded in the United Kingdom, France, Germany and Australia. Another group of countries (the Netherlands, Spain, Ireland, Sweden, Denmark and

Austria) issued smaller amounts, in a range of €17 billion to €36 billion. In the other countries issuance was smaller.

Table 1: Bond issuance in individual countries

Country	Total issuance[1]	Number of issuers	Number of bonds issued	Average size of bonds[1]	Average maturity at issuance[2]	Take-up rate[3]	Rollover ratio[4]
Australia	80	17	276	0.3	36	na	2.7
Austria	19	5	20	0.9	42	25	3.1
Belgium	4	1	4	0.9	23	21	1.0
Denmark	21	22	118	0.2	19	na	2.7
France	89	2	54	1.7	28	34	0.3
Germany	116	10	37	3.1	19	29	0.5
Ireland	36	8	109	0.3	16	100	0.4
Luxemburg	1	1	2	0.3	21	16	na
Netherlands	35	5	30	1.2	40	18	1.6
New Zealand	5	7	22	0.2	40	na	na
Portugal	4	5	5	0.9	36	22	0.7
Spain	34	29	72	0.5	32	34	1.7
Sweden	17	4	68	0.2	31	13	1.5
United Kingdom	119	11	155	0.8	29	44	2.2
United States	204	42	191	1.1	31	11	1.5

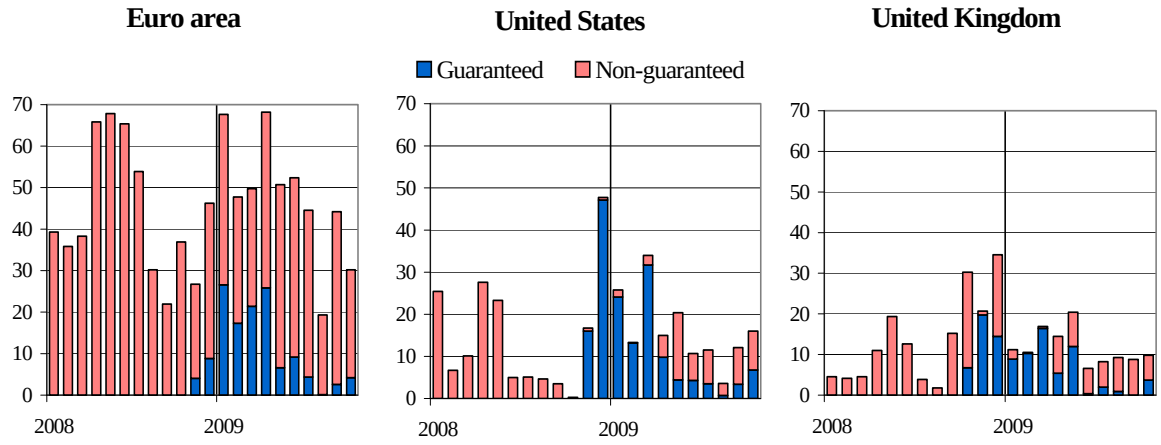
Source: Bloomberg, BIS, European Commission. Cut-off date: 31 October 2009.
(1) Billions of euro equivalent; (2) Average maturity in months; (3) Ratio of actual issuance to amounts pledged by authorities; (4) Ratio of new (guaranteed) bond issuance to expiring debt.

As far as the number of issuers is concerned, the US and Spain stand out for the high number of banks: as noted, all US issuing banks use the guarantees unless they expressly opt out, while for Spain the large number reflects the fragmentation of savings banks. 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 (276), followed by the US (191) and the United Kingdom (155). As for issue characteristics, national average size differs significantly, mainly reflecting the investor class at which the bonds were targeted: €3.1 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, with Swedish and Danish banks in particular opting for very small issues (€200 million).

