

# Government Guarantees and Bank Risk Taking Incentives <sup>\*</sup>

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## ABSTRACT

This paper analyzes the effect of government guarantees on bank risk taking incentives. We exploit the removal of state guarantee for German Landesbanken which results in a deterioration in their credit rating, higher funding costs, and a loss in their franchise value. This removal was announced in July 2001 and became effective in 2005 and Landesbanken were still allowed to issue state-guaranteed bonds during the four-year transition period. We analyze the lending behavior of Landesbanken around the announcement of the removal of the guarantees relative to non-protected private banks using a difference-in-difference framework. We find that Landesbanken significantly increase risk after July 2001 relative to the period before and relative to other banks. Analyzing a subsample of loans issued by Landesbanken, we show that in particular Landesbanken with the highest expected decrease in franchise value increase risk. We also document that Landesbanken significantly increased their bond issuance volume during the transition period. Our results are consistent with theories on gambling and provide implications for the current debate on the optimal removal of government guarantees.

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# 1. Introduction

Governments and central banks around the world have reacted to the financial and sovereign debt crisis, which has shattered financial markets since the summer of 2007, by providing guarantees and injecting significant amounts of liquidity and capital into banks and the financial system. The main motivation behind these measures has been the fear of a systemic meltdown with substantial consequences for the economy as a whole. The related academic literature dates back at least to the question of credit rationing as in Stiglitz and Weiss (1981) and the work on non-monetary transmission following Bernanke (1983) and Bernanke and Blinder (1992, 1998). This transmission has become of particular interest in the wake of the current crisis in which liquidity and solvency problems of banks led to a substantial reduction in lending. Ivashina and Scharfstein (2010) and Puri, Rocholl, and Steffen (2011) show that banks decrease credit supply to both corporate and retail borrowers, which in turn leads to a decrease in corporate investment, as shown by Duchin, Ozbas, and Sensoy (2010). Still, it is wide consensus that the interventions by governments and central banks - despite their negative externalities (e.g. a reduction of market discipline and lower funding costs as in Flannery, 2010) and substantial costs to taxpayers - have saved the world-wide economy from much more substantial damage and detrimental consequences.<sup>1</sup>

It is far less clear what happens when these interventions and in particular explicit guarantees are withdrawn and whether and how banks subsequently change their lending and overall risk taking behavior. The removal of government guarantees has a significant impact on a bank's funding costs and thus its franchise value. As argued by Kashyap, Stein, and Hanson (2010) “...*the most important ... competitive advantage that banks bring to bear ... is the ability to fund themselves cheaply. Thus if Bank A is forced to adopt a capital structure that raises its cost of funding relative to other intermediaries by only 20 basis points, it may lose most of its business.*” Such a decrease in franchise value may increase the bank's incentives to gamble, as shown theoretically by Hellmann, Murdock, and Stiglitz (2000). The bank trades off the rent from gambling and the franchise value that it loses if the gamble fails. Thus, the lower the franchise value, the higher the incentive to gamble. Consequently, banks that lose their government guarantees may start gambling as a reaction to the loss of their funding cost advantage.

The removal of explicit government guarantees for German Landesbanken in July 2001 provides an ideal laboratory to study the risk-taking behavior of banks upon the loss of government guarantees. Deposits and other liabilities of Landesbanken were traditionally guaranteed by the federal state in which a Landesbank is

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<sup>1</sup>The President of the United States Barack Obama summarized in 2009: “... *(T)he unprecedented intervention of the federal government to stabilize the financial markets and prevent a wider collapse...*”

domiciled. Landesbanken thus enjoyed lower financing costs than privately owned banks with whom they compete in particular in the corporate lending business. The European Commission and the German government agreed in July 2001 that state guarantees for Landesbanken had to be abandoned. The sudden and surprising decision increased the expected refinancing cost for Landesbanken and thus led to a decrease in franchise value. At the same time, during a transition period of four years until 2005, Landesbanken were allowed to issue bonds that were still fully guaranteed.

Using this exogenous event, we are able to address a series of novel questions. Do borrowers' risk profiles as well as lending terms - in particular interest rates - change after the removal of government guarantees? Is there a relation between a bank's likelihood to default and the subsequent change in lending behavior? Do we observe an excessive increase in bond issuances during the four-year transition period? And, do Landesbanken with the highest expected decrease in franchise value issue more debt relative to other Landesbanken? These are important questions and of particular relevance in light of the guarantees as well as liquidity and capital injections provided by governments and central banks around the world and the timing of their exit strategies.

First, we analyze whether there is a change in lending behavior, using a comprehensive loan-level dataset of bank loans to corporate customers. In particular, we examine whether Landesbanken change their lending practices to corporate customers in Germany after July 2001 relative to all other banks. We concentrate on two measures to capture the lending practices used by these banks. The first measure is the riskiness of a customer as measured by the Z-Score (MacKie-Mason, 1990).<sup>2</sup> The second measure is the interest rate charged to each customer as measured by the All-In-Spread-Drawn (AISD). Controlling for a number of borrower and loan characteristics, we find that Landesbanken do not differ from other banks in their lending behavior before July 2001: The riskiness of the borrowers and the interest rates they are charged are not significantly different. In contrast, after July 2001, the riskiness of borrowers at Landesbanken is significantly higher than that at other banks. At the same time, this higher riskiness is not accompanied by a simultaneous increase in interest rates that these borrowers are charged. Rather to the contrary, Landesbanken now charge significantly lower interest rates in comparison to other banks. Taken together, while Landesbanken do not differ in their lending behavior from other banks before July 2001, they lend to riskier borrowers without being adequately compensated for this additional risk. These results suggest that the removal of state guarantees results in a substantial increase in Landesbanken's risk taking.

Second, we test whether there is cross-sectional variation in the lending behavior of Landesbanken, dependent on their relative strength and thus their anticipated change in ratings and franchise value after the removal

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<sup>2</sup>In the robustness section, we use other measures of customer riskiness.

of state guarantees. We analyze whether the change in lending behavior is most pronounced among those Landesbanken that are hit hardest. We thus divide Landesbanken into two groups: The first group comprises those Landesbanken with a large anticipated rating change and the second group those Landesbanken with a small anticipated change. We then analyze again the riskiness of customers and the interest rates charged to these customers in the first group of banks before and after July 2001 relative to those in the second group of banks. We find that loans of both groups do not differ significantly before July 2001. However, Landesbanken with a large decrease in franchise value grant loans to significantly riskier borrowers after July 2001 than Landesbanken with a small decrease. Furthermore and similar to the results for the comparison of Landesbanken to other banks lending to German firms, this increase in borrower riskiness is not accompanied by a simultaneous increase in interest rates. In fact, the interest rates charged to borrowers of Landesbanken with a large decrease in franchise value dropped after 2001 relative to before and in comparison to the interest rate charged by Landesbanken with a small decrease. These results suggest that in particular Landesbanken with the highest decrease in franchise value change their lending practices and start lending to riskier borrowers and at lower rates. These results are robust to the inclusion of a variety of borrower and loan characteristics.

Finally, we analyze how the four-year transition period affects the issuance behavior by Landesbanken. We document that it gave them an incentive to issue substantial amounts of bonds before their funding cost advantage disappears, with the funding cost advantage even outweighing the additional carry costs from keeping excess liquidity.<sup>3</sup> The increase in bond issuances was particularly strong for those Landesbanken that faced the highest expected loss in franchise value. We then document another way in which Landesbanken significantly increased risk. Landesbanken used off-balance sheet vehicles to invest substantially and overproportionally in U.S. subprime mortgages, with negative consequences for their long-term viability. Using the funds obtained during the four-year transition period as liquidity backstop for these vehicles enabled them to obtain significantly larger amounts of short term funding (with highest ratings) than it would have been otherwise possible. This final result indicates that it was not optimal to allow for such an extended transition period.

In sum, our analysis suggests that the removal of government guarantees and the significant loss in franchise value leads to more risk-taking by banks, as evidenced by a riskier pool of borrowers and lower interest rates charged to these borrowers. This effect is most pronounced for those banks that face the largest decrease in franchise value. The results are thus consistent with theories on gambling, and they are robust to a variety of loan and borrower control variables and to several different measures of customer riskiness. Moreover, our

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<sup>3</sup>As noted by Fitch Ratings (2006): “Fitch estimates the additional expense from holding excess liquidity to be between around 0.5 percent and 8 percent of published net income... However, at most banks this cost is more than compensated for by having to issue less unguaranteed (and more expensive) long-term bonds...”

results suggest that banks' behavior is linked to the way in which they exit guarantees.

Our paper makes contributions to several strands of the literature. First, it relates to the literature that analyzes banks' risk taking. An increase in risk taking has been documented in various settings, as for example in the context of the S&L (savings and loan) crisis in the United States, e.g. Kane (1989), Dewatripont and Tirole (1994), Cole, McKenzie, and White (1995), and Hellwig (1995), in the case of large commercial banks in the United States (Boyd and Gertler, 1994), for Swedish banks (Berglöf and Sjögren, 1998), and for a large subprime mortgage originator (Landier, Sraer, and Thesmar, 2011). We focus in our paper on a removal of explicit guarantees, which is the consequence of a legal decision, and analyze the effect on banks' risk taking.

Second, it contributes to the literature that examines the role of government guarantees during the financial crisis. Implicit government guarantees have been documented in various contexts and have been shown to affect access to credit (Puri, Rocholl, and Steffen, 2011) as well as risk taking of banks (e.g. Gropp, Hakenes, and Schnabel, 2010; Kacperczyk and Schnabl, 2011). Puri, Rocholl, and Steffen (2011) find that savings banks significantly reduce lending once their implicit guarantees to the Landesbanken have been utilized. Gropp, Hakenes, and Schnabel (2010) assess the effect of implicit future bail-out guarantees and find an elevated risk-taking behavior of competitor banks, however, not of the banks subject to the guarantee.<sup>4</sup> Kacperczyk and Schnabl (2011) analyze implicit guarantees granted by financial institutions that own mutual funds. Their evidence suggests that these implicit guarantees reduce risk taking. We take a different approach in our paper. As implicit guarantees are inherently difficult to measure, we focus on the removal of explicit government guarantees and consider the risk-taking behavior of banks after this removal.<sup>5</sup>

Finally, our paper is related to the literature on bank ownership. For example, Dinc (2005) shows that government-owned banks increase lending in election years relative to private banks. Sapienza (2004) finds that government-owned banks charge lower loan rates to otherwise identical firms. This effect is stronger if the political party is stronger. We find evidence that government-owned banks charge interest rates that are not statistically different from those charged by private banks. After the removal of the government guarantee has been announced, however, government-owned banks lend at lower rates and to, *ceteris paribus*, riskier firms.

The rest of the paper is organized as follows. Section 2 describes the institutional background and the methodology for our empirical analysis. Section 3 provides the data description and summary statistics. Section

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<sup>4</sup>Acharya, Drechsler, and Schnabl (2011) provide a different view on the effect of bank bailouts and model a feedback effect from the sovereign to the financial sector. In their model, if the sovereign has sufficiently large legacy debt, additional bank bailouts lead to reduction in the value of outstanding sovereign debt and a reduction in the value of government guarantees, i.e. the risk of the financial sector increases if sovereign risk increases.

<sup>5</sup>Gropp, Gründl, and Güttler (2011) use a similar experiment to analyze the change in risk taking by savings banks. However, the Sachverständigenrat (2004), a group of economists officially advising the German government and Parliament on economic policy issues, points out that savings banks should not be affected by the legal change because they refinance themselves mainly through deposits that are covered by deposit insurance.

