THE IMPACT OF STATE GUARANTEES ON BANKS' RATINGS AND RISK BEHAVIOUR

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Abstract

State guarantees are supposed to have positive influence on banks' ratings as they provide an additional safety net to depositors while lending the guarantor's creditworthiness to the bank. Based hereupon, we research if and to what extent guarantees perceptibly affect market prices of securities issued by banks. Our results indicate that banks receive governmental rating subsidies of up to 7 notches depending on the region. Furthermore, literature suggests that guarantees and subsequent bailout expectations increase the risk appetite of banks enjoying this governmental support, as protected actors feel less incentivized to apply market discipline. Based hereupon, we consider the possibility of reversed causality: Is the probability of bailouts correlated to a bank's risk taking? Analysing the drivers of governmental support for different types of banks, we find that governments are particularly willing to bail out (traditional commercial) banks with low returns on investment, or weak share performance, and a higher exposure to risk.

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1. Introduction

To discuss the institutional function of banks and non-bank financial institutions in 'capitalist'-oriented states has a long tradition and gained particular momentum since the 1950s[39]. In recent years, the worldwide financial and economic crisis between 2007 and 2011 showed once again that the development of national economies depends on the well-being of particular, systemically important financial institutions[40]. Being aware of that fact, market participants tested the resilience of the banking sector, and were proven right: During the crisis, governments had been intervening in the financial market on several occasions trying to avert the insolvency of institutions they deemed *global systemically important banks* (*G-SIB*s), thereby accepting high government re-indebtedness.[41] However, as shown in the course of the crisis, 'smaller' banks received financial aid, too.

If financial institutions (and, among them, mainly credit institutions) are overtly or covertly categorised as being systemically important, they gain an additional safety net shielding them from insolvency[42]. Traditionally, this approach – and its contradiction to market economic principles – is justified by politicians and regulators on the basis of the argument that the economic costs of a market exit of a systemically important bank are higher than the costs of a bailout by the government, and that the stability of the financial system is a public good anyway.

Therefore, it seems obvious that some financial institutions and in particular banks receive a kind of subsidies from their governments in general. However, the value of this governmental support waits to be estimated. This paper provides a clear and traceable way for the (1) identification and (2) valuation of governmental support for banks by analysing the support embedded in their credit ratings. Prior research on the topic of implicit

[39] See with further references Moosa (2010), p. 11; Schönfelder (2012), p. 12.

[40] See for statements on level of the G20: G20 (2008), p. 1 and 3 as well as G20 (2009), p. 3.

[41] For a comparative overview of (the compatibility of) European and US interventions since the financial crisis, see Goldstein/Veron (2012).

[42] See representatively Stern/Feldman (2004), pp. 17-18, and Moss (2009), p. 1f.

government subsidies for banks – although with differing approaches – has been done by Soussa (2000), Morgan/Stiroh (2005), Rime (2005) and Schich/Lindh (2012). To this the authors' knowledge, only Ueda/Weder di Mauro (2013) use a comparable approach to valuate rating and financing subsidies for banks.

The remainder of this paper is structured as follows. *Section 2* outlines the general rationale and problem of governmental guarantees. In *Section 3*, the type of rating used for analysis of state guarantees is defined, followed by a descriptive presentation of the distribution of explanatory variables of the banking (sub-)samples. *Section 4* starts with a brief presentation of the empirical regression methodology and subsequently depicts the results for the estimation of governmental support. A novel connection from rating spreads to banking financials is presented in *Section 5* to assess determinants of government support for banks. *Section 6* concludes with remarks on policy implications.

2. The Basic Rationale and Problem of Governmental Guarantees

In a market economy, governments are allowed to intervene only if a market failure is detected which can be corrected effectively and efficiently by the intervention. Regardless of these requirements, governments de facto intervene for various reasons, some of them still rooted in public interest considerations, some in personal interest considerations of political and regulatory entrepreneurs. This is why regulation always will be as imperfect as the markets it is aimed at – and sometimes even worsen things.[43]

In most countries, the entirety of governmental intervention in the banking market is a complex structure of a considerable number of written and unwritten rules and organizations executing them. As well most countries share the basic rationale of banking regulation, which is based on (1) depositor protection and (2) system protection.[44] Pivot human actors are private household depositors of banks who lend debt capital to banks in spite of the opaqueness of these financial institutions, which exposes them to various risks rooted in asymmetric information, i.e. forms of adverse selection and moral hazard on the banks' side[45]. As a bank failure would hit them inappropriately hard, these consumers are deemed protection-worthy; because they have limited abilities to distinguish bad banks from good banks, and thus base their lending on trust considerably, and are prone to panic, they are deemed protection-needy, too. Furthermore, protecting depositors helps to dissuade them from starting a run on their bank, which would inevitably lead to the institution's failure because of a combination of insufficient liquidity to meet all withdrawal demands and losses incurred during subsequent fire sales of bank assets. In the end, depositor protection serves the aim of system protection, too: All the banks build a closely knit network, and a run on one bank will not remain an isolated event, but will contagiously affect an unknown number of connected banks thereafter. This particularly holds for banks that are of special meaning, making them too-important-to(-be-allowed-to)-fail, usually abbreviated to too-big-to-fail (TBTF)[46].

Under imperfect knowledge and fundamental uncertainty, governmental intervention cannot prevent any bank failure in the first place. Consequently, most financial systems do not only contain the continuous regulation and supervision of banks which is designed to preclude or at least detect unsound practices early, allowing for regulatory countermeasures. Additionally, special institutions are designed to prevent either a bank failure itself a priori or too serious consequences of it a posteriori. Partly, these special organizations are set up to rescue a bank or its customers, i.e. deposit insurance schemes[47] and lenders-of-last-resort (LOLR)[48]. The principle of the latter can be summarized as follows: If a bank fails, politicians and regulators have to evaluate the probable consequences. If they conclude that those would be more unwelcome than a rescue mission that violates market economic principles, they intervene in the market by bailing out the bank.

Governmental guarantees represent a particular case of LOLR – and of insurance: The government promises to rescue a certain bank in a situation where its economic survival is endangered. Unfortunately, this not only means rescue in case of urgency, but also induces particular moral hazard before: "Any form of insurance, and liquidity and capital support are no exception in this respect, creates moral hazard."[49] According to the *market discipline*

[43] On the two-sided imperfection, see in particular Benston (1998), p. 13. For an explicitly skeptical view on regulation, see the Austrian works as of von Mises, e.g. von Mises (1949), p. 854.