As we can see from the second-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 (11 and

13 per cent, respectively), whereas the United Kingdom and especially Ireland recorded much higher take up rates (44 and 100 per cent respectively). 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 here is the "rollover ratio" for individual banks, i.e. the ratio, over the whole period, of new (guaranteed) bond issuance to expired debt. The ratios differ significantly between banks and countries. For 90 banks with bonds maturing between October 2008 and October 2009, the average ratio was 1.9. By country (last column of Table 1), the ratio was below 1 in just four countries (including France and Germany), between 1 and 2.2 in a group of countries including the United Kingdom, the US and Spain, and significantly higher, between 2.7 and 3.1, in Australia, Austria and Denmark.[3] These figures suggests that some institutions took advantage of the public guarantees by issuing a much more than the amount required to roll over their expiring debt.[4]

Figure 2: Gross issuance of bank bonds (billions euro)



Source: Dealogic. Cut-off date: 31 October 2009.

[3] As for the characteristics of single issuers, Panetta et al. (2009) argue that the banks that were most active in issuing guaranteed bonds are larger than average and have a high volume of writedowns. In contrast, the amount and the intensity of guaranteed issuance are not correlated with bank liquidity and capitalisation.

[4] There are two possible reasons why many banks were able to do so: one is that each country set a different date against which the stock of "existing debt" could be rolled over. The second is that the ceiling was set for individual financial institutions and not for groups, allowing each group to issue bonds under different "hats".

Government guarantees are considered to have been successful (see IMF, 2009) in allowing banks to tap the markets and roll over their maturing debt, which was the main goal, by favouring not only guaranteed but also non-guaranteed issuance. Figure 2 shows that in the US, the euro area and the UK total bank issuance has increased since the fourth quarter 2008, regardless of composition. And although this is not in itself proof that the guarantees were effective – this would require a counterfactual or an equilibrium model of bond issuance – there is a consensus among policy makers and practitioners that the guarantees have been useful, either because guaranteed bonds have more than offset a decline of non-guaranteed debt or because rescue schemes indirectly boosted the banks' ability to raise funds without guarantees by reducing their "funding liquidity risk" (i.e. the risk that the bank cannot roll over its debt).

2.2 The role played by institutional factors

Three major policy-determined institutional factors have affected the supply of and the demand for guaranteed bonds. The supply has been critically shaped by the pricing and the optionality of the guarantees, whereas the demand was affected by national provisions on the promptness of guaranteed disbursement in case of default.

As noted, all government guarantees on bank liabilities entail a fee for the insurance, but the fee mechanisms differ. Where the US authorities charge a flat fee that depends only on the bond's maturity, in Europe the cost is also based on each bank's CDS spread over a given time window. One implication of the different pricing mechanisms is that Europe's market-based fee can be likened, at least in part, to a risk-based tax on banks (guarantors are likely to break even, and may even profit). In contrast, the American flat-fee system is similar to a subsidised system, in which the government and "strong" banks subsidise "weak" banks. But apart from France, which levies a fixed guarantee fee of only 20 basis points above the median CDS over a pre-defined time window, the international variation is relatively modest, the average fee ranging from 78 basis points in Sweden to 114 in the UK (see Table 2). [5]

[5] More in detail, in the US the current 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 the euro-area countries follow the ECB guideline, which for bonds with maturity of over one year recommends a flat fee of 50 basis

Table 2 Characteristics of guarantee schemes by country

Country	Fees to Government[1]		Grace period[2]	
	Range	*Average*	*Interest payment*	*Principal payment*
Australia	70-150	101	10	10
Austria	92-123	102	5-30	5-30
France	51-56	53	na	na
Germany	68-95	91	30	30
Ireland	na	na	14-15	7
Netherlands	73-93	85	14-30	7-30
Portugal	96-101	99	10-14	10-14
Spain	89-130	107	na	na
Sweden	75-83	78	10-30	10-15
United Kingdom	95-150	114	14-30	7-14
United States	100	100	na	na

Source: Royal Bank of Scotland (2009)
(1) Basis points per year; (2) Days.