4 gives the empirical results. Section 5 does robustness checks. Section 6 concludes.

## 2. Institutional Background and Methodology

### 2.1. Institutional Background

The German banking system is a three-pillar system, consisting of private commercial banks, cooperative banks, and public banks which are savings banks and Landesbanken. Lending to medium-sized and larger companies represents a major business activity of both private commercial banks and Landesbanken. Their market shares in the credit market between 2000 and 2007 amount to 27% and 19%, respectively (Deutsche Bundesbank, 2009). In 2001, 11 Landesbanken cover Germany's 16 federal states (see Figure 1 for a geographical representation and information about mergers during our sample period). Each Landesbank is owned by at least one federal state and by the savings banks domiciled in these states. Therefore, Landesbanken also act as central institutions for the savings banks in their region.<sup>6</sup>

[Figure 1]

Due to their public ownership Landesbanken as well as savings banks were characterized by two particular legal foundations providing state guarantees, namely guarantor's liability ("Gewährträgerhaftung") and maintenance obligation ("Anstaltslast"). The guarantor's liability implies that the government guarantees all of the banks' liabilities. Under the maintenance obligation the government has to capitalize the bank such that it can conduct its business as long as it exists. Given the unlimited guarantee of the state governments, the risk of default of the public banks was very low which was reflected in high credit ratings and low funding costs. Thus, the two closely related legal mechanisms provided a competitive advantage to the state-owned banks. The German private banks had tried several times to put the removal of the state guarantee on the agenda of the German government but did not succeed. In December 1999, they made the argument at the DG Competition of the European Commission that the state guarantee constitutes state aid and therefore violates Art. 87 of the EU treaty (Grossman, 2006). The detailed arguments were presented in July 2000. On January 26, 2001 the Commission opened a "formal investigation procedure". The first meeting between bank representatives, the German Ministry of Finance and the Commission took place on June 1, 2001. Very surprisingly, a compromise

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<sup>6</sup>In this respect, they are clearing houses for cashless transactions and provide services, such as the administration of the savings banks' liquidity reserves. They also offer services to the customers of savings banks, for instance for their foreign business, and grant loans in amounts that are too large to be financed by the savings banks themselves.

was already reached on July 17, 2001 (Grossman, 2006).<sup>7</sup> This compromise foresaw to replace the maintenance obligation and to abolish the guarantor’s liability. However, a grandfathering clause applied during a transition period of four years. Liabilities issued through July 18, 2001 were covered by guarantor’s liability. Liabilities assumed in the transition period between July 19, 2001 and July 18, 2005 and maturing no later than December 31, 2015 were also covered by the guarantor’s liability. Liabilities that were assumed after the transition period or during the transition period but maturing after December 31, 2015 were no longer covered by guarantor’s liability. Further, the maintenance obligation ended on July 18, 2005. The agreement is known as “Brussels’ agreement” (European Commission, 2002).<sup>8</sup> Figure 2 summarizes how the state guarantee applies to new bond issues of Landesbanken depending on their date of issuance and maturity.

[Figure 2]

## 2.2. Methodology

We analyze whether lending practices to corporate customers at Landesbanken change after the removal of their state guarantees in July 2001 relative to those of other banks that lend to German corporate customers. We use a difference-in-differences approach to analyze two questions. First, do Landesbanken provide credit to riskier borrowers after July 2001? Second, do Landesbanken adjust the interest rates to their borrowers accordingly? We thus use two sources of identifying variation: (i) the time before and after the announcement of the removal of state guarantees in July 2001, (ii) the group of Landesbanken that are affected by the removal of state guarantees and the group of other banks (i.e., Non-Landesbanken) that are not affected by this removal. We estimate the effects of the removal of state guarantees on lending practices using the conventional difference-in-differences methodology as in Gruber and Poterba (1994). Specifically, we estimate the following models for borrower risk and spreads:

$$\begin{aligned}
 Z\text{-Score}_i = & \beta_0 + \beta_1 \text{Landesbank}_i + \beta_2 \text{After.July.2001}_i \\
 & + \beta_3 (\text{Landesbank} * \text{After.July.2001})_i + \sum_{k=1}^n \beta_{Lk} (\text{Loan.Characteristics}_i) \\
 & + \sum_{k=1}^n \beta_{Bk} (\text{Borrower.Characteristics}_i) + \varepsilon_i
 \end{aligned} \tag{1}$$

$$AISD_i = \beta_0 + \beta_1 \text{Landesbank}_i + \beta_2 \text{After.July.2001}_i$$

<sup>7</sup>Given that in another complaint against the biggest Landesbank (WestLB) it had taken several years until a decision was made, the compromise was reached very suddenly (Grossman, 2006).

<sup>8</sup>This agreement is also referred to as “Brüsseler Konkordanz”.

$$\begin{aligned}
& +\beta_3(Landesbank * After.July.2001)_i + \sum_{k=1}^n \beta_{Lk}(Loan.Characteristics_i) \\
& + \sum_{k=1}^n \beta_{Bk}(Borrower.Characteristics_i) + \epsilon_i
\end{aligned} \tag{2}$$

where  $Z-Score_i$  is the Z-Score (MacKie-Mason, 1990) of loan  $i$ , as measured as the difference between a borrower's Z-Score from the mean value of the whole German corporate universe in the year in which the loan was granted. We use this difference in order to control for the trend of improving credit quality.  $AISD_i$  is the interest rate charged to this loan  $i$ .  $Borrower.Characteristics_i$  and  $Loan.Characteristics_i$  are controls for borrower and loan characteristics, such as the borrower's coverage ratio or the loan's maturity.  $Landesbank_i$  is an indicator variable that takes a value of one if a Landesbank is among the lead arrangers of the loan and a value of zero otherwise.  $After.July.2001_i$  is an indicator variable that takes a value of one if the loan is granted after the removal of state guarantees in July 2001 and zero otherwise. Finally,  $\epsilon_i$  is an error term. The key variable of interest is the interaction term  $Landesbank * After.July.2001$  as it captures the change in the behavior of Landesbanken after July 2001 relative to all other banks that lend to German corporate customers. Our inference is thus primarily based on the coefficient  $\beta_3$ .

In a subsequent analysis, we only consider the subset of loans originated by Landesbanken to analyze whether Landesbanken that expect the largest decrease in franchise value behave differently after 2001 relative to all other Landesbanken. Again, we have two sources of identifying variation: (i) the time before and after the announcement of the removal of state guarantees in July 2001, (ii) the group of Landesbanken with a high expected downgrade in 2005 and the group of Landesbanken with a low expected downgrade. The specific estimation is thus very similar to the one above:

$$\begin{aligned}
Z-Score_i &= \beta_0 + \beta_1 Landesbank.High.Downgrade_i + \beta_2 After.July.2001_i \\
& + \beta_3(Landesbank.High.Downgrade * After.July.2001)_i + \sum_{k=1}^n \beta_{Lk}(Loan.Characteristics_i) \\
& + \sum_{k=1}^n \beta_{Bk}(Borrower.Characteristics_i) + \epsilon_i
\end{aligned} \tag{3}$$

$$\begin{aligned}
AISD_i &= \beta_0 + \beta_1 Landesbank.High.Downgrade_i + \beta_2 After.July.2001_i \\
& + \beta_3(Landesbank.High.Downgrade * After.July.2001)_i + \sum_{k=1}^n \beta_{Lk}(Loan.Characteristics_i) \\
& + \sum_{k=1}^n \beta_{Bk}(Borrower.Characteristics_i) + \epsilon_i
\end{aligned} \tag{4}$$

where the new variable is *Landesbank.High.Downgrade<sub>i</sub>*, which comprises the four Landesbanken active in the loan market with the highest rating downgrades and our inference is therefore based again on the interaction term, *Landesbank.High.Downgrade \* After.July.2001*, and the coefficient  $\beta_3$ .

### 3. Data Description and Summary Statistics

To gain insights into the loan pricing behavior of the Landesbanken, we construct a unique dataset using two main data sources, namely the Loan Pricing Corporation's Dealscan Database (henceforth, LPC) and Bureau van Dijk's (BvD) Amadeus database (Amadeus). Later we analyze the bond issuance behavior of German Landesbanken and therefore add information on unsecured debt issuances by Landesbanken from Bloomberg. We focus on lending behavior of the Landesbanken and other banks to German firms.<sup>9</sup> To get financial statement data for our sample borrowers, we manually match the LPC database to Amadeus. Our final sample consists of 1,607 syndicated loans issued over the 1989 to 2008 period. Panel A of Table 2 shows the calendar time distribution of loans for syndicates with and without Landesbanken as lead arranger. Similar to the patterns in other studies both in the U.S. and Europe, the number of observations is larger in later years because of better data availability. 25% of all loans have been originated with at least one Landesbank as lead arranger in the syndicate.

[Table 2]

Panel B of Table 2 shows the industry classification of our sample firms using the 1-digit SIC code. Both loans from Landesbanken and Non-Landesbanken show concentration in the manufacturing (SIC Codes 2 and 3) and transportation industry (SIC Code 4), thereby reflecting the composition of the German industry. Table 3 provides descriptive statistics of loan characteristics.<sup>10</sup> We report both sample means as well as means for the sub-samples of Non-Landesbanken and Landesbanken loans. In the last column, we also provide t-statistics for a difference in means test. Loans from Landesbanken carry lower spreads, have shorter maturities, are more likely to be secured and less likely to include financial covenants. Further, Landesbanken are more likely to invest in loans for corporate purposes, but less likely for LBO loans. Syndicate structures are also different between Landesbanken and Non-Landesbanken loans: syndicates of loans in which Landesbanken are lead arrangers are larger and have more lead lenders. Firms borrowing from Landesbanken are more likely to be

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<sup>9</sup>We provide a detailed discussion of other activities of Landesbanken at the end of the paper.

<sup>10</sup>All variables are defined in Table 1.

public, are less likely to have a non-investment-grade rating, are smaller (in terms of total assets), have lower leverage ratios but also lower Z-Scores compared to firms borrowing from Non-Landesbanken.

[Table 3]

We find that Landesbanken charge, on average, lower spreads compared to Non-Landesbanken. However, there are also significant differences in terms of loans and borrower characteristics that can explain lower spreads of Landesbanken loans. For example, Saunders and Steffen (2011) provide evidence in a sample of U.K. syndicated loans that public firms pay significantly lower spreads compared to privately-held firms because, for example, investors incur lower cost of information production for these firms. In the subsequent section, we use a difference-in-differences approach to estimate the causal effect of the removal of state guarantees on loan spreads.

## **4. Empirical Results**

### **4.1. Removal of Guarantees and Risk Taking Incentives**

#### **4.1.1. Bivariate Results**

Table 4 presents bivariate results of the mean difference-in-differences (DiD) estimate of Z-Scores and loan spreads for Landesbank and Non-Landsbank deals. We report the Z-Score estimate for the full sample as well as separately for Non-Landesbanken and Landesbanken before and after July 2001. Standard errors are in parentheses and number of observations in brackets. Before July 2001, the mean difference of the Z-Score between borrowers of Landesbanken (Non-Landesbanken) and all German firms is -0.10 (-0.22), respectively. This difference is not statistically significant. After July 2001, the difference from the mean Z-Scores (-0.24) did almost not change relative to the period before the event in the subsample of Non-Landesbanken. However, the difference from the mean Z-Score decreased significantly to -0.63 in the subsample of Non-Landesbanken. The DiD estimate is significant. Thus, the average Z-Score of firms borrowing from Landesbanken decreased by -0.51 relative to those firms borrowing from Non-Landesbanken after July 2001 and the DiD estimate is significant at the 1% level implying that Landesbanken lend to riskier borrowers.