[44] Because of their interconnectedness, and the comparably little opaqueness of banking, depositor protection has been criticized to be no sufficient single rationale for banking regulation, see e.g. Benston (2000).

[45] On the opaqueness of banks as seen by depositors, see in particular the seminal contributions of Douglas Diamond, i.e. Diamond/Dybvig (1983); Diamond (1984); Diamond (1989).

[46] The term 'too big to fail' (TBTF) is misleading and is often wrongly understood, but has established itself as part of the political, and scientific discussion. For an explanation of the origins of the phrase, see Safire (2008).

[47] On the (history of the) concept of deposit insurance, see (in brief) Calomiris (1990); and (extensively) the compilation edited by Campbell et al. (2007). On the costliness of government deposit insurance, see Hogan/Luther (2014).

[48] The concept goes back to Henry Thornton and – later – Walter Bagehot and their considerations on the role of a central bank; for encompassing retrospectives including a history of thought, see Goodhart (1999), pp. 340-342; Humphrey (2010), pp. 334-352.

[49] Freixas et al. (2000), p. 73.

hypothesis[50] this moral hazard is attributed to guarantees because they are deemed to incentivize the beneficiaries as well as decision-makers in banks to reduce prudent action while engaging in riskier activities. Normally, bank managers would measure chances of a decision against the risk of stakeholder pressure and job loss. But if they interpret a governmental guarantee of their bank as a job guarantee, they are prone to neglect (even high) risk and to focus on return only instead. Normally, stakeholders would sanction riskier policies by demanding compensation, in particular by adding risk premia to the (interest) rate they call for. But if they are sure of the persistence of their bank due to governmental guarantees, they might reduce their corporate control activities and waive the necessary risk premium.

At first sight, governmental guarantees seem to be nothing but large-scale credit insurance, as the government promises compensation in cases of insolvency of the bank as the debtor. Obviously, a bank profits from such a guarantee as part of the creditworthiness of the guarantor is attributed to the guarantee. Consequently, its access to capital becomes easier and less costly. At second sight, guarantees provide a second positive effect on a systemic level. Also on this level, it is a characteristic feature of these governmental guarantees that if they seem trustworthy, they will be a promise that is not going to be tested – because it is so widely believed, as can be illustrated by the following example: For reasons named above, it has been hardly discussed that depositors of German banks had started to withdraw funds in the autumn of 2008, after the world had observed the insolvency of Lehman Bros., a company that had seemed to be a prototype of a TBTF, thus governmentally guaranteed bank.[51] The German government decided to stop the evolving withdrawal process by making a very encompassing governmental guarantee explicit: Chancellor Merkel and Minister of Finance Steinbrück appeared on TV, stating that savings deposits of depositors were safe.[52] Although it is more than doubtful that the government would be have been able to stand up for more than € 500 billion, the general guarantee announced could restore confidence and brought withdrawals to an end.

The value of a guarantee depends significantly on the confidence market participants have in it. This leads to the question if and by which means this value could be quantified. If a valuation turns out to be possible, it might also allow for an analysis of drivers of governmental support.

3. Data and Samples Description

The most widely known and communicated rating class for financial institutions is the long term issuer credit rating (*LT issuer rating*) that "opines on an entity's relative vulnerability to default on financial obligations"[53]. Besides the overall *LT issuer rating*, the rating agency Fitch Ratings[54] provides a *viability rating* measuring an institution's intrinsic creditworthiness, a *support rating floor* and a *support rating* measuring the probability of governmental / parental support. This enables the separation of the external support element in banks' *LT issuer ratings*. Fitch defines (1) *Viability rating*, (2) *Support rating floor* and a (3) *Support rating* as follows (see also Table 3):

1. "*Viability ratings* ... represent Fitch's view as to the intrinsic creditworthiness of an issuer. … The [viability rating] excludes any extraordinary support that may be derived from outside of the entity as well as excluding potential benefits to a bank's financial position from other extraordinary measures, including a distressed restructuring of liabilities."[55]

2. "*Support rating floors* (SRFs) reflect the agency's view about the likelihood that the rated entity will receive extraordinary support, in case of need, specifically from government authorities [national authorities, international government institutions]."[56]

3. *"Support ratings* ... are Fitch Ratings' assessment of a potential supporter's propensity to support a bank and of its ability to support it. … Support Ratings do not assess the intrinsic credit quality of a bank. Rather they communicate the … judgment on whether a bank would receive support should this become necessary."[57]

[50] Earliest discussions go back to Merton (1977). For a current analysis of the market discipline hypothesis see Flannery (1998) and Gropp/Vesala/Vulpes (2006).

[51] Probably, the insolvency of US-american Lehman Bros. will remain the most outstanding case regarding size, speed, surprise, and consequence, see e.g. Brunnermeier (2009); Summe (2009).

[52] See e.g. Dougherty (2008).

[53] Fitch Ratings (2013), p. 9.

[54] Fitch, the third-largest rating agency after S&P's and Moody's has approx. 350,000 outstanding ratings (see SEC [2012], p. 6).

[55] Fitch Ratings (2013), p. 25.

[56] Ibid, p. 23.

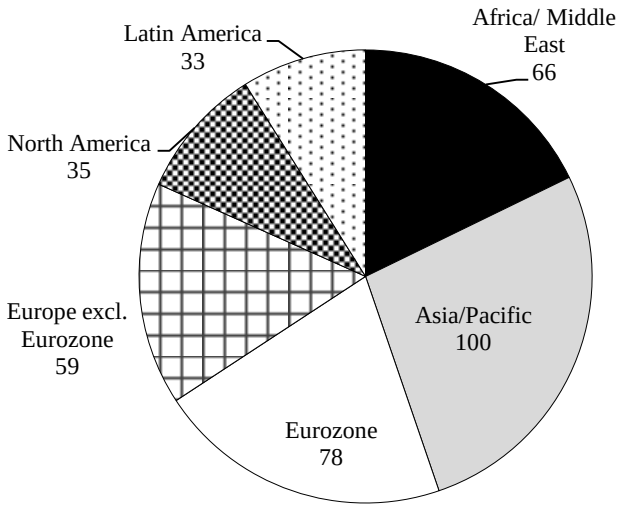
[57] Ibid, p. 24.