The second important difference between the American and European guarantee schemes is the optionality of participation. In the US, financial institutions participate automatically unless they opt out; if they do not opt out, then all their senior unsecured liabilities are insured by the FDIC (*Federal Deposit Insurance Corporation*). In Europe, by contrast, participation is optional for each single issue. The difference clearly affects the take-up rate of the guarantees (see Table 1). Moreover, it will probably influence the medium-term ability of the banks to end their reliance on government support. The European opt-in mechanism will probably lead to the outcome known in literature as "separating equilibrium", possibly revealing to markets which intermediaries are "stronger" and which are "weaker" and so allowing banks to raise debt and equity accordingly. In contrast, the US opt-out system is more likely to lead to a "pooling equilibrium", in which all institutions are

points augmented by each bank's median five-year CDS spread observed over a specified time window (January 2007–August 2008). Australia, the fourth largest issuer of guaranteed bonds after US, UK and Germany, differs slightly in that it applies a rating-related fee (ranging from 70 basis points for AAA-rated institutions to 150 basis points for BBB-rated or unrated bank).

very likely to ask for guarantees, preventing markets from discriminating among them on the basis of credit risk. In this regard, Acharya and Sundaram (2009) suggest that the "separating outcome" is more likely to ensure that lending markets will continue to function in an orderly way once the guarantees are removed.[6]

A third important difference across countries is the promptness of payments in case of default: as we shall see in the next section, this is an important determinant of the spread that investors require on guaranteed bonds. Among those governments that have provided details on the way they would honour the guarantee, two main approaches have been followed. On the one hand, France has devised a prepayment structure, setting up an agency (SFEF) that issues the bonds on behalf of individual institutions. Banks that want to issue through the agency and receive the issuance proceeds must post a certain amount of collateral. In order to ensure timely payments, the banks get a collateral call from the agency at least 13 days prior to any payment date. The participating bank has to transfer the required amount to the agency at least three days in advance; otherwise the agency asks the government to activate the guarantee, and the government makes any shortage good in one day. So the funds needed to service the bond will be available at least two days before the payment date.

Other countries have adopted a different approach, in which the guarantor steps in on request only after the issuer has failed to pay on the due date. Some countries, such as Australia, Germany, Ireland and the United Kingdom, provide details on the procedures in case of default and refer explicitly to a grace period before the guarantee becomes effective: those of Australia and Ireland are shorter, those of Germany and the UK longer (see Table 2). Other countries (Austria, Netherlands, Portugal and Sweden) have announced the length of the grace period but not the details of the reimbursement procedure.

2.3 The size of the subsidy implicit in guarantees: an illustration

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 issuance under the government scheme instead of directly to the market. Since banks had

[6] The authors do acknowledge, though, that their assessment is predicated on a "benign scenario" for the financial crisis. Should the crisis deepen further (a "pessimistic scenario"), the "separating outcome" could push some weak banks into bankruptcy, resulting in a greater burden for taxpayers.

also incurred a cost for the public guarantee (the annual fees are reported in Table 2), we proceeded as follows. For each fixed-rate bond issued with the government guarantee 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.

Table 3: Net subsidy implicit in guaranteed bond issuance

Bank	Total guaranteed issuance[1]	Total saving over bond's life	Average saving per quarter	Saving in % of Q2 profits	Sample size as a % of guaranteed debt
			USA		
JPMorgan Chase	40659	2261	200	7.3	49.8
Citigroup	44600	4737	424	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	188	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
LeasePlan	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, millions of euro.
(1) Total issuance between October 2008 and June 2009.

The estimated saving is then calculated in 5 steps. First, on the issuance day of each fixed-rate guaranteed bond, the yield to maturity (YTM), augmented by the fee paid by banks to government, is compared with that of the comparable non-guaranteed bond. Second, the difference between the two YTMs is multiplied by the outstanding amount of the guaranteed bond, yielding the saving (or subsidy) per year. Third, the saving over the bond's life is calculated according to its maturity. Fourth, the saving on the total guaranteed fixed-rate debt issued by each bank is derived by totalling the saving accrued on each bond. Finally, an estimate of the subsidy is derived also for floating-rate guaranteed bonds: given that the YTM is usually not available for floating-rate bonds, it is assumed that the same "percentage subsidy" derived as above holds for guaranteed floating-rate debt as well (e.g. if

the average subsidy is 3 percentage points we apply this to the outstanding amount of guaranteed floating-rate bonds).

Table 3 shows the results for 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.[7] 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 Q2 2009 profits. For 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 programmes, which in practice may subsidise large and complex financial institutions, the very ones that some commentators hold responsible for the crisis.[8] 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 (Roubini and Richardson, 2009).