[Table 4]

We also report mean loan spreads for Landesbanken and Non-Landesbanken and find similar patterns until July 2001. While loan spreads are not significantly different between loans originated by both types of lenders,

Non-Landesbanken demand significantly higher spreads after July 2001 relative to before July 2001. Loans spreads from Landesbanken, however, did not change. Non-Landesbanken increased loan spreads relative to Landesbanken by 57 basis points (bps) after abolition of state guarantees. The DiD estimate is significant at the 1% level.

Taken together, analyzing the within-group variation in Z-Scores and loan spreads suggests that the abolition of state guarantees induced Landesbanken to increase risk and simultaneously demand lower loan spreads relative to Non-Landesbanken.

#### 4.1.2. Regression DiD Results

The differences reported in Table 4 may be due to changes in the characteristics of Landesbanken and Non-Landesbanken over time. Therefore, we further estimate OLS regression models as shown in equation (1) for Z-Scores and in equation (2) for loan spreads that control for these characteristics. Including control variables in DiD regressions might reduce the sampling variance of the DiD estimator as noted for example in Gruber and Poterba (1994). We report the results in Table 5 and Table 6. Our first set of control variables are loan characteristics which are commonly used in the lending literature: loan maturity, loan amount, secured, covenants, loan type and loan purpose. In some specifications, we further include variables to control for borrower risk: total assets, tangible assets, profitability, interest coverage, leverage, and current ratio. All control variables are defined in Table I. We also include indicator variables if the borrower is investment-grade rated, if the firm is not rated, and if the firm is listed on an exchange. In some model specifications, we further include time and industry dummies. We report Huber-White heteroscedasticity robust standard errors.<sup>11</sup> The results for the effect of the removal of state guarantees on Z-Score are reported in Table 5.

[Table 5]

We employ different regression models with and without borrower and loan characteristics. Borrower specific factors such as asset size or profitability are used to calculate Z-Scores and, consequently, could potentially cause multicollinearity problems between our control variables. Therefore, they are not included in our regressions.<sup>12</sup> We include whether the firm is publicly listed or privately held, two dummy variables indicating whether the borrower is investment-grade rated or not rated as firm control variables as well as loan purpose controls in models (4) to (6). Non-investment-grade rated firms are the omitted group. In model (5) we add

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<sup>11</sup>In our robustness section 6, we discuss further tests with respect to the treatment of standard errors and bank fixed effects .

<sup>12</sup>However, our results are robust to including borrower characteristics (i.e. total assets, tangibility, profitability, coverage, leverage and current ratio).

controls for loan type and purpose and model (6) additionally includes SIC-industry and year fixed effects. Throughout our models, the DiD estimate, i.e. the interaction term *Landesbank \* After.July.2001*, ranges between -0.372 and -0.550 depending on the specification of the regression models. In other words, Z-Scores are relatively lower (and firms riskier) after July 2001 if a Landesbank is lead arranger of a syndicated loan. This result is statistically significant at the 1% level. Before July 2001, however, there was no difference in risk between Landesbanken and Non-Landesbanken led loan deals.

With respect to the other control variables, we find that loan size as well as being stock-exchange listed are negatively correlated with Z-Scores. Loan size, ceteris paribus, increases the firm's bankruptcy risk while public firms are usually less risky, for example, due to lower leverage ratios (Saunders and Steffen, 2011). Investment-grade and not rated firms are less risky compared to non-investment-grade rated firms.

We then test how the interest rate of the loans arranged by Landesbanken change after July 2001 relative to those arranged by Non-Landesbanken. Since Landesbanken increase the risk in their corporate loan portfolio, do they also adjust the interest rate on these loans accordingly? We report these results in Table 6.

[Table 6]

The dependent variable is the AISD. We employ the same model sequence as in Table 5 and add an additional regression explicitly controlling for a wide array of borrower characteristics. Consistent with our bivariate results, we find that loans arranged by Landesbanken have 39 bps to 65 bps lower spreads relative to Non-Landesbanken after July 2001 (which is our DiD estimator). This result is statistically and economically significant. We also analyze the null hypothesis that there have been no spread differences between Landesbanken and Non-Landesbanken loans before the removal of the state guarantee and cannot reject this hypothesis at conventional levels. Analyzing the long-term trend, we find that spreads have been increasing in the period after July 2001 by 13 bps to 56 bps. That is, Landesbanken deviate from this trend charging significantly lower spreads. Comparing the general trend in loan spreads and the coefficient of the interaction term, we find evidence that Landesbanken demand even lower spreads compared to the pre-July 2001 period.

The control variables have the expected signs. Longer maturity as well as secured loans are associated with higher spreads. Investment-grade and not rated loans have lower spreads compared to non-investment-grade rated loans. Loans for acquisitions or LBO's have higher loan spreads compared to, for example, corporate or working capital related purposes. Larger firms and firms with a higher percentage of tangible relative to total assets pay lower spreads.

Overall, we find results consistent with the ones in Table 4, namely, that Landesbanken simultaneously grant riskier loans and decrease loan spreads on their loans after the removal of the state guarantees relative to

Non-Landesbanken.

## 4.2. Variation across Landesbanken

### 4.2.1. Expected Rating Downgrade

In this section, we analyze how the results vary across Landesbanken depending on their change in franchise value.

[Figure 3]

Figure 3 presents the expected rating downgrade of the Landesbanken which have been active in the syndicated loan market before and after the removal of the state guarantee. As proxy for the expected rating, we use the first senior unsecured debt rating after the removal of the state guarantee in 2005.<sup>13</sup> We compare the ratings of the three major rating agencies Standard & Poor's, Moody's and Fitch and choose the lowest before and after rating for each Landesbank (in the case of a split rating). It is important to note that the rating downgrade is not caused by excessive issuance of public debt. To see this, we compare the bank financial strength (or stand-alone) rating and do not find significant differences between 2001 and 2005 (see table in Figure 3). In other words, the debt issuance did not increase the default probability of each individual Landesbank, such that the rating agencies responded by lowering their stand-alone rating. Therefore the difference in the (senior unsecured debt) ratings is a direct result of the removal of the state guarantee for Landesbanken. Consequently, we sort in Figure 4 the 8 Landesbanken based on their expected rating downgrade and therefore decrease in their franchise value starting with the highest downgrade in notches. The four Landesbanken with the highest expected rating downgrade are Bayern LB, Sachsen LB, LBBW and Helaba with 6, 5 and 4 notches, respectively. The other Landesbanken are West LB, Bremer LaBa, Nord LB and HSH Nordbank with 3 or 2 notches.

### 4.2.2. Expected Rating Downgrade and Risk Taking Incentives

We explore whether in particular Landesbanken with a large decrease in franchise value increase borrower risk after the removal of the state guarantee. For this analysis, we incorporate the same difference-in-differences framework as described in section 2.2 and report these results in Table 7.

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<sup>13</sup>Two major ratings agencies, Standard & Poor's and Fitch, also offered so called shadow ratings for senior unsecured debt in July 2004, one year before the end of the transition period. These ratings were presented as an indication on how the Landesbanken would be rated on basis of their current condition at this point of time. These indication ratings are nearly identical to the realized ratings in July 2005. For example, the ratings of the 11 Landesbanken offered by Fitch in July 2004 and July 2005 differ only in one case and that by only one notch. However, we decide to use the realized ratings since (i) Moody's did not offer any indicative ratings before July 2005 and (ii) S&P did not offer indicative ratings for all Landesbanken.

[Table 7]

Panel A of Table 7 analyzes the change in borrower risk of high- versus low-downgrade Landesbanken after July 2001. The difference in Z-Scores of the borrowers of Landesbanken relative to all German firms is our proxy for borrower risk. We find that the average Z-Score of high-downgrade Landesbanken is 0.39 lower relative to low-downgrade Landesbanken after July 2001, while Z-Scores of borrowers have been comparable among the high-downgrade and the low-downgrade Landesbanken groups before July 2001. Panel B of Table 7 presents the results related to loan spreads. The mean AISD (i.e. the DiD estimate) is 50 bps lower for high versus low-downgrade Landesbanken after July 2001.

[Table 8]

In order to control for additional characteristics we report multivariate DiD regression results in Table 8 and 9. Table 8 presents DiD regression results with the Z-Score as the dependent variable. We use the same model sequence as in Table 5. *Landesbank.High.Downgrade* is an indicator variable equal to 1 if the Landesbank has an expected rating downgrade of four or more notches. Indicator variable *After.July.2001* equals 1 if the loan has been originated after July 2001 and zero otherwise. *Landesbank.High.Downgrade \* After.July.2001* is the interaction term and our DiD estimate. The number of observation (between 372 and 412) is much lower compared to Table 5 because we only include loans originated by Landesbanken. Our DiD estimate is negative and significant which suggests that high-downgrade Landesbanken give loans to riskier borrowers compared to low-downgrade Landesbanken after July 2001.

[Table 9]

Table 9 presents DiD regression results with the AISD as the dependent variable. Again, we employ the same model sequence as presented before. Consistent with our bivariate results, we find that loans arranged by high-downgrade Landesbanken have 50 bps to 75 bps lower spreads relative to low-downgrade Landesbanken after July 2001. This DiD estimate is statistically and economically significant. Further, in the period before July 2001, loans arranged by high-downgrade Landesbanken had spreads not different from low-downgrade Landesbanken. The long-term trend (represented by the indicator variable *After.July.2001*) shows also that spreads have not been different in the period after July 2001 compared to the pre-July 2001 period for Landesbanken borrowers. The control variables have the expected signs and are similar in magnitude compared to Table 6.

### 4.3. Ex-post Borrower Performance

The analysis so far shows that Landesbanken, and in particular those Landesbanken with the largest expected downgrading, react to the removal of government guarantees with a substantial change in their lending behavior. They lend, relative to other banks, to significantly riskier customers, but do not adjust their rates compared to the period before the removal of government guarantees. In our quantitative approach, we control for borrower risk using Z-Scores and other control variables. However, it might be the case that borrowers from Landesbanken are of higher quality on an unobservable basis which is not reflected in our risk measures. To examine this, we analyze borrower risk over time, after the loan has been originated. The results are shown in Figure 4.

[Figure 4]

The graph shows the difference in the development of borrower riskiness over time, dependent on whether a borrower receives a loan from a Landesbank or not and whether the loan is given before or after 2001. Borrower riskiness is again measured by the difference in Z-Scores between the bank's borrowers and the Z-Score of all German firms. More specifically, the lines represent the development of the Z-Scores of Landesbank borrowers since loan issuance relative to the development of the Z-Scores of Non-Landesbanken borrowers since loan issuance. The lighter green line captures the development before 2001. It shows that the development of Z-Scores of Landesbanken and Non-Landesbanken borrowers stays rather close to each other as it can be seen from the table below the graph. After four years the difference reaches a value of -0.18, but this value is not statistically significant. In strict contrast, the darker blue line for the comparison of borrower risk after 2001 continuously decreases and reaches already a value of -0.24 after three years. It further decreases to a value of -0.32, and both differences are statistically significant. In short, Figure 4 suggests a substantially different risk development for borrowers of Landesbanken and Non-Landesbanken in the before and after July 2001 periods.