Table 1. Comparison of Fitch's ratings

	LT issuer rating	*Viability Rating*	*Support rating floor*	*Support rating*
Intrinsic strength	x	x		
Institutional support	x			x
Sovereign support	x		x	x

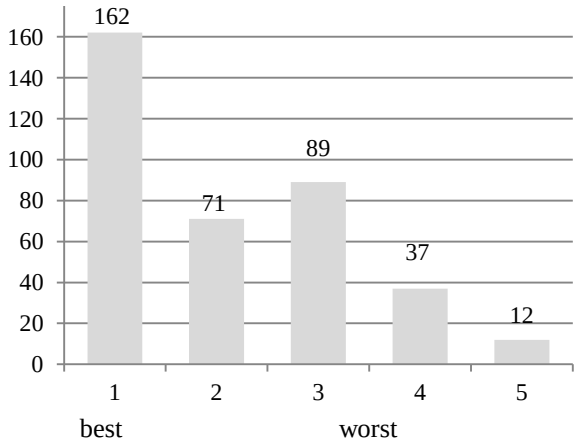
Ratings from 2,737 bank issuers were obtained from Fitch's online ratings database on 27 Mar 2014. The date of the latest rating update ranges from 27 Mar 2014 to 09 Apr 2013, by the latest. The data had to be cleaned in several respects: Firstly, those institutions with withdrawn long term issuer ratings and those without both a support rating floor and viability rating had to be sorted out. Secondly, if the state in which the bank had its headquarters was not rated by Fitch but by S&P's or Moody's (the case for: United Arab Emirates, South Korea, Belarus, Oman, Qatar, Jordan), their ratings have been taken as alternative (Four rated banks headquartered in Uzbekistan had to be dropped from the sample due to a missing sovereign rating). The *full sample* amounts to 371 banks. Almost 37 per cent of the banks are located in Europe (27 sovereign states and dependent territories) (see Figure 1). There is data for 100 banks from the region Asia/Pacific, and the American banks (North and Latin America) amount to 68.

Figure 1. Regional distribution of 371 bank sample



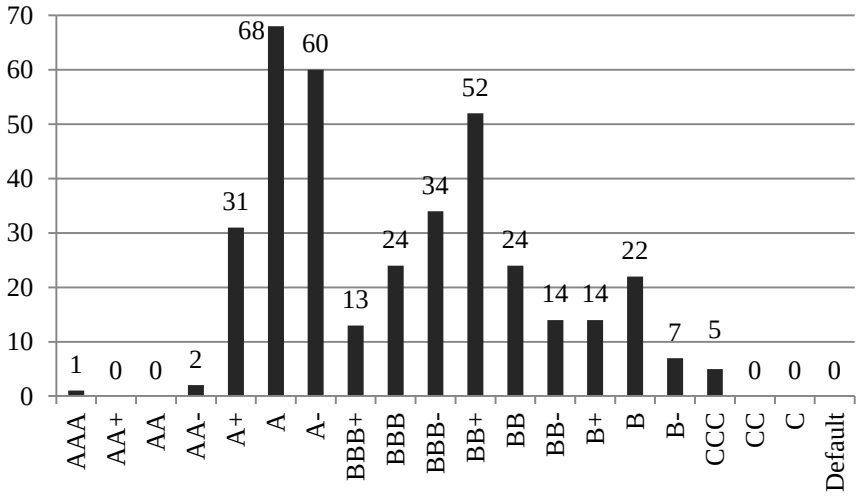
Source: authors' figure and calculations

Figure 2. Distribution of support ratings



Source: authors' figure and calculations

Figure 3. Distribution of support rating floors in the 371 bank sample

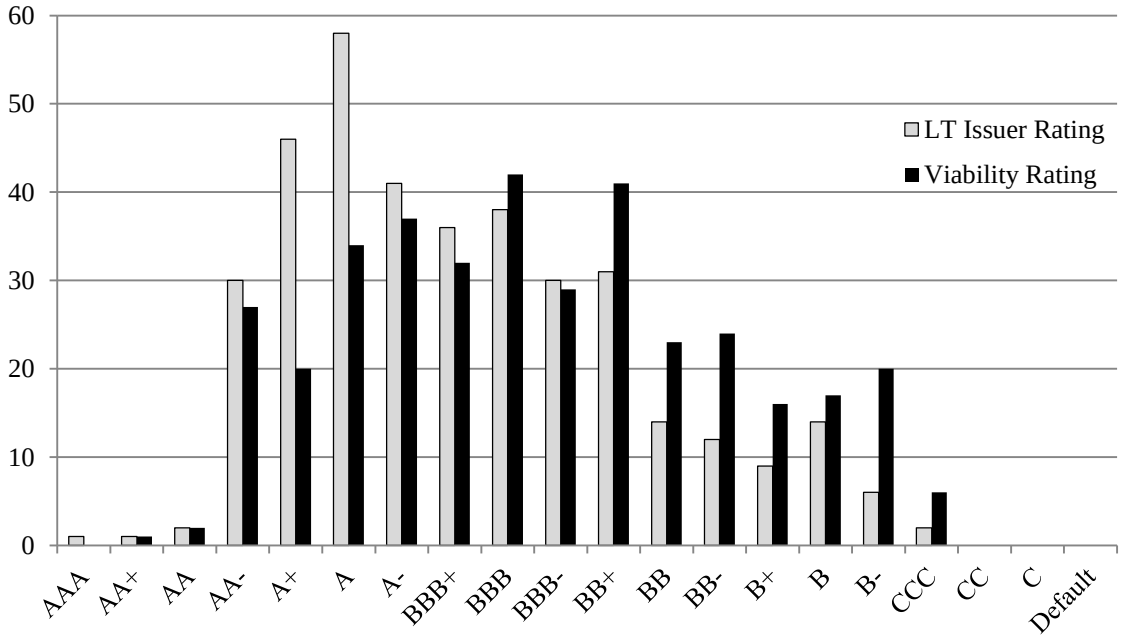


Source: authors' figure and calculations

Fitch's rating scales between different products are matched and numerically transformed: Fitch uses the AAA rating scale for *LT issuer ratings*. For numerical reasons, numeric values from 1 to 20 are assigned, with 20 denoting the highest rating (AAA) and 1 denoting D (default) (Note that the modifiers "+" or "–" may be appended to a rating to denote relative status within major rating categories. Such suffixes are not added to the "AAA" category, nor to categories below "B" (see Fitch [2013], p. 10)). It is the same with *viability ratings*, *support rating floors* and *sovereign ratings* of those countries where the respective banks are headquartered, which are used as another input variable in the following empirical analysis (For an overview of the assignments, see Appendix Table 1).