3. 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.[9] 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

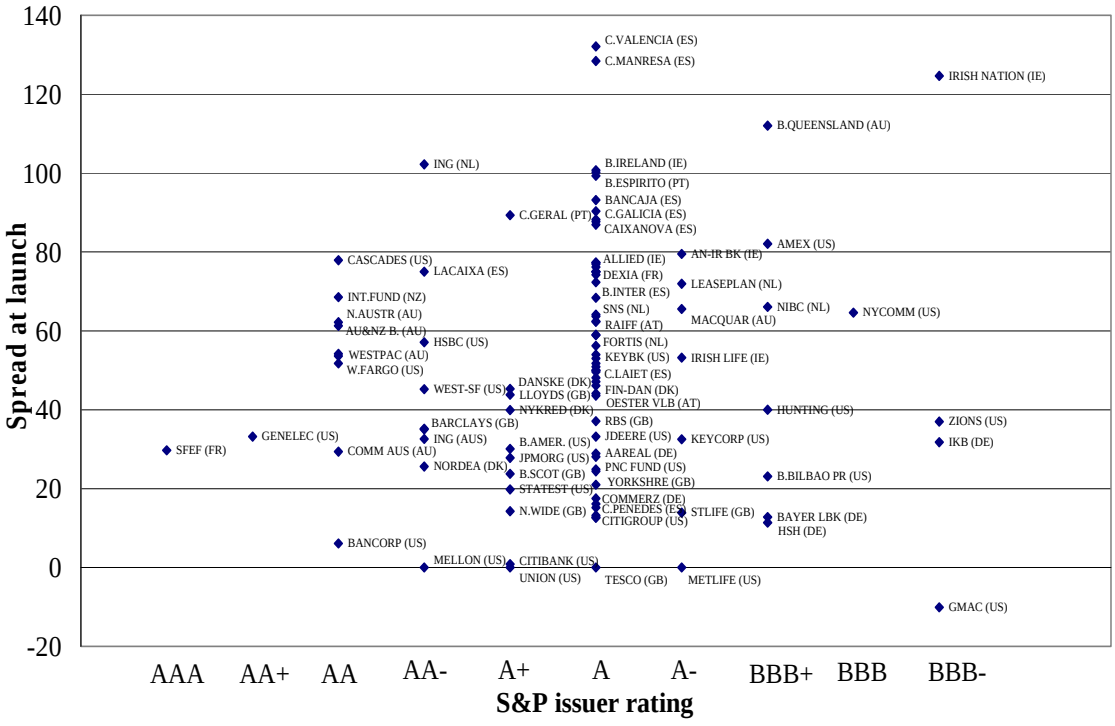
[7] Note that for Morgan Stanley, which recorded close to zero profits in that quarter, the government subsidy of $280 million made the difference between loss and profit.

[8] For example, Wolf (2009) argues that "We are painfully learning that the world's mega-banks are too complex to manage, too big to fail and too hard to restructure"; see also Partnoy (2009).

[9] 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.

countries pay larger spreads than weaker banks in other countries. Figure 3 shows how wide the range of spreads can be. For example, 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 Commercial 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.

Figure 3: Dispersion of spreads at launch on guaranteed bonds[1]



1 Includes guaranteed bonds issued in the period October 2008–October 2009. Averages, basis points.
Sources: Bloomberg; Dealogic.

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).

Table 4: 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
Promptness of payments in case of default	3	Fast, medium, slow
Market conditions	4	2008Q4; 2009Q1; 2009Q2; 2009Q3

In order to disentangle these factors, we run the following cross-sectional regressions on 512 guaranteed bonds issued in the 13-month period from 1st October 2008 to 31st October 2009 for which data on the spread over the asset swap at launch are available:

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

where D_j^{BANK} are dummies 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} dummies associated with the guarantor and the guarantee program (rating, CDS spread, guarantee size, resources committed, promptness of reimbursement), D_z^{MKT}

dummies about the market conditions (time dummies). Table 4 reports the exogenous variables considered in the regressions and their breakdown into dummies.[10]

Table 5 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 favours 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 5: OLS regression results