We also find that the distribution of the Z-Scores for Landesbanken's borrowers compared to Non-Landesbanken's borrowers becomes more positively skewed over the sample period. In other words, many borrowers of Landesbanken have low Z-Scores which in the average is partially off-set by borrowers with very high Z-Scores. This suggests that Landesbanken attract borrowers of low credit quality.

In summary and also taking into account the previous results, the evidence suggests that Landesbanken and Non-Landesbanken choose a fairly similar risk profile of borrowers before 2001, and this risk profile does not change much over the first four years of the lifetime of the loan. In contrast, after 2001, Landesbanken not only choose a significantly higher risk profile of borrowers when they decide to grant a loan, but these borrowers also become substantially riskier over time in comparison to the borrowers who receive a loan from

Non-Landesbanken. These results provide further evidence consistent with theories on gambling.

#### **4.4. Do Landesbanken Keep Riskier Loans on their Balance Sheets?**

It could be argued that Landesbanken may distribute a major portion of these riskier loans to participants without increasing the riskiness of their own loan portfolio since all these loans are syndicated. To test this, we employ a similar DiD framework and compare the loan share retained by the lead arranger for Landesbanken versus Non-Landesbanken loans before and after July 2001. Dealscan provides information on the loan share retained by various members of the syndicate for a subset of the data. The data for loan shares are available for 1,205 loans in our sample. We report the results in Table 10.

[Table 10]

Before July 2001, we do not find a statistically significant difference between Landesbanken and Non-Landesbanken. However, the DiD estimate shows that, after the removal of the guarantee, Landesbanken retain a 2.61% larger share of the loan relative to Non-Landesbanken and relative to before July 2001. This estimate is significant at the 1% level suggesting that Landesbanken retain a substantial portion of these riskier loans on their balance sheets.<sup>14</sup>

### **5. The Impact of the Transition Period**

The Brussels' agreement eventually removed the government guarantees. However, for a transition period of four years, Landesbanken were still allowed to issue fully guaranteed bonds as long as these bonds did not mature after December 2015 ("grandfathered debt"). Put differently, the Brussels' agreement is a particular type of strategy as to how governments can revoke guarantees provided to financial institutions. During the financial crisis of 2007 - 2009 and during the current sovereign debt crisis, governments have extended billions of EUR in guarantees, albeit for different reasons. But they face a very similar question: How can banks exit the various guarantee plans and what are the incentive effects of these strategies?

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<sup>14</sup>In unreported tests, we identify a larger change in volume of loans originated by Landesbanken versus Non-Landesbanken (the CAGR of Landesbanken is 0.46% relative to 0.13%) during the transition period. This is consistent with Landesbanken expanding their market share in the corporate loan market.

## 5.1. Transition Period and Bond Issuances

Our setting provides a unique opportunity to analyze the behavior of banks under one particular exit plan. As already explained above, there is an incentive of banks to issue bonds due to low costs of carry. Moreover, there is an additional incentive for gambling banks to issue debt to finance their gambles as long as grandfathered debt as source of liquidity still exists. We thus expect to find a relatively larger increase in bond issuances by Landesbanken who face the largest decrease in franchise value. Figure 5 shows that the total volume of bond issuance by Landesbanken started to increase in the second half of 2002 and continued until July 2005 when the grandfathering clause expired. Bond issues peaked in the first half year 2005, right before the end of the transition period. Afterwards, the volume of bond issues almost decreased back to levels where it had been before the abolishment of state guarantees was announced.<sup>15</sup>

[Figure 5]

The eight light-green bars on the bottom of Figure 5 show the change in unsecured public debt issuances of Landesbanken in the transition period (July 2001 to July 2005) relative to a period before the removal of the state guarantee was announced (July 1999 to July 2001). The Landesbanken with the highest expected rating downgrades are also the ones that issue more public debt in the transition period relative to before compared to the other Landesbanken. For example, Bayern LB issue 14 times and Sachsen LB 15.8 time the amount of public debt after July 2001 compared to the pre-July 2001 period. Nord LB or HSH Nordbank with only 3 and 2 notches downgrades issue 7.3 and 8.9 times the amount, respectively. We analyze this more formally and calculate the correlation between public bond issuance and expected rating downgrade and find a correlation 0.8345 which is significant at the 1% level. This is exactly what we would expect under the gambling hypothesis.

In the next section, we provide further evidence consistent with the gambling hypothesis analyzing a second channel through which Landesbanken significantly increased risk taking.

## 5.2. Risk Taking with Grandfathered Debt

As graphically shown in Figure 5, Landesbanken issued billions of EUR grandfathered debt during the 2001 to 2005 period. A substantial increase in risk taking did not only occur in the corporate loan portfolio of the Landesbanken, but also in off-balance sheet activities. Apparently, a major proportion of these funds have been

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<sup>15</sup>The more recent increase in 2007 and 2008 is due to the bonds issued during the Landesbanken's solvency crises when many of the bonds are guaranteed by either the federal state or the central government.

used to invest in and provide a liquidity back-stop for off-balance sheet conduits. Given the paucity of data, however, it is difficult to cleanly establish off-balance sheet risk taking empirically. In the following, we provide evidence consistent with this behavior using structured investments in conduits as an example. The main idea is that Landesbanken used the funds issued under grandfathered state guarantees to invest in conduits. The state guarantee allowed them to hold significantly more conduit assets relative to (on balance sheet) total assets which significantly increased their exposure to the conduits (Acharya and Schnabl, 2010).

We collect additional information about the investments of the Landesbanken in asset backed commercial paper conduits (ABCP) and structured investment vehicles (SIVs) from S&P and Capital IQ. Overall, the Landesbanken have a combined exposure to ABCP conduits and SIVs of 97 billion EUR at the end of 2006. The majority of these exposures can be attributed to Sachsen LB (25 billion EUR), West LB (34 billion EUR) and Bayern LB (16 billion EUR), which translates into 37.2%, 11.8% and 4.5% of total assets, respectively.<sup>16</sup>

Ormond Quay is an interesting example. This conduit was set up and managed by Sachsen LB in 2004. As of July 2007, Ormond Quay invested about 11.4 billion USD almost exclusively in asset backed securities (ABS) and 79% of it in residential and commercial mortgages. These assets were almost entirely refinanced with short-term ABCPs which usually have a maturity of 30 days or less. Only 0.3% of the asset value was equity (Acharya and Schnabl, 2010). Still, the conduit was rated “P-1”, the highest possible (short-term) rating assigned by Moody’s. Sachsen LB provided an explicit guarantee for all ABCP assumed by Ormond Quay. According to Moody’s, the rating was only possible because of Sachsen LB’s grandfathered state guarantee. In other words, Landesbanken were able to have higher exposures to conduits relative to other banks who did not have access to this state guarantee. Even though these assets were off-balance sheet, explicit (or implicit) liquidity insurance from the Landesbanken exposed the banks themselves to the risk that they have to provide liquidity once the maturing ABCP could not be rolled over.

Ormond Quay is thus a typical example how Landesbanken benefited from the grandfathered state guarantee and consistent with our earlier results that Landesbanken substantially increased risk taking after the removal of the state guarantees was announced. It further relates to the question of how government guarantees should effectively be revoked. The access to grandfathered debt masked the looming liquidity problems of the Landesbanken if the refinancing of short-term liabilities is not longer possible.

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<sup>16</sup>Standard & Poor’s (2007) states that “we consider that credit risk in the German banking sector from U.S. subprime mortgage exposures is limited as it is generally concentrated in the ‘AAA’ and ‘AA’ rated tranches and we consider the potential market valuation effects to be manageable.”

## 6. Robustness

We provide a number of tests to show the robustness of our results. First, we look at the possibility that abundance of liquidity may explain our results. Second, we provide different measures in order to capture a borrower's credit risk profile. Third, we perform miscellaneous tests with respect to (i) different sample periods, (ii) syndicate structures, (iii) clustering of standard errors, and (iv) bank fixed effects.

### 6.1. Excess Liquidity and Risk Taking

To ensure that our results are not driven by liquidity on the balance sheets of the Landesbanken but rather through increased risk taking after the removal of the guarantee was announced, we construct a measure of liquidity of Landesbanken. We obtain information about cash holdings ("Cash & Cash Equivalents" and Marketable Securities) from the annual reports of the Landesbanken and include this variable as additional regressor in our models. Panel A of Table 11 reports the results.

[Table 11]

Column (1) shows the results for Z-Score and column (2) the results for loan spreads. The coefficients of the interaction term are similar in magnitude compared to Tables 8 and 9, respectively, and significant at the 5% level. The coefficient of Cash & Cash Equivalents is insignificant suggesting that on balance sheet liquidity is not a significant determinant of risk taking behavior of Landesbanken in our sample period. We can further analyze this effect by exploiting the time-series variation in bond issuances. Figure 5 shows that the issuance activity of Landesbanken between 2001 and 2005 is first fairly stable, then gradually increasing, reaching a one-time peak in the first half of 2005. In fact, the issuance volume in the first half of 2005 is more than twice as large as the issuance volume in any half year before. This substantial difference between the first half of 2005 and the time period before provides an interesting opportunity to test the robustness of our results. We exclude the first half year of 2005, in which the highest liquidity inflow occurs, and test whether the results also hold if the sample period is cut at the end of 2004. Panel B of Table 11 reports the results in a similar fashion as Table 4. Again, we find that after the removal of the guarantees, Landesbanken give riskier loans and at lower loan rates relative to Non-Landesbanken and relative to the period before. The robustness of this evidence suggests that our results are not driven by the substantial liquidity inflow in the first half of 2005 and also holds in the period before 2005 over which the liquidity inflow has initially been quite moderate, e.g. mainly in 2001 and 2002, but also in 2003.

## 6.2. Different Credit Score Measures

We perform several robustness using alternative credit score measures as alternative proxies for borrower credit risk in addition to the Z-Score as defined in MacKie-Mason (1990):

$$\begin{aligned} Z\text{-Score}_i = & 1.2 * \frac{\text{Working.Capital}_i}{\text{Total.Assets}_i} + 1.4 * \frac{\text{Retained.Earnings}_i}{\text{Total.Assets}_i} \\ & + 3.3 * \frac{\text{EBIT}_i}{\text{Total.Assets}_i} + 1.0 * \frac{\text{Sales}_i}{\text{Total.Assets}_i} \end{aligned} \quad (5)$$

Specifically, these alternative proxies are: the original Z-Score (Altman, 1968), the O-Score (Ohlson, 1980) and the Zmijewski (1984) Score.<sup>17</sup> We find high correlations between our used credit score and the alternative proxies. For the MacKie-Mason (1990) Z-Score and the Altman (1968) Z-Score we obtain a correlation of 0.9622 which is significant at the 1% level. Regarding the correlation of the Altman (1968) Z-Score to the credit scores developed by Ohlson (1980) and Zmijewski (1984), both purely consisting of accounting data, we find correlations both significant at the 1% level of -0.3460 and -0.3837, respectively.<sup>18</sup> Further, for example replacing the MacKie-Mason (1990) Z-Score with the original Z-Score of Altman (1968) in Table 4, the mean DiD estimate is -0.46 and significant at the 1% level. If we use the Ohlson (1980) or Zmijewski (1984) scores our mean DiD estimates for the Table 4 set-up is 1.47 and 0.52, respectively. Both DiD estimates are significant at the 1% level.<sup>19</sup> Therefore we can record that all used risk measures show consistently that Landesbanken increased borrower risk relative to Non-Landesbanken in the period after the removal of the state guarantee.