Unsurprisingly, LT issuer ratings of the *full sample* are – on average – higher (~1.3 notches) than viability ratings, since they consider both the individual strength (viability rating) and the probability of a governmental bailout (support rating floor), as shown in Figure 4 and Table 2. The histogram in Figure 3 shows the distribution of the support rating floor. There are a high number of financial institutions (102) with a rating of "A" or better at which "the potential provider of support is very highly rated in its own right and has a very high propensity to support the bank in question" (Ibid).

Figure 4. Distribution of LT issuer, and viability rating



Source: authors' figure and calculations

Table 2 below shows descriptive statistics on the distribution of the LT issuer rating, the viability rating, and the support rating floor in the *full sample* as well as six subsamples, namely:

1. G-SIB: On 11 Nov, 2013, the Financial Stability Board published an "Update of group of global [sic] systemically important banks (G-SIBs)" (Financial Stability Board (2013b), p. 4). The updated list of that international standard-setter (closely connected to the BIS) contains 29 global systemically important banks (G-SIB) (For the list of G-SIB Banks, see Appendix Table 2). During the last financial crisis, those institutions sent "shocks through the financial system which, in turn, harmed the real economy" (Financial Stability Board (2013a), p. 2). Since these institutions are deemed too big to fail (TBTF) – by both the regulator and market participants – they may receive extraordinarily high government subsidies. A comparatively high mean support rating floor of 14.59 supports this assumption (see Table 2).

To account for regional differences, the following regional sub-samples are applied:

1. Eurozone: This sample contains data of 78 banks from 18 members of the currency union.
2. Europe excl. Eurozone: This sample contains data of 59 banks from the 9 sovereign states and dependent territories on the European continent.
3. North America: This sample merges data of 35 US and Canadian banks. The sovereign ratings of both countries are identical (Therefore, the standard deviation is equal to 0).
4. Asia: This sample of 100 banks covers the Asian continent (including the Pacific region).
5. Latin America: A small Latin America sample (33 banks) is selected for comparison purposes.
6. Africa/Middle-East: An Africa/Middle-East sample (66 banks) is also selected for comparison purposes.

Table 2. Summary statistics for ratings

		LT issuer rating			Viabilit rating		Support rating floor		Sovereign rating	
		Count	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.	Mean	St.Dev.
Full Sample		371	12.77	3.20	11.45	3.55	11.79	3.27	15.18	4.17
(1)	G-SIB	29	15.24	1.15	14.48	2.01	14.59	1.02	18.24	2.50
(2)	Eurozone	78	12.87	2.76	10.99	3.74	12.22	2.79	15.71	3.82
(3)	Europe excl. Eurozone	59	12.00	3.95	11.39	4.11	10.73	3.80	14.73	4.98
(4)	North America	35	16.03	0.92	15.54	1.82	14.86	0.43	20	-
(5)	Latin America	33	11.45	2.53	11.24	2.51	9.94	2.55	11.85	2.27
(6)	Africa/ Middle-East	66	12.82	3.65	10.12	2.95	12.59	3.86	14.85	4.41
(7)	Asia/Pacific	100	12.39	2.72	11.36	3.17	11.09	2.67	14.68	3.46

Source: authors' calculations

4. Estimation of government support for banks

4.1 Methodology

A regression analysis is applied to estimate the value of government support on the LT issuer rating for bank *i*. The dependent variable is the long term issuer rating (*LT_issuer*) of bank *i*. This overall rating of bank *i* shall be explained by the bank's viability rating (*Viability*), its support rating floor (*Support rating floor*), and the sovereign rating (*Sovereign*) of the country where the respective entity's headquarters are located. This leads to the following regression analysis:

$$LT\_issuer_i := \alpha_{0_i} + \alpha_1 \cdot Viability_i + \alpha_2 Support\ rating\ floor_i + \alpha_3 \cdot Sovereign_i + \varepsilon_i$$

Since all variables only take discrete values on an ordinal scale (1 to 20, or 1 to 5) an *ordered probit regression* is applied in Stata.[58] We are able to exclude multicollinearity after calculating the variance inflation factors and the correlations of the estimated coefficients (see sppendix Table 4, Table 5).

[58] For more information on the use and advantages of the ordered probit regression, see Boes/Winkelmann (2006).

4.2 Results

Table 3 shows the results of the regression analysis for the full 696-bank sample and the eight subsamples. All coefficients α_1- α_3 are significant on a 99 % confidence level. Column 1 (*full sample*) indicates that a one-notch increase of the support rating floor ($Support\ rating\ floor$) is expected to effect a one-notch increase of LT issuer rating (*LT_issuer*) by odds of 0.6184 ($=\alpha_2$) or with a probability of 38.21 % $\left(=\frac{0.6184}{1+0.6184}\right)$, while the other variables in the model are held constant. The regression coefficients α_1 and α_3 for the *full sample* have lower values and, thus, a one-notch increase of the viability or sovereign rating is less likely to increase the LT issuer rating for one notch (0.4288 odds, e.g. 30.01 %, or 0.3073 odds, e.g. 23.51 %, respectively).

The subsamples bring even more interesting results. The high support rating floor coefficient for banks headquartered in Africa/Middle East – 4.8427 – asserts that the probability of an improvement of the LT issuer rating caused by a one-notch increase of the support rating floor is 82.88 % $\left(=\frac{4.8427}{1+4.8427}\right)$.