Dependent Variable: SPREAD AT LAUNCH

Variable	Coefficient	Std. Error	t-Statistic
Constant	133.3 ***	10.470	12.733
Rating Gov AAA	-32.5 ***	5.450	-5.959
Sovereign CDS LOW	-8.3 *	4.522	-1.832
Commitment HIGH	13.3 ***	4.189	3.186
Bond Scheme HIGH	-9.9 ***	3.393	-2.910
Good timeliness	-16.6 ***	5.671	-2.920
Issuance currency Euro	1.9	4.347	0.445
Issuance currency USD	1.1	3.800	0.280
Maturity LOW	-9.8 **	3.958	-2.468
Volume HIGH	-6.5 *	3.420	-1.895
Issuance rating HIGH	0.4	3.181	0.118
Rating issuer AA	4.4	3.628	1.214
Rating issuer AAA	-2.1	8.080	-0.266
Issuer is a bank	0.9	3.486	0.254
CDS HIGH	13.3 *	6.902	1.921
Single issuance	-2.4	4.585	-0.527
2009 Q2&Q3	-18.9 ***	3.333	-5.664
R-squared	*0.29*		
Included observations	*512*		

Note: One, two and three asterisks denote statistical significance at 90%, 95% and 99%, respectively.

[10] 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. 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.

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 second half of the issuance period suggests that market conditions were more favourable in the second and in the third quarter of 2009.

Table 6: OLS regression results

Dependent Variable: SPREAD AT LAUNCH

Variable	Coefficient	Std. Error	t-Statistic
Constant	136.4 ***	9.446	14.441
Rating Gov AAA	-31.8 ***	5.142	-6.192
Sovereign CDS LOW	-9.0 **	4.313	-2.086
Commitment LOW	-14.0 ***	3.891	-3.594
Bond Scheme HIGH	-8.6 ***	3.072	-2.813
High timeliness	-17.2 ***	5.352	-3.212
Maturity LOW	-9.3 **	3.903	-2.393
Volume HIGH	-6.7 **	3.259	-2.052
CDS LOW	-13.4 *	6.832	-1.956
2009 Q2&Q3	-19.4 **	3.174	-6.124
R-squared	*0.28*		
Included observations	*512*		

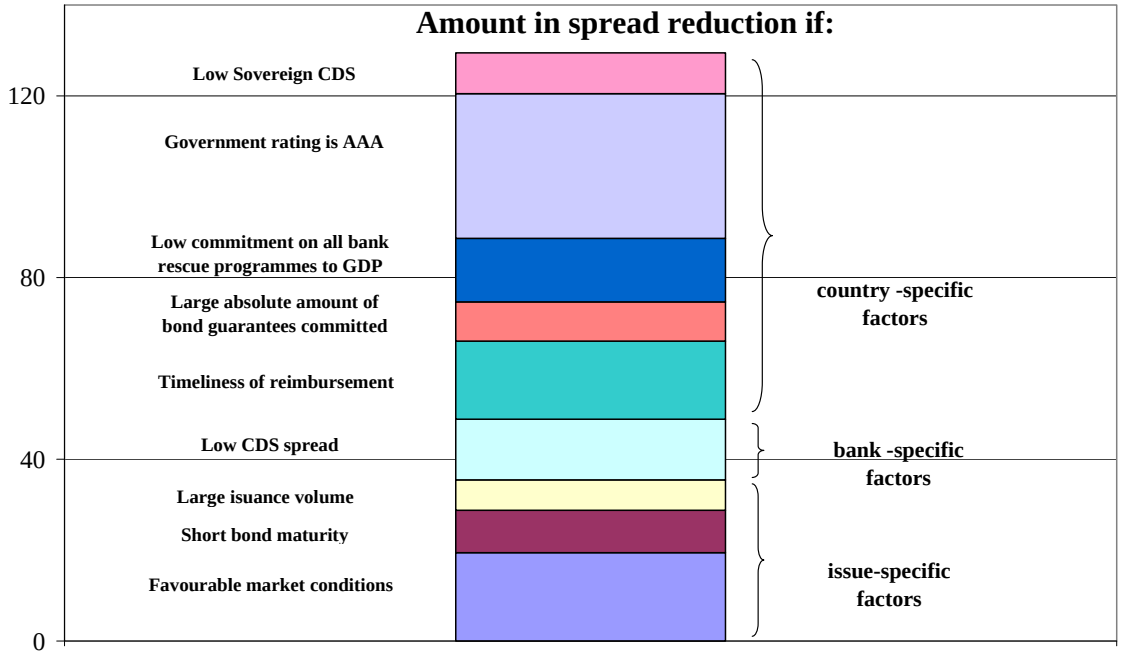
Note: One, two and three asterisks denote statistical significance at 90%, 95% and 99%, respectively.