## 6.3. Further Robustness Tests

We perform miscellaneous tests with respect to (i) a different sample period, (ii) syndicate structure, (iii) clustering of standard errors, and (iv) bank fixed effects.<sup>20</sup>

- (i) Sample period: In our main tests, our sample spans the 1989 to 2008 period. To make sure that the results are not driven by changes in the crisis period, we repeat all tests using the 1989 to July 2007 period. The results do not change. We split our sample period into a period spanning July 2001 to July 2005, the transition period, and into a period post-July 2005 on. Our bivariate analysis shows that Landesbanken

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<sup>17</sup>However, since our dataset consists of publicly listed as well as privately held firms, we replace the market value of equity by the book value of equity for all firms in the Altman (1968) Z-Score.

<sup>18</sup>In the credit scores of Ohlson (1980) and Zmijewski (1984) larger negative values, represent lower risk of borrower default.

<sup>19</sup>All untabulated results are available upon request

<sup>20</sup>We do not tabulate the results for reasons of space.

already offered significantly lower spreads for loans in the transition period. This effect extends to the period after July 2005.

- (ii) **Syndicate structure:** Our data are syndicated loan data. Our definition of Landesbanken involvement is that there has to be one Landesbank within the group of lead arrangers. We use various definition, i.e. we require that there is at least 1 Landesbank among the lead arrangers, exactly 1 Landesbank or more than 1 Landesbank. We get very similar results. Interestingly, the results get stronger if a larger number of Landesbanken is among the lead arrangers.
- (iii) **Clustering of standard errors:** Possible auto-correlation of standard errors could go both ways. First, many firms have more than one loan, i.e. standard errors of the same firm might be auto-correlated. Second, Landesbanken extend loans at different points in time, i.e. standard errors of the same bank might be auto-correlated. We repeat all tests clustering standard errors either at the firm or at the bank level. Again, the results do not change.
- (iv) **Bank fixed effects:** To further control for time-invariant characteristics of our sample banks as well as differences between Landesbanken and Non-Landesbanken in our DiD tests, we further include bank fixed effects in our analysis. The results, again, do not change.

## 7. Conclusion

This paper studies how the removal of government guarantees affects bank risk taking incentives. We exploit a natural experiment in which regulators remove the state guarantee of German Landesbanken which results in a deterioration in their credit rating, higher funding costs, and a loss in their franchise value. Moreover, the Landesbanken obtain a four-year transition period during which they are allowed to issue grandfathered debt.

We analyze the lending behavior of Landesbanken around the announcement of the removal of the guarantees relative to non-protected private banks using a difference-in-differences framework. We find that Landesbanken do not differ in their lending behavior from other banks before the removal of the state guarantees. In contrast, they lend to significantly riskier borrowers but do not accordingly adjust the charged interest rates after this removal. Consistent with banks starting to gamble before they lose their funding cost advantage, we show that this change in risk-taking is particularly pronounced for Landesbanken that face the highest expected rating downgrade and therefore the highest loss in franchise value.

These results are particularly relevant in light of the substantial guarantees provided by central banks and

governments around the world during the current crisis and the urgent question of how and when to exit their support programs. How shall governments communicate their exit strategy and what is an optimal transition period? Other possible avenues for future research are to analyze which mechanisms outside or within the banking institutions may prevent excessive gambling. In particular, it is important to understand how banking supervision and bank governance can mitigate the increased risk taking incentives of banks.

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**Figure 1**

**Landesbanken in 2001: Geographical Overview**



Landesbank	Comments
Bremer LaBa	– Subsidiary (92,5%) of Nord LB.
HSH Nordbank	– Founded in 2003 as a merger between Hamburgischen Landesbank and Landesbank Schleswig-Holstein.
LaBa Berlin	– Renamed from Bankgesellschaft Berlin AG in 2006. – No loans arranged after July 2001.
LRP	– Fully owned subsidiary of LBBW since 2005. – No loans arranged after July 2001
Nord LB	– Since 2005 no longer Landesbank for Mecklenburg-Western Pomerania.
Saar LB	– Subsidiary (75%) of Bayern LB since 2002. Shareholder (25%) since 1993.
Sachsen LB	– No loans arranged after July 2001. – Fully owned subsidiary of LBBW since 2008.

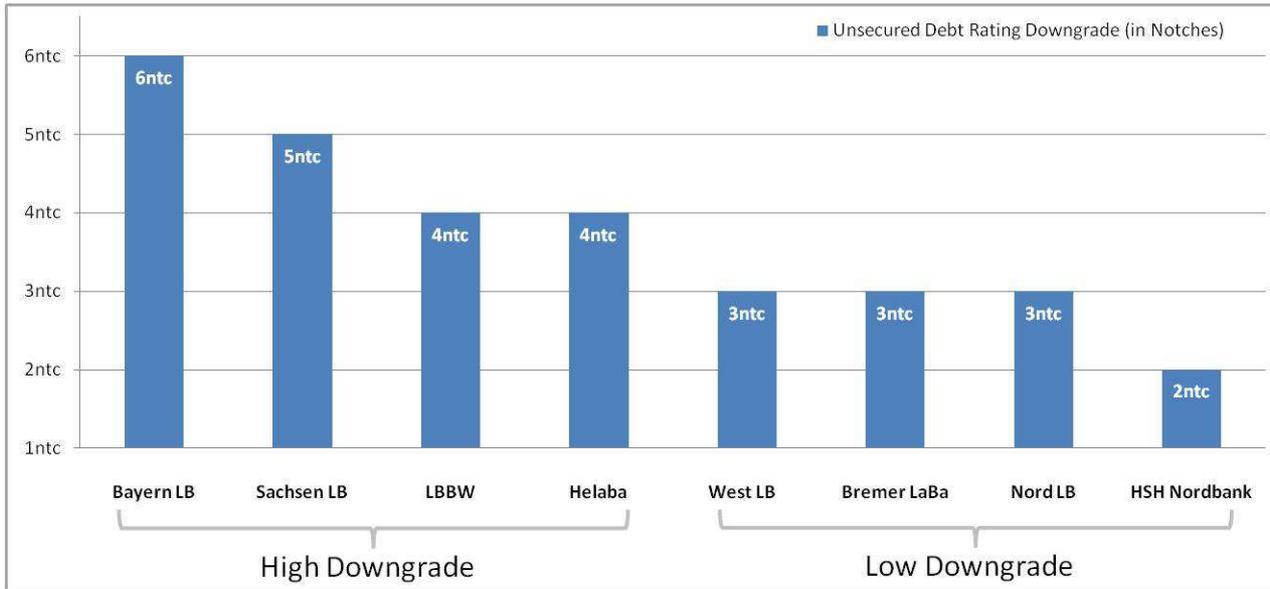
**Figure 2**  
**Provision of the “Brussels’ Agreement”**

Date of Issuance	Maturity Until Dec. 31, 2015	After Dec. 31, 2015
Until July 18, 2001	Yes	Yes
July 19, 2001 – July 18, 2005	Yes Due to Grandfathering Clause	No
After July 18, 2005	No	No

### Figure 3

#### Landesbanken Unguaranteed and Guaranteed Credit Ratings and Bond Issuance Behavior

We compare each Landesbank's credit rating before the abolition of state guarantees ("Rating Before") and the expected rating after the abolition of state guarantees ("Rating After"). We look at the senior unsecured debt rating of all three major credit rating agencies (i.e. Standard & Poor's, Moody's and Fitch) and take the lowest rating for each Landesbank. We only consider Landesbanken active in the syndicated loan market before 2001 and after 2001.



Individual Ratings (Fitch) or Financial Strength Ratings (Moody's) assess how a bank would be viewed if it were entirely independent and could not rely on external support. Again we list the lowest rating of these two rating agencies, i.e. Moody's or Fitch.

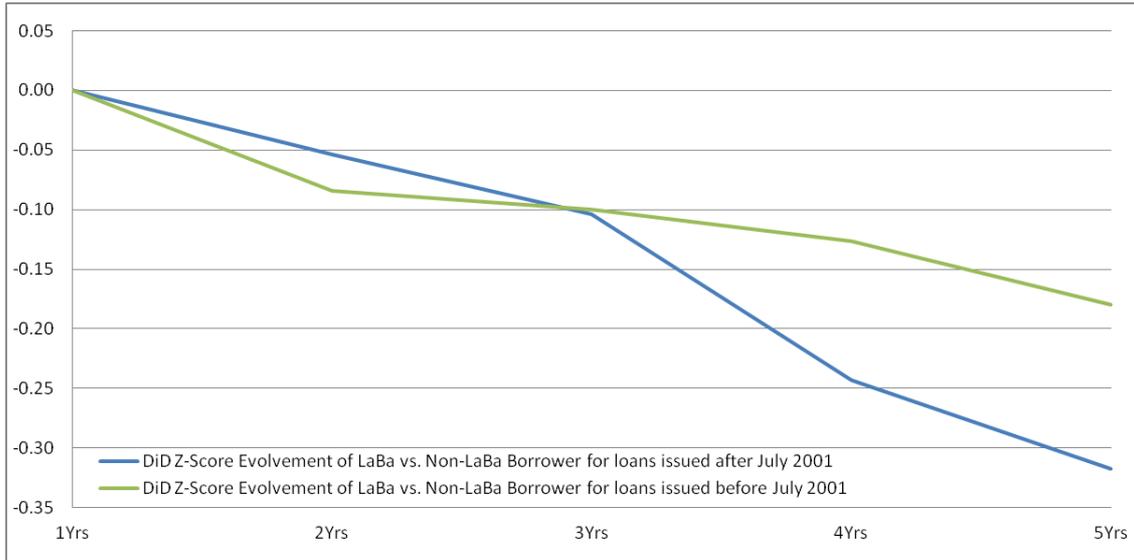
Landesbank	Individual Rating 2001	Individual Rating 2005	Change in Notches
Bayern LB	C	D+	-2
Bremer Landesbank	C	C	0
HSH Nordbank	C	C	0
LBBW	B-	B-	0
Helaba	C+	C	-1
Sachsen LB	C	C-	-1
Nord LB	C	C-	-1
West LB	D+	D-	-2

## Figure 4

### Ex-post Borrower Performance - Difference Non-Landesbank vs. Landesbank

This graph shows the relative performance - as measured by the difference-in-differences in the Z-Score - of borrowers after the loan was issued. We track the borrowers' performance up to four years after the initial issuance of the loan and subdivide the sample into whether the lender is a Landesbank or not. Further, the sample is split between loans issued before and after July 2001. The relative performance is defined as the difference between the score of a Non-Landesbank (Non-LaBa) and a Landesbank (LaBa) borrower relative to the score at loan issuance. Heteroscedasticity-robust standard errors are shown in parenthesis. \*, \*\*, \*\*\* denotes significance at the 10%, 5% and 1% level, respectively.