The results of the North America sample differ in several respects from those of the other samples: Firstly – due to comparably equal LT issuer and support rating floor ratings as well as a low number of observations –, the model suffers from poor explanatory power (Pseudo R^2=0.2093). Secondly, in contrast to the rest of the samples, the results indicate that a one notch increase of the support rating floor is more likely to reduce (14,29%) than increase the LT issuer rating of a North American bank. It means that banks with highest support get lower overall ratings. One explanation for this result could be that, should it become necessary, US policy makers are more willing to bail out those banks with riskiest business models. The Latin America sample leads to interesting results, too: A viability rating (61.81 %) and a sovereign rating (63.82 %) improvement have a higher impact on the banks' issuer ratings than the support rating floor (53.04 %), matching with Fitch's assessment that "the evolving dynamics of sovereign support for senior creditors of banks are not likely to affect Long-term Issuer […] Ratings […] of Latin American banks"[59].

LR chi² is the Likelihood Ratio Chi-Square test (with 2 and 3 degrees of freedom) that at least one of the coefficients $\alpha_1\ and\ \alpha_3$ is not equal to zero. *Prob>LR chi²* is the probability of obtaining the Likelihood Ratio Chi-Square test statistic (*LR chi²*) if the predictors *Viability*, *Support rating floor* and *Sovereign* have, in actuality, no impact on the independent variable *LT_issuer*.[60] *Pseudo R²* is a coefficient of determination of McFadden (1977). *Pseudo R²* is not an equivalent of R^2 of the linear regression, and should be interpreted with great caution.[61]

[59] Fitch Ratings (2014).

[60] See UCLA (2013).

[61] McFadden (1977), p. 307: "Values tend to be considerably lower than those of the R^2 index and should not be judged by the standards for a 'good fit' in ordinary regression analysis. For example, values of 0.2 to 0.4 … represent an excellent fit".

Table 3. Regression of banks' LT issuer ratings - results ordered probit regression

	Full Sample	G-SIB	Eurozone	Europe excl Eurozone	North America	Latin America	Africa/ Middle East	Asia/ Pacific
Viability rating (α_1)	0.4288***	0.5236***	0.4516***	0.9682***	0.4474***	1.6188***	0.8790***	0.5211***
Support rating floor (α_2)	**0.6184*****	**0.8527*****	**0.8598*****	**0.7576*****	**-0.1667*****	**1.1294*****	**4.8427*****	**0.5519*****
Sovereign rating (α_3)	0.3073***	0.4416***	0.2011***	0.3070***	-	1.7657***	1.9493***	0.4430***
cut 1	5.428	23.972	9.911	9.103	3.951	24.261	27.547	9.958
cut 2	7.144	25.323	11.514	11.486	4.939	39.235	50.677	11.414
cut 3	8.962	29.563	13.190	13.179	6.962	42.238	55.923	12.901
cut 4	9.947	30.392	15.179	14.220	-	47.598	71.708	14.330
cut 5	11.112	-	15.705	16.577	-	49.560	79.060	15.897
cut 6	12.223	-	17.381	18.277	-	53.946	81.583	17.369
cut 7	13.686	-	19.657	22.343	-	58.046	95.994	18.654
cut 8	14.722	-	21.306	25.633	-	65.670	107.356	19.923
cut 9	16.090	-	23.123	27.956	-	-	114.400	21.468
cut 10	17.573	-	25.220	31.890	-	-	118.640	23.406
cut 11	19.169	-	25.685	32.617	-	-	128.096	23.939
cut 12	20.688	-	26.022	35.625	-	-	-	-
cut 13	22.312	-	-	-	-	-	-	-
cut 14	24.072	-	-	-	-	-	-	-
cut 15	24.503	-	-	-	-	-	-	-
cut 16	25.128	-	-	-	-	-	-	-
No. of Obs.	371	29	78	59	35	33	66	100
LR chi² (3 df)	993	34	196	192	17†	107	249	248
Prob>LR chi²	0.0000	0.0000	0.0000	0.0000	0.0002	0.0000	0.0000	0.0000
Pseudo R²	0.5418	0.4223	0.5552	0.6998	0.2093	0.8281	0.8777	0.5523

*** Coefficient is significant on a 99 % confidence level. † 2 degrees of freedom (df)
Source: authors' calculations with data from Fitch's online rating database.

Cut 1 - *Cut 18* are the values of the estimated cut points on *LT_issuer* when *Viability*, *Support rating floor* and *Sovereign* are evaluated at zero. For the *full sample*, the following statements can be made: Because Cut 1 is 5.428 and Cut 18 is 25.128, stepping up one notch in the LT issuer rating requires about 1.3133 $\left(=\frac{25.128-5.428}{15}\right)$ of an additional score increase, potentially drawing from *Viability*, *Support rating floor* and / or *Sovereign*. Thus if *Support rating floor* was the only independent variable that changed, a one-notch increase would uplift *LT_issuer* in the *full sample* on average by 0.4709 $\left(=\frac{\alpha_2}{1.3133}=\frac{0.6184}{1.3133}\right)$; see Table 4.[62]

However, 0.4709 is an average value. The effect of a one-notch government support rating floor increase differs widely depending on the initial rating level: Moving from cut 5 to cut 6 (from BB- to BB) requires a step of $1.111\ (=12.223-11.112)$ to increase the LT issuer rating in the amount of one notch, whereas the move from cut 13 to cut 14 (from AA- to AA) requires a step of $1.760\ (=24.072-22.312)$. This would mean that the rating subsidy is more valuable for those banks with lower LT issuer ratings. This relation however, does not hold true throughout the samples. Therefore we can calculate analogously that a one-notch support rating floor increase for a B- rated bank is expected to increase the rating in the amount of 0.56 notches $\left(=\frac{0.6184}{1.111}\right)$. The expected effect of a one-notch support increase for an AA rated bank is 0.35 notches $\left(=\frac{0.6184}{1.760}\right)$.

[62] This interpretation was first suggested by Ueda/Weder di Mauro (2013), p. 3834.

Table 4. Average notch impact of a one-notch government support rating floor increase on the LT issuer rating

Full Sample	G-SIB	Eurozone	Europe excl. Eurozone	North America	Latin America	Africa/ Middle East	Asia/ Pacific
0.4709	0.3985	0.5869	0.3142	-0.1107	0.1909	0.4816	0.3956

Table 4 shows that the highest impact of support rating floors can be expected for the Eurozone and for Africa/Middle East. Again, the North American governments are expected to give the least support since an increased probability of Government support is expected to lead to a lower LT issuer rating for a bank. Latin American banks also receive little support, perhaps because their governments have neither the willingness nor the capacity to provide support should it be required.