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.[11] The results, shown in Table 6, confirm the previous ones (a graphical representation is given in Figure 4). The height of the bar is the sum of all the regression coefficients (129 basis points)

[11] 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 6 even when the number of regressors to be included in the equation is left free.

except the intercept.[12] The layers of the bar show the contribution of each variable to the overall spread (represented by the regression coefficients of Table 6). 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.

Figure 4: Spread decomposition from OLS regression analysis



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.

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 40 basis points (over 30% 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

[12] 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).

of payment in the event of default), the country-specific factors increase to 80 basis points (62% of the possible total). The characteristics of the issuer contribute just 13 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 16 basis points: an issuer could reduce the spread by issuing the bond in a large volume (7 basis points) and by choosing shorter maturities (9 basis points). Finally, a further 20 basis points could be saved by issuing the bond under favourable market conditions.[13]

Table 7: OLS regression results for 2006

Dependent Variable: SPREAD AT LAUNCH

Variable	Coefficient	Std. Error	t-Statistic
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	-36.8 ***	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	8.4	6.673	1.256
Rating issuer AAA&AA+	-9.9 *	5.350	-1.857
CDS HIGH	1.5	7.644	0.199
Single issuance	-3.8	8.350	-0.451
2006 Q1&Q2	-29.2 ***	4.713	-6.187
R-squared	*0.35*		
Included observations	*336*		

Note: One, two and three asterisks denote statistical significance at 90%, 95% and 99%, respectively.

In order to check the robustness of these results, 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 7, which shows, as expected, that

[13] As an aside, note that the value of the intercept is just 7 basis points higher 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 a spread over the swap rate of less than 10 basis points.

the coefficients of the variables associated with the government are non-significantly 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.

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 57 and 74 basis points over the swap rate.[14] 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

[14] The calculation uses the regression coefficients and deducts from the maximum spread (136 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, 14 points for the small ratio to GDP of total rescue packages, 9 points for the large sheer size of the guarantee committment, 13 points because MPS and Unicredit had a low CDS spread, 7 points because the bond has a large issuance volume, 0 points because the bonds are not short term, 19 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 57-74 points.

199-216 basis points over swaps for MPS and 201-218 for Unicredit, slightly more than the cost of their non-guaranteed issues.

4. Conclusion

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, 2008). The crisis has also been related to the more recent development of securitization (Shin, 2009) and the originate-to-distribute model of bank lending (Purnanandam, 2009).[15] Against this background, our paper focuses on the effects of one type of rescue measure, namely guarantee schemes for banks' long term funding. We analyse 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 (see IMF, 2009), namely enabling banks to tap bond markets and roll over their maturing debt, by favouring 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. 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.

At the same time, however, the guarantees have had a number of undesirable side effects and produced distortions. First and foremost is the significant tiering of the issuance

[15] 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).

spreads paid by banks from different countries. Banks with the same rating but different nationality have been subject to markedly different spreads. 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 – "weak" banks from "strong" countries may have access to cheaper funding than "strong" banks from "weak" countries. Such a pricing of risk is inconsistent with a "level playing field" and implies the inefficient allocation of resources, in that weak banks can attract more funds than sounder and more deserving banks.

One fundamental implication of the paper is that the distortions induced by government intervention should have been taken into account in designing the guarantee schemes. To ensure a level playing field internationally, the guarantees could have been priced to take country-specific factors into account. For instance, "weaker" countries could have been allowed to charge lower fees to their banks, in particular in the euro area, in order to offset substantial differences in issuance costs that are unrelated to the characteristics of the issuing bank itself.

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