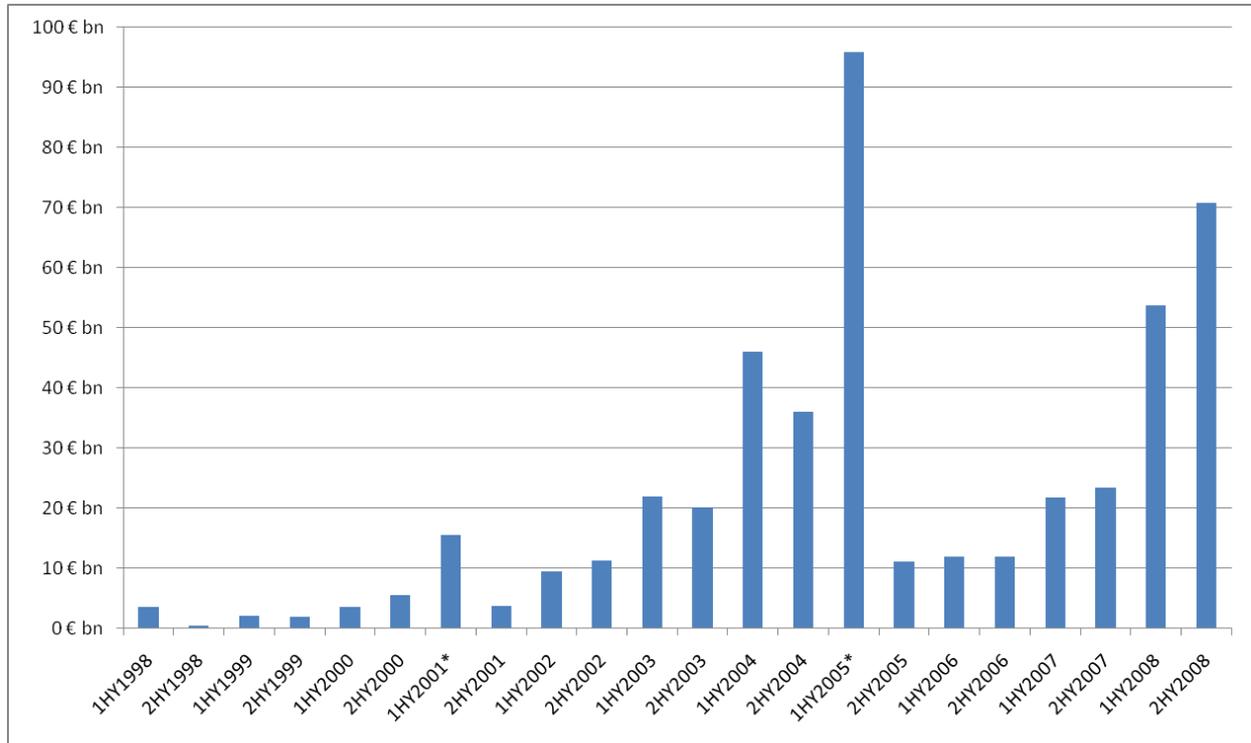
The difference-in-differences estimate corresponds to the vertical distance between blue (green) line and the x-axis.



<b>Loan Issuance Before July 2001</b>						
Since Loan Issuances		0 Yrs	1 Yr	2 Yrs	3 Yrs	4 Yrs
LaBa	<i>Mean</i>	-0.10	-0.17	-0.22	-0.26	-0.31
Non-LaBa	<i>Mean</i>	-0.22	-0.21	-0.24	-0.24	-0.25
Difference		0.12	0.04	0.02	-0.01	-0.06
	<i>SE</i>	(0.11)	(0.15)	(0.15)	(0.15)	(0.14)
DiD		.	<b>-0.08</b>	<b>-0.10</b>	<b>-0.13</b>	<b>-0.18</b>
	<i>SE</i>	.	<b>(0.13)</b>	<b>(0.15)</b>	<b>(0.15)</b>	<b>(0.15)</b>
<b>Loan Issuance After July 2001</b>						
Since Loan Issuances		0 Yrs	1 Yr	2 Yrs	3 Yrs	4 Yrs
LaBa	<i>Mean</i>	-0.63	-0.74	-0.84	-0.97	-1.04
Non-LaBa	<i>Mean</i>	-0.24	-0.31	-0.35	-0.34	-0.34
Difference		-0.39***	-0.43***	-0.49***	-0.63***	-0.70***
	<i>SE</i>	(0.07)	(0.10)	(0.10)	(0.11)	(0.16)
DiD		.	<b>-0.05</b>	<b>-0.10</b>	<b>-0.24**</b>	<b>-0.32***</b>
	<i>SE</i>	.	<b>(0.09)</b>	<b>(0.10)</b>	<b>(0.10)</b>	<b>(0.12)</b>

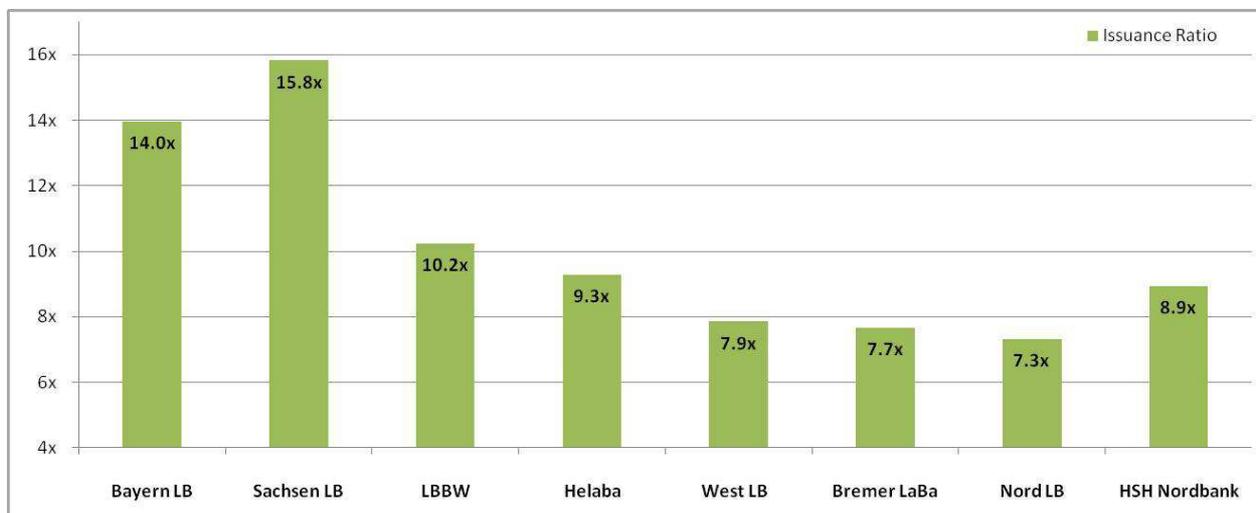
**Figure 5**  
**Bond Issuance Behavior of Landesbanken**

The histogram shows the volume of unsecured bond issuances undertaken by Landesbanken (in EUR billion) over time.



\* Issuance till July 18, 2005 (2001)

The green bars are the ratios of bond issuance in the transition period (2HY2001-1HY2005) to issuance behavior two years (2HY1999-1HY2001) prior to the start of the transition period.



**Table 1**  
**Definition of Variables**

Variable	Description	Source
<i>Landesbank Identifier</i>		
Landesbank	Dummy equal to one if at least one Landesbank (LaBa) is among the lead arrangers in the loan syndicate.	LPC Dealscan
LaBa High Downgrade	Dummy equal to one if a Landesbank's expected credit rating downgrade is in the upper half of all Landesbanken's rating downgrades.	Rating Agencies
After July 2001	Dummy equal to one if loan was issued since July 19, 2001, i.e. after the "Brussels' Agreement."	LPC Dealscan
<i>Loan Characteristics</i>		
AISD	AISD (All-In-Spread-Drawn) is measured in basis points and is the coupon spread over LIBOR on the drawn amount plus the annual fee.	LPC Dealscan
Maturity (month)	Maturity of the loan (measured in month).	LPC Dealscan
Secured	Dummy variable equal to one if the loan is secured.	LPC Dealscan
Covenants	Dummy variable equal to one if at least one financial covenant is attached to the loan.	LPC Dealscan
Facility Size	Facility amount of the loan (in constant 2005 EUR million).	LPC Dealscan
<i>Borrower Characteristics</i>		
Publicly Listed	Dummy variable equal to one if the borrower is listed on a stock exchange.	LPC Dealscan
Investment Grade Rating	Dummy variable equal to one if the borrower's senior debt rating is BBB- or above by Standard & Poor's (S&P).	LPC Dealscan
Not Rated	Dummy variable equal to one if the borrower's senior debt is not rated by S&P.	LPC Dealscan
Total Assets	Book value of assets (toas) of the borrower in terms of constant 2005 EUR million.	BvD Amadeus
Leverage Ratio	Ratio of book value of total debt (ltdb + loan) to book value of assets (toas).	BvD Amadeus
Coverage Ratio	Ratio of EBIT (ebit) to interest expenses (inte).	BvD Amadeus
Profitability	Ratio of Profit before Taxes (plbt) to sales (turn).	BvD Amadeus
Tangibility Ratio	Ratio of net tangible fixed assets (tfas) to total assets (toas).	BvD Amadeus
Current Ratio	Ratio of current assets (cuas) to current liabilities (culi).	BvD Amadeus
Z-Score	Z-Score according to Mackie-Mason (1990) for measuring the financial health of a company.	BvD Amadeus
Altman Z-Score	Z-Score (Altman, 1968) for measuring the financial health of a company.	BvD Amadeus
Ohlson Score	The O-Score of Ohlson (1980) for measuring the financial health of a company.	BvD Amadeus
Zmijewski Score	The score of Zmijewski (1984) for measuring the financial health of a company.	BvD Amadeus
<i>Loan Tranche Types and Purposes</i>		
Term Loan	Dummy equal to one if the loan type is "Term Loan."	LPC Dealscan
Bridge Loan	Dummy variable equal to one if the loan type is "Bridge Loan."	LPC Dealscan
Revolver $\geq$ 1 Year	Dummy equal to one if the loan type is "Revolver $\geq$ 1 Year."	LPC Dealscan
Corporate Purpose	Dummy equal to one if the loan issuance purpose is "Corporate Purpose."	LPC Dealscan
Debt Repayment Purpose	Dummy equal to one if the loan issuance purpose is "Debt Repayment."	LPC Dealscan
LBO Purpose	Dummy equal to one if the loan issuance purpose is "LBO."	LPC Dealscan

For variables constructed from the BvD Amadeus database the BvD Amadeus data item name is given in the parentheses. Rating Agencies is information collected from Standard & Poor's, Moody's and Fitch.