By combining the average support rating floor for each sample (Table 2) and the average effect of a one-notch government support rating floor increase on the LT issuer rating in the corresponding sample (Table 4), an estimation for the overall notch impact of government support on the LT issuer rating can be made (Table 5).

Table 5. Overall notch impact of support rating floor on the LT issuer rating

Full Sample	G-SIB	Eurozone	Europe excl. Eurozone	North America	Latin America	Africa/ Middle East	Asia/ Pacific
5.552	5.814	7.172	3.371	-1.645	1.898	6.063	4.387

It means that, on average, banks headquartered in Africa/Middle East receive a six notches higher LT issuer rating (e.g. A instead of BB) than they would get without government support. The Eurozone sample receives the highest support with 7.172 notches but Asia/Pacific (4.387) and global systemically important banks (5.814) receive a comparably high LT issuer rating subsidy, too. Although the levels of the governmental rating subsidy in the subsamples are be quite remarkable, they remain comprehensible (e.g. a negative subsidy is observed for North America, and banks in the Eurozone receive more subsidy than those European banks outside the Eurozone). In periods of economic recession, i.e. when it really matters, mean spreads for debt yields of different rating classes are far higher than in 'normal times'. Governmental support is then far higher.

A LT issuer rating uplift due to governmental support has a direct influence on a bank's funding costs. Although a rating is a relative statement on the credibility of a debtor and does not include an explicit default probability, rating agencies do publish empirical cumulative default rates for different rating categories that could be used for bond price (and financing cost) estimation. Soussa (2000) proposes a theoretical method for the computation of structural annualised interest rate differentials derived from the expected present value of a bond.[63] Another preferable option would be to use market prices from bond indexes of various rating classes to derive interest rate differentials for different rating classes. Market prices are 'ideal indicators' for the informational content of an event, since they are the result of human expectations, knowledge, and actions of all the market participants – concentrated in one measure. However, this remains a task for future research. After this valuation of government support imbedded in banks' ratings, we turn our attention on the analysis of determinants for governmental support for those banks.

5. Drivers of government support for banks

5.1 Methodology

In theory, government support can affect banks' risk taking in two ways working in the opposite direction. The first, more obvious *market discipline hypothesis* argues that bank risk taking increases since state guarantees reduce market discipline [Sironi (2003), Gropp/Vesala/Vulpes (2006)]. Shareholders and creditors anticipate their bank's bail-out and therefore accept higher risk taking for increased profits. Secondly, *the charter value hypothesis* suggests decreased risk taking of banks since state guarantees affect banks' margins and consequently charter values positively [Keeley (1990)]. There is broad empirical literature on banks' behaviour under the influence of government support. Various measures can serve as a surrogate for government support: As a measure of explicit government support Demirguc-Kunt/Detragiache (2002) use deposit insurance and De Nicoló/Loukoianova (2007) use state ownership. Bank size as a rather very indirect measure of support is used by Boyd/Runkle (1993) and O'Hara/Shaw (1990). The results of those studies are mixed, suggesting that the net effect of government support on banks risk behaviour is ambiguous and depends on the extent of the two channels. Recent studies measuring governmental support embedded in credit ratings however have been able to prove increased

[63] In a similar paper, Ueda/Weder di Mauro (2013) also refer to Soussa (2000).

risk taking by banks that receive state guarantees [Brandao-Marques/Correa/Sapriza (2013)] and increased risk taking by competitors of those banks [Gropp/Hakenes/Schnabel (2010)].

This study is linked to those recent ones as it extracts the information on bailout probability embedded in ratings. However unlike similar studies, we look at a *reversed causality*: We analyze the determinants of government support. To put it simple: we ask which factors drive a government's willingness to bailout a bank should this become necessary?

According to theory, banks with highest risk (and also banks with lowest earning prospects) are most exposed to a bailout and therefore should receive the highest portion of state guarantees. To test those arguments, we run a simple linear OLS-regression on three types of ratings (calculations) is run using four measures for risk and profitability on five-year-average basis as *explanatory variables*:

- Investment return (5y average) as a measure of a bank's efficiency at allocating capital $\left(\frac{\text{net income}-\text{dividends}}{\text{total capital}}\right)$.
- Interest income ratio (5y average) as a measure of a bank's business model. High interest ratios indicate traditional commercial bank business $\left(\frac{\text{interest income}}{\text{non interest income}}\right)$.
- Share return (5y average) as a measure of market participants' view on future earnings prospects of a bank $\left(\frac{share\ price+dividends}{last\ years\ share\ price}\right)$.
- Equity ratio (5y average) as a measure for loss absorbency potential $\left(\frac{common\ equity}{total\ capital}\right)$.

After dropping those institutions from the 371 banks sample for which Worldscope provides no information on the four selected explanatory variables (5 year averages from financial statements of 2008 to 2012), a sample of *165 banks* remains.

Table 6. Descriptive statistics for the bank characteristics

	Mean	Median	Min	Max	St.Dev.
Investment return (5y avg.)	5.75%	4.75%	-3.26%	24.35%	4.45%
Interest income ratio (5y avg.)	3.85	3.18	0.39	18.29	2.77
Share return (5y avg.)	-5.54%	-4.88%	-67.27%	26.82%	15.66%
Equity ratio (5y avg.)	54.86%	56.58%	2.33%	100.00%	26.29%

The sample includes 165 banks.
Source: author's calculations with data from Worldscope.

As descriptive sample statistics (Table 6) show, the banks of the sample have been able to allocate capital investments with positive returns of 5.75% annually during the five financial years from 2008 to 2012. Therefore it is surprising that share returns do not reflect this development alowing a negative trend of -5.54% annual share price reductions (including dividends paid). One explanation could be the overall downward stock market trend during 2008 and 2012. The high ratio of interest income to non-interest income (Median 3.18) shows that the core business of most banks of the sample is commercial banking. However, as the standard deviation is 2.77 and the minimum observed value is 0.39, it would appear that the sample consist of two classes of banks: "traditional" banks focusing on deposit/lending activities, and "non-traditional" banks focusing on capital market investment/funding. The common equity ratio is comparatively high for a banking sample. One explanation would be the high portion of banks from developing markets that tend to have sounder leverage levels than European/North American banks.