**Table 2**  
**Syndicated Loans over the Sample Period**

<b>Panel A: Syndicated Loans over Sample Period</b>			
Year	Non-Landesbank	Landesbank	All
1989	2	0	2
1994	5	0	5
1995	9	0	9
1996	13	0	13
1997	10	4	14
1998	11	7	18
1999	26	21	47
2000	39	35	74
2001	64	14	78
2002	81	11	92
2003	101	9	110
2004	167	40	207
2005	167	62	229
2006	233	84	317
2007	197	61	258
2008	70	64	134
Total	1,195	412	1,607

<b>Panel B: Syndicated Loans and Borrower Industries</b>						
Primary SIC	Non-Landesbank		Landesbank		All	
	Obs.	in %	Obs.	in %	Obs.	in %
1	49	4%	27	7%	76	5%
2	346	29%	74	18%	420	26%
3	422	35%	147	35%	569	36%
4	178	15%	83	20%	261	16%
5	88	7%	37	9%	125	8%
7	65	5%	28	7%	93	6%
8	33	3%	12	3%	45	3%
9	7	1%	0	0%	7	0%
n/a	7	1%	4	1%	11	1%
Total	1,195	100%	412	100%	1,607	100%

**Table 3**  
**Summary Statistics**

This table provides descriptive data for loan, borrower and bank characteristics for syndicated loans granted to non-financial firms between 1989 and 2008 in Germany. All absolute values are in constant 2005 EUR million. Every facility shows up only once in the summary statistics, resulting in a maximum of 1,607 observations. Results are winsorized at the 1 percent and 99 percent level. All variables are defined in Table 1. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

	All			Non-Landesbank			Landesbank			t-statistics
	Obs.	Mean	Std	Obs.	Mean	Std	Obs.	Mean	Std	
<b>Loan Characteristics</b>										
All-In-Spread-Drawn (bps)	1,607	149.6	165.0	1,195	161.2	177.0	412	116.0	117.4	5.85***
Maturity (months)	1,503	70.6	34.2	1,110	72.3	33.6	393	65.7	35.7	3.22***
Facility Size (EUR M)	1,607	446	1,110	1,195	433	1120	412	498	1,030	-1.22
Secured	1,607	35.3%	50.8%	1,195	37.7%	51.8%	412	28.4%	47.3%	3.34***
Covenants	1,607	13.8%	34.5%	1,195	15.3%	36.0%	412	9.2%	29.0%	3.45***
<b>Syndicate Structure</b>										
Number of Lenders	1,602	10.1	9.8	1,190	9.6	10.0	412	11.5	8.9	-3.53***
Number of Lead Arrangers	1,607	2.9	2.4	1,195	2.3	1.8	412	4.5	2.9	-14.29***
Number of Landesbank LA	1,607	0.3	0.6	.	.	.	412	1.3	0.5	.
<b>Borrower Characteristics</b>										
Publicly Listed	1,607	29.7%	45.7%	1,195	26.5%	44.2%	412	39.1%	48.9%	-4.61***
Investment-Grade	1,607	13.0%	33.6%	1,195	14.0%	34.7%	412	10.2%	30.3%	2.10**
Non-Investment-Grade	1,607	11.0%	31.3%	1,195	12.5%	33.1%	412	6.8%	25.2%	3.62***
Not Rated	1,607	76.0%	42.7%	1,195	73.6%	44.1%	412	83.0%	37.6%	-4.20***
Total Assets (EUR M)	1,607	9,320	27,600	1,195	10,300	30,400	412	6,113	15,000	3.37***
Profitability	1,395	0.06	0.06	1,070	0.06	0.06	325	0.06	0.06	-0.53
Leverage	1,541	0.40	0.22	1,169	0.41	0.21	372	0.38	0.23	1.95*
Coverage	1,337	28.44	175.81	1,018	26.51	164.28	319	34.61	208.57	-0.63
Current Ratio	1,607	2.39	3.40	1,195	2.55	3.57	412	1.93	2.78	3.57***
Absolute Z-Score	1,607	2.09	1.21	1,195	2.16	1.24	412	1.88	1.09	4.41***
Z-Score (difference from yearly mean)	1,607	-0.32	1.15	1,195	-0.24	1.17	412	-0.54	1.07	4.85***
<b>Loan Tranche Type &amp; Purpose</b>										
Term Loan	1,607	45%	50%	1,195	45%	50%	412	43%	50%	0.70
Bridge Loan	1,607	4%	21%	1,195	5%	21%	412	3%	18%	1.34
Revolver $\geq$ 1Yr	1,607	31%	46%	1,195	30%	46%	412	35%	48%	-2.18**
Corporate Purpose	1,607	11%	32%	1,195	10%	30%	412	14%	35%	-1.85*
Debt Repayment	1,607	21%	40%	1,195	18%	39%	412	28%	45%	-3.81***
LBO Purpose	1,607	32%	47%	1,195	33%	47%	412	29%	45%	1.56

**Table 4****Removal of State Guarantee, Borrower Risk and Loan Spreads (Bivariate Test)**

This table reports mean difference-in-differences (DiD) estimates of borrower risk and loan spreads. Lead arrangers are classified into two groups: Landesbanken who are affected by the removal of the state guarantee of their public debt issue after July 2001, and Non-Landesbanken. Panel A reports the results for borrower risk proxied by the Z-Score. Panel B reports the results for loan spreads measured using the All-In-Spread-Drawn (AISD). All variables are defined in Table 1. Heteroscedasticity-robust standard errors are shown in parentheses. The DiD estimates are shown in bold. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

<b>Panel A: Z-Score</b>				
	All	Landesbank	Non-Landesbank	Difference
Before July 2001	-0.184 (0.05) [234]	-0.103 (0.09) [70]	-0.219 (0.06) [164]	0.116 (0.11)
After July 2001	-0.338 (0.03) [1,373]	-0.632 (0.06) [342]	-0.241 (0.04) [1,031]	-0.391*** (0.07)
Difference		0.529*** (0.11)	0.023 (0.07)	<b>-0.506***</b> <b>(0.12)</b>
<b>Panel B: AISD</b>				
	All	Landesbank	Non-Landesbank	Difference
Before July 2001	114.3 (6.2) [234]	116.8 (10.2) [70]	113.3 (7.8) [164]	-3.5 (12.8)
After July 2001	155.6 (4.7) [1,373]	115.8 (6.7) [342]	168.8 (5.8) [1,031]	53.0*** (8.8)
Difference		1.0 (12.2)	-55.5*** (9.7)	<b>-56.5***</b> <b>(15.5)</b>

**Table 5**

**Removal of State Guarantee and Borrower Risk**

This table reports the results of an OLS regression relating borrower risk to lead arranger, loan and borrower characteristics. The dependent variable is the Z-Score. Models (5) and (6) include the full set of explanatory variables, model (6) also industry and year fixed effects. *Landesbank \* After.July.2001* is the DiD estimate under the  $H_0$  that the DiD estimate is equal to zero. Intercept, industry and year fixed effects are not shown. All variables are defined in Table 1. Heteroscedasticity-robust standard errors are shown in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Landesbank	0.115 (0.10)	0.156 (0.11)	0.196 (0.12)	0.164 (0.11)	0.182 (0.11)	0.120 (0.13)
After July 2001	-0.023 (0.06)	-0.068 (0.07)	-0.089 (0.07)	-0.065 (0.07)	-0.042 (0.07)	0.086 (0.13)
LaBa*After July 2001	-0.50*** (0.12)	-0.509*** (0.13)	-0.550*** (0.13)	-0.479*** (0.13)	-0.506*** (0.13)	-0.372** (0.15)
Maturity		0.052 (0.04)	0.030 (0.04)	0.014 (0.04)	0.007 (0.05)	0.040 (0.05)
Facility Size (logs)		-0.130*** (0.01)	-0.120*** (0.01)	-0.096*** (0.02)	-0.096*** (0.02)	-0.084*** (0.02)
Secured			0.186*** (0.05)	0.174*** (0.06)	0.189*** (0.06)	0.287*** (0.06)
Covenants			-0.098 (0.08)	-0.030 (0.09)	-0.034 (0.09)	-0.039 (0.09)
Publicly Listed				-0.283*** (0.06)	-0.301*** (0.07)	-0.173** (0.07)
Investment-Grade				0.385*** (0.11)	0.369*** (0.11)	0.301*** (0.11)
Not Rated				0.275*** (0.1)	0.258** (0.1)	0.287*** (0.1)
Dummy Term Loan					0.020 (0.09)	0.035 (0.08)
Dummy Bridge Loan					-0.013 (0.14)	-0.012 (0.14)
Dummy Revolver $\geq 1$					0.123 (0.09)	0.028 (0.09)
Dummy Debt Repay.					-0.001 (0.07)	-0.017 (0.08)
Dummy LBO Purp.					-0.060 (0.07)	-0.039 (0.07)
Dummy Corp Purp.					0.105 (0.09)	0.118 (0.09)
Constant	1.219*** (0.45)	2.032*** (0.43)	1.899*** (0.44)	1.313*** (0.5)	1.323*** (0.5)	1.063* (0.55)
Industry Fixed Effects	No	No	No	No	No	Yes
Year Fixed Effects	No	No	No	No	No	Yes
Observations	1,607	1,454	1,454	1,454	1,454	1,454
$R^2$	0.021	0.065	0.072	0.086	0.089	0.176

**Table 6**  
**Removal of State Guarantee and Loan Spreads**

This table reports the results of an OLS regression relating loan spreads to lead arranger, loan and borrower characteristics. The dependent variable is the AISD. Models (6) and (7) include industry and year fixed effects and model (7) additionally uses the full set of explanatory variables. *Landesbank \* After.July.2001* is the DiD estimate under the  $H_0$  that the DiD estimate is equal to zero. Intercept, industry and year fixed effects are not shown. All variables are defined in Table 1. Heteroscedasticity-robust standard errors are shown in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Landesbank	3.56 (12.76)	5.68 (14.24)	12.00 (13.73)	10.31 (13.37)	13.40 (12.75)	9.17 (14.44)	18.26 (17.63)
After July 2001	55.54*** (9.67)	36.40*** (9.16)	39.15*** (8.71)	35.93*** (8.62)	30.75*** (8.03)	12.55* (7.32)	12.57* (7.60)
LaBa*After July 2001	-56.55*** (15.51)	-45.05*** (16.44)	-48.37*** (15.88)	-45.42*** (15.83)	-40.52*** (15.28)	-38.51** (17.00)	-65.28** (30.11)
Maturity		61.17*** (5.85)	55.67*** (5.87)	46.17*** (5.83)	49.48*** (9.09)	57.24*** (9.32)	66.25*** (11.68)
Facility Size (logs)		-18.89*** (2.23)	-17.66*** (2.22)	-11.82*** (2.81)	-8.28*** (2.71)	-7.44*** (2.82)	-5.63* (3.43)
Secured			-31.49*** (8.24)	-23.26*** (8.6)	-19.32** (8.74)	-16.25* (8.95)	-21.07* (12.72)
Covenants			43.45*** (12.12)	28.39** (12.46)	27.02** (11.82)	19.98 (12.37)	8.33 (15.21)
Publicly Listed				-29.30*** (9.11)	-14.07 (8.66)	-11.09 (9.66)	-12.34 (11.38)
Investment-Grade				-82.53*** (14.98)	-87.01*** (14.65)	-79.91*** (14.51)	-55.13*** (17.05)
Not Rated				-45.29*** (14.01)	-50.71*** (13.93)	-39.88*** (14.55)	-22.47 (16.13)
Dummy Term Loan					-41.07* (22.12)	-47.74** (22.34)	-65.15** (27.31)
Dummy Bridge Loan					38.18* (22.70)	32.73 (22.01)	42.34 (27.37)
Dummy Revolver $\geq 1$					-78.00*** (19.76)	-83.88*** (20.14)	-98.10*** (24.51)
Dummy Debt Repay.					-59.18*** (8.79)	-65.76*** (9.54)	-70.44*** (10.98)
Dummy LBO Purp.					21.40* (11.03)	18.81* (11.12)	27.43* (14.19)
Dummy Corp Purp.					-58.40*** (9.99)	-47.35*** (10.31)	-51.29*** (11.62)
Total Assets (logs)							-4.32* (2.42)
Profitability (logs)							-14.34 (16.78)
Leverage							66.88*** (24.99)
Coverage (logs+1)							-2.29** (0.95)
Current Ratio							-1.37 (1.53)
Constant	113.25*** (7.76)	238.10*** (56.39)	216.88*** (55.24)	207.72*** (64.42)	193.26*** (63.84)	165.25** (74.1)	163.46* (94.96)
Industry Fixed Effects	No	No	No	No	No	Yes	Yes
Year Fixed Effects	No	No	No	No	No	Yes	Yes
Observations	1,607	1,454	1,454	1,454	1,454	1,454	1,021
$R^2$	0.024	0.177	0.194	0.212	0.272	0.296	0.361