Following regressions are conducted to estimate drivers of government support for banks (for *Support Rating*, definition see Section *3*, we use flipped values):

$$LT_{issuer\,i} - Viability_i \coloneqq \alpha_{0_i} + \alpha_1 \cdot Inv.Ret._i + \alpha_2 \cdot Interest_i + \alpha_3 \cdot ShareRet._i + \alpha_4 \cdot Equity_i + \varepsilon_i$$

$$Support\ Rating\ Floor_i \coloneqq \alpha_{0_i} + \alpha_1 \cdot Inv.Ret._i + \alpha_2 \cdot Interest_i + \alpha_3 \cdot ShareRet._i + \alpha_4 \cdot Equity_i + \varepsilon_i$$

$$Support\ Rating_{\ i} \coloneqq \alpha_{0_i} + \alpha_1 \cdot Inv.Ret._i + \alpha_2 \cdot Interest_i + \alpha_3 \cdot ShareRet._i + \alpha_4 \cdot Equity_i + \varepsilon_i$$

We are able to exclude multicollinearity after calculating the variance inflation factors (see Appendix Table 6).

5.2 Results

The results shown in table 7 present strong evidence that banks' risk taking drives governmental support: The probability of a governmental bailout is expected to decrease with increasing returns on invested capital. A bank that has positive returns on invested capital for a longer period of time is obviously in healthy condition and may be less close to a governmental bailout than banks in trouble. All three support measures show a negative influence of increasing returns on bailout probability, two of them are highly significant. The interest income ratio as a measure for a bank's income share from traditional lending and borrowing business has a significant

impact on the probability of governmental supporting of a bank. The positive effect of traditional bank business on the expected government support measured by *LT issuer rating viability rating* is plausible since banks mainly involved in traditional commercial banking have a broad customer base and many depositors. That makes a bailout more likely. However, the results of *Interest income ratio's* impact on *Support rating floor* and *Support rating* suggest a contrary dependence. The return of banks' shares significantly negatively affect the willingness of governments for a bail out, measured by *LT issuer rating - viability rating*.

Table 7. Regression of banks' support ratings

5 year average values of	*LT issuer rating - viability rating*	*Support rating floor*	*Support rating*
Investment return	-6.920	-20.359***	-8.219***
	(0.136)	(0.004)	(0.001)
Interest income ratio	0.232***	-0.172**	-0.082***
	(0.000)	(0.032)	(0.004)
Share return	-5.339***	-2.246	-0.413
	(0.000)	(0.179)	(0.488)
Equity ratio	2.817***	2.131**	0.777**
	(0.000)	(0.048)	(0.044)
No. of Obs.	165	165	165
R^2	0.296	0.1314	0.149
Adj. R^2	0.278	0.1097	0.128

* / ** / *** indicate significance at the 10% / 5% / 1% level. The *p*-values are denoted in parentheses.
Source: authors' calculations with data from Worldscope.

All the results for *Share return* show negative signs and therefore once again confirm that banks with falling share prices (and presumably struggling business models) are more likely to receive governmental support should this become necessary. The explanation of significant positive influence of banks' equity ratio as shown by the model is not obvious in the first place since one would firstly expect decreasing state support for banks with sufficient equity capital (and risk coverage potential). One possible explanation for this result could be the c*harter value hypothesis* suggesting that government guarantees effect banks' margins and consequently charter values like the equity positively. Another possible explanation would be again that banks with high equity ratios are those that do less engage in investment banking/proprietary trading but rather in commercial banking with deposit activities. In those cases, depositor protection in form of bank bailouts seems a priority for governments. However, in most cases the results validate our argumentation suggesting banks' risk taking increases governments' willing- and preparedness for support.

6. Conclusion

In the first part, this paper provides a clear and traceable method for the identification and valuation of governmental support for banks. The results indicate that banks implicitly receive rating and funding subsidies that are neither inconsiderable nor negligible. In the second part, we analyze which bank determinants influence governments' willingness to support a bank in case of distress. Depending on the measure for government support, we show that governments are most willing to bail out banks with high equity ratios. Furthermore, those banks with lowest returns on investment and worst share price performance receive comparably high government support imbedded in ratings.

Market failure, which is effectively and efficiently corrected, could justify such kind of regulatory interventions – that are factually subsidies. However, there are no comparable lines of argument for those subsidies in the given case. In contrast, governments should make every effort to diminish their support, since it leads to a distortion market competition on markets and to adverse effects like *moral hazards*. Under these conditions, yield-oriented decision makers of a systemically important financial intermediary are given the incentive to choose a riskier business strategy, since market disciplining (e.g. through increased interest requirement adequately reflecting enhanced risk taking) is weakened.[64] Since these processes interfere with or even eliminate the selection function of the (financial) market, (in particular: global systemically important) banks are incentivized to act, i.e. invest and grow in ways that threaten to pose inappropriately high negative external effects on the financial system and the economy as a whole. In the long run, this can lead to different forms of market failure (e.g. survival of inefficient actors, instability

[64] See O'Hara/Shaw (1990), p. 1588-1589. See on the existence of moral hazard and the effectiveness of market disciplining, Nier/Baumann (2006).

of the financial system), higher indebtedness of public households and, in this way, to welfare losses[65]. Unfortunately, these losses might even turn out bigger than those which interventionist guarantees were meant to avoid.

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[65] See Kellermann (2010), p. 18.

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Appendix

Table 1. Rating assignments

Rating symbol	*LT issuer Support rating floor Sovereign rating*
AAA	20
AA+	19
AA	18
AA-	17
A+	16
A	15
A-	14
BBB+	13
BBB	12
BBB-	11
BB+	10
BB	9
BB-	8
B+	7
B	6
B-	5
CCC	4
CC	3
C	2
RD	1
Rating symbol	*Support*
1	5
2	4
3	3
4	2
5	1

Table 2. Government support (support rating floor)

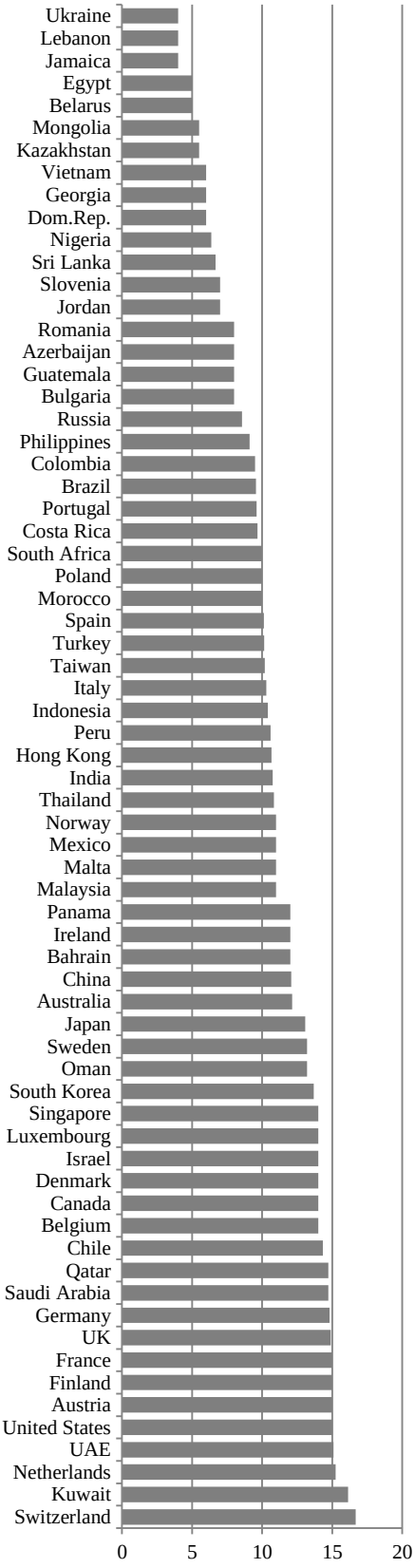

Table 3. Country list

Country	Freq.	Per cent	LT issuer − viability	Sup.rat. floor	Country	Freq.	Per cent	LT issuer − viability	Sup.rat. floor
Australia*	8	2.16	0.375	12.13	Malaysia	3	0.81	0.00	11.00
Austria*	4	1.08	3.25	15.00	Malta	1	0.27	0.00	11.00
Azerbaijan	2	0.54	3.00	8.00	Mexico*	3	0.81	0.00	11.00
Bahrain	2	0.54	1.00	12.00	Mongolia	2	0.54	0.00	5.50
Belarus	2	0.54	0.00	5.00	Morocco	1	0.27	2.00	10.00
Belgium*	3	0.81	1.33	14.00	Netherlands*	4	1.08	1.25	15.25
Brazil	9	2.43	0.00	9.56	Nigeria	8	2.16	0.75	6.38
Bulgaria	1	0.27	3.00	8.00	Norway*	5	1.35	0.00	11.00
Canada*	6	1.62	0.00	14.00	Oman	5	1.35	3.20	13.20
Chile	3	0.81	1.33	14.33	Panama	1	0.27	2.00	12.00
China	15	4.04	4.60	12.07	Peru	5	1.35	0.60	10.60
Colombia	4	1.08	0.00	9.50	Philippines	9	2.43	0.00	9.11
Costa Rica	3	0.81	0.00	9.67	Poland*	3	0.81	1.00	10.00
Denmark*	4	1.08	0.00	14.00	Portugal*	5	1.35	3.00	9.60
Dom.Rep.	1	0.27	0.00	6.00	Qatar	7	1.89	3.00	14.71
Egypt	2	0.54	0.00	5.00	Romania	1	0.27	0.00	8.00
Finland*	2	0.54	0.00	15.00	Russia	9	2.43	1.11	8.56
France*	5	1.35	0.20	15.00	Saudi Arabia	11	2.96	1.45	14.73
Georgia	3	0.81	0.00	6.00	Singapore	3	0.81	0.00	14.00
Germany*	16	4.31	3.44	14.81	Slovenia*	3	0.81	2.00	7.00
Guatemala	3	0.81	0.00	8.00	South Africa	3	0.81	0.00	10.00
Hong Kong	6	1.62	0.00	10.67	South Korea*	6	1.62	0.67	13.67
India	8	2.16	0.63	10.75	Spain*	17	4.58	1.18	10.12
Indonesia	5	1.35	0.80	10.40	Sri Lanka	3	0.81	0.33	6.67
Ireland*	2	0.54	6.00	12.00	Sweden*	5	1.35	0.00	13.20
Israel*	2	0.54	1.00	14.00	Switzerland*	3	0.81	1.33	16.67
Italy*	14	3.77	1.07	10.29	Taiwan	11	2.96	0.64	10.18
Jamaica	1	0.27	0.00	4.00	Thailand	6	1.62	0.17	10.83
Japan*	13	3.5	0.46	13.08	Turkey*	7	1.89	0.00	10.14
Jordan	2	0.54	0.00	7.00	Ukraine	2	0.54	0.00	4.00
Kazakhstan	2	0.54	0.00	5.50	UAE	13	3.5	4.85	15.08
Kuwait	8	2.16	6.38	16.13	UK*	10	2.7	1.00	14.90
Lebanon	2	0.54	0.00	4.00	United States*	29	7.82	0.59	15.03
Luxembourg*	2	0.54	0.50	14.00	Vietnam	2	0.54	1.50	6.00
					Total	371	100	1.32	11.83

Table 4. Variance inflation factors probit regression

	VIF	1/VIF
Viability rating	1.93	0.517005
Support rating floor	2.95	0.339137
Sovereign	3.43	0.291384

Source: authors' calculations.

Table 5. Correlations of the estimated coefficients probit regression

	Viability rating	Support rating floor	Sovereign
Viability rating	1		
Support rating floor	-0.1524	1	
Sovereign	-0.4009	-0.6704	1

Source: authors' calculations.

Table 6. Variance inflation factors linear regression

	VIF	1/VIF
Investment return	2.11	0.473429
Interest income ratio	1.75	0.572487
Share return	1.50	0.668101
Equity ratio	1.07	0.932283

Source: authors' calculations.