**Table 7****Rating Downgrade, Borrower Risk and Loan Spreads (Bivariate Test)**

This table reports mean difference-in-differences (DiD) estimates of borrower risk and loan spreads. Lead arrangers are classified into two groups: Landesbanken who expect the highest rating downgrade (upper half) of their senior unsecured debt after the removal of the state guarantee rating (“high-downgrade”) and other Landesbanken active in the loan market (“low-downgrade”). Panel A report the results for borrower risk proxied by the Z-Score. Panel B reports the results for loan spreads measured using the All-In-Spread-Drawn (AISD). All variables are defined in Table 1. Heteroscedasticity-robust standard errors are shown in parentheses. The DiD estimates are shown in bold. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

<b>Panel A: Z-Score</b>				
	All	High Downgrade	Low Downgrade	Difference
Before July 2001	-0.103 (0.09) [70]	-0.081 (0.12) [37]	-0.129 (0.14) [33]	0.048 (0.19)
After July 2001	-0.632 (0.06) [342]	-0.763 (0.07) [210]	-0.422 (0.11) [132]	-0.341*** (0.13)
Difference		0.682*** (0.14)	0.294* (0.17)	<b>-0.389**</b> <b>(0.20)</b>
<b>Panel B: AISD</b>				
	All	High Downgrade	Low Downgrade	Difference
Before July 2001	116.8 (10.2) [70]	122.6 (14.5) [37]	110.4 (14.4) [33]	12.2 (20.4)
After July 2001	115.8 (6.7) [342]	101.2 (8.5) [210]	139.0 (10.4) [132]	-37.8*** (13.5)
Difference		21.4 (16.8)	28.7 (17.8)	<b>-50.0**</b> <b>(24.3)</b>

**Table 8**  
**Rating Downgrade and Borrower Risk**

This table reports the results of an OLS regression relating borrower risk to lead arranger, loan and borrower characteristics. The dependent variable is the Z-Score. Models (5) and (6) include the full set of explanatory variables, model (6) also industry and year fixed effects. *LaBa.High.Downgrade \* After.July.2001* is the DiD estimate under the  $H_0$  that the DiD estimate is equal to zero. Intercept, industry and year fixed effects are not shown. All variables are defined in Table I. Heteroscedasticity-robust standard errors are shown in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
LaBa High Downgrade	0.048 (0.18)	0.060 (0.19)	-0.028 (0.19)	-0.010 (0.2)	0.304 (0.19)	0.279 (0.23)
After July 2001	-0.294* (0.17)	-0.316* (0.18)	-0.264 (0.18)	-0.205 (0.2)	-0.176 (0.2)	-0.688 (0.75)
LaBa High Downgrade*After July 2001	-0.389** (0.20)	-0.536** (0.23)	-0.422* (0.23)	-0.453* (0.23)	-0.689*** (0.22)	-0.714*** (0.27)
Maturity		0.031 (0.09)	0.063 (0.09)	0.028 (0.09)	0.048 (0.11)	0.086 (0.11)
Facility Size (logs)		-0.031 (0.03)	-0.057 (0.04)	-0.031 (0.04)	-0.057 (0.04)	-0.087* (0.04)
Secured			-0.449*** (0.09)	-0.467*** (0.1)	-0.293*** (0.1)	-0.222* (0.12)
Covenants			0.042 (0.15)	0.066 (0.16)	0.100 (0.16)	-0.111 (0.19)
Publicly Listed				-0.192 (0.14)	-0.394** (0.16)	-0.401** (0.16)
Investment-Grade				0.030 (0.22)	0.045 (0.23)	0.227 (0.25)
Not Rated				0.053 (0.17)	0.090 (0.18)	0.159 (0.21)
Dummy Term Loan					0.040 (0.16)	0.017 (0.17)
Dummy Bridge Loan					-0.053 (0.27)	-0.029 (0.3)
Dummy Revolver $\geq 1$					0.080 (0.18)	0.093 (0.18)
Dummy Debt Repay.					-0.088 (0.15)	-0.172 (0.17)
Dummy LBO Purp.					-0.619*** (0.16)	-0.692*** (0.18)
Dummy Corp Purp.					0.153 (0.2)	0.109 (0.21)
Constant	0.129 (0.14)	0.348 (1.02)	0.787 (1.04)	0.428 (1.07)	0.867 (1.02)	2.156 (1.48)
Industry Fixed Effects	No	No	No	No	No	Yes
Year Fixed Effects	No	No	No	No	No	Yes
Observations	412	372	372	372	372	372
$R^2$	0.055	0.098	0.133	0.141	0.182	0.249

**Table 9**  
**Rating Downgrade and Loan Spreads**

This table reports the results of an OLS regression relating loan spreads to lead arranger, loan and borrower characteristics. The dependent variable is the AISD. Models (6) and (7) include industry and year fixed effects and model (7) additionally uses the full set of explanatory variables. *LaBa.High.Downgrade \* After.July.2001* is the DiD estimate under the  $H_0$  that the DiD estimate is equal to zero. Intercept, industry and year fixed effects are not shown. All variables are defined in Table I. Heteroscedasticity-robust standard errors are shown in parentheses. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
LaBa High Downgrade	12.20 (20.25)	13.58 (20.85)	16.77 (20.84)	11.14 (20.51)	16.90 (21.47)	15.72 (23.71)	11.07 (21.78)
After July 2001	28.66 (17.65)	21.43 (18.53)	21.48 (17.18)	27.86 (17.84)	22.51 (15.69)	45.28 (40.11)	55.71 (71.29)
LaBa High Down.*A. July 2001	-50.01** (24.33)	-62.42** (24.73)	-66.97*** (25.14)	-72.72*** (24.74)	-53.32** (24.55)	-49.88** (25.32)	-75.20** (32.70)
Maturity		19.63*** (7.56)	18.07** (7.32)	13.69* (7.27)	11.15* (6.48)	10.82* (6.42)	29.31** (14.10)
Facility Size (logs)		-13.43*** (3.77)	-11.41*** (3.96)	-7.18* (4.21)	-3.59 (4.43)	-5.47 (4.34)	-5.41 (4.31)
Secured			-25.54* (13.18)	-22.11* (13.4)	-10.78 (14.4)	-13.37 (13.70)	-9.32 (18.24)
Covenants			21.69 (17.52)	19.96 (17.99)	17.60 (16.91)	20.44 (22.1)	28.29 (33.08)
Publicly Listed				-25.71** (12.2)	-16.76 (10.11)	-13.13 (13.09)	-18.36 (18.75)
Investment Grade				-34.18 (22.52)	-72.89*** (25.12)	-44.66** (21.26)	-41.91** (21.15)
Not Rated				-13.93 (20.58)	-38.84* (22.72)	-21.42* (12.27)	-21.60* (13.95)
Dummy Term Loan					-33.80** (16.79)	-22.59 (13.41)	-20.68 (25.55)
Dummy Bridge Loan					14.70 (25.83)	10.34 (26.24)	9.30 (48.64)
Dummy Revolver $\geq 1$					-9.91 (16.01)	-5.43 (16.92)	-22.02 (23.84)
Dummy Debt Repay.					-38.35*** (12.37)	-56.47*** (12.7)	-64.79*** (18.68)
Dummy LBO Purp.					76.74*** (20.53)	83.85*** (19.73)	62.85* (36.19)
Dummy Corp Purp.					-21.14 (15.64)	-19.05 (17.75)	-14.97 (24.6)
Total Assets (logs)							-7.34** (2.9)
Profitability (logs)							13.59 (14.45)
Leverage							18.95* (10.39)
Coverage (logs+1)							-12.76*** (4.76)
Current Ratio							-1.54 (2.92)
Constant	110.36*** (14.22)	293.06*** (90.17)	252.45*** (94.06)	211.50** (100.29)	203.11** (100.35)	181.45 (128.34)	168.49* (100.59)
Industry Fixed Effects	No	No	No	No	No	Yes	Yes
Year Fixed Effects	No	No	No	No	No	Yes	Yes
Observations	412	372	372	372	372	372	223
$R^2$	0.021	0.119	0.132	0.144	0.248	0.356	0.404

**Table 10****Removal of State Guarantee: Share Retained by Lead Arranger**

This table reports mean difference-in-differences (DiD) estimates of the (actual) share retained by each lead arranger. Lead arrangers are classified into two groups: Landesbanken who are affected by the removal of the state guarantee after July 2001, and Non-Landesbanken. All variables are defined in Table 1. Heteroscedasticity-robust standard errors are shown in parentheses. The DiD estimate is printed in bold. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

<b>Share Retained by Lead Arranger</b>				
	All	Landesbank	Non-Landesbank	Difference
Before 19 July 2001	9.41%	8.90%	9.47%	0.57%
	(0.42%)	(1.11%)	(0.45%)	(1.38%)
	[304]	[32]	[272]	
After July 2001	12.77%	14.47%	12.43%	-2.04%**
	(0.37%)	(0.91%)	(0.40%)	(0.98%)
	[901]	[153]	[748]	
Difference		<b>-5.57%***</b>	<b>-2.96%***</b>	<b>2.61%***</b>
		(2.05%)	(0.72%)	<b>(0.86%)</b>

**Table 11**

**Removal of State Guarantee, Borrower Risk and Loan Spreads: Until 2004 & Cash Holdings**

Panel A reports the results of OLS regressions relating Z-Score (column (1)) and AISD (column (2)) to our main inference variables controlling additionally for the ratio of “Cash & Cash Equivalents to Total Assets.” All control variables shown in the previous models are included and defined in Table I. Panel B reports mean difference-in-differences (DiD) estimates of borrower risk and loan spreads. Lead arrangers are classified into two groups: Landesbanken who are affected by the removal of the state guarantee and Non-Landesbanken. However, the “After July 2001” observation period ends in 2004 (instead of 2008). Heteroscedasticity-robust standard errors are shown in parentheses. The DiD estimate in Panel B is printed in bold. \*, \*\*, \*\*\* denote significance at the 10%, 5% and 1% level, respectively.

<b>Panel A</b>	<b>Z-Score (1)</b>	<b>AISD (2)</b>
LaBa High Downgrade	0.219* (0.25)	14.56 (24.44)
After July 2001	-0.713 (0.77)	54.17 (38.38)
LaBa High Downgrade*After July 2001	<b>-0.0523**</b> (0.26)	<b>-99.52**</b> (46.42)
[...]		
Cash & Cash Equivalents to Assets	-0.025 (0.08)	-13.21 (14.87)
Observations	367	223
$R^2$	0.219	0.394

<b>Panel B</b>				
<b>Z-Score</b>	All	Non-Landesbank	Landesbank	Difference
Before July 2001	-0.184 (0.05) [234]	-0.103 (0.09) [70]	-0.219 (0.06) [164]	-0.115 (0.11)
After July 2001	-0.341 (0.05) [324]	-0.669 (0.13) [44]	-0.290 (0.06) [280]	0.379** (0.15)
Difference		0.565*** (0.16)	0.071 (0.08)	<b>-0.494***</b> <b>(0.18)</b>
<b>AISD</b>	All	Non-Landesbank	Landesbank	Difference
Before July 2001	114.3 (6.2) [234]	116.8 (10.2) [70]	113.3 (7.8) [164]	-3.6 (12.8)
After July 2001	142.6 (8.1) [435]	113.2 (15.2) [71]	148.3 (9.2) [364]	35.1** (17.7)
Difference		3.6 (18.3)	-35.1*** (12.0)	<b>-38.6*</b> <b>(21.8)</b>