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The value of a joint liability scheme: Estimating group support for German Landesbanken

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The Value of a Joint Liability Scheme

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Estimating Group Support for German Landesbanken

Benjamin Käfer^{*}

2015-07-20[†]

Abstract

This paper estimates the funding advantage afforded by the joint liability scheme to German Landesbanken. The advantage is estimated by computing the difference between Moody's baseline credit assessment (BCA), representing the stand-alone rating, and the adjusted BCA incorporating group support assumptions. This notch advantage is then multiplied by time-varying yield spreads between the respective notches and the rating-dependent liabilities. Our methodology estimates the funding advantage that remains when governmental support for banks formerly considered 'Too Big to Fail' (TBTF) is substantially reduced or even abolished. We find a substantial monetary funding advantage due to group support assumptions, amounting on average to a multiple of the Landesbanken's aggregated annual profits. The aggregated observations mask a distinct heterogeneity, with some of the banks being significantly more exposed to the funding advantage than others.

JEL Classification:

G12, G21, G24

Keywords:

Too big to fail, implicit guarantee, support rating, systemic risk, Landesbanken, Haftungsverbund, joint liability scheme, institutional protection scheme, deposit insurance

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1. Introduction

In the aftermath of the subprime crisis, rating agencies have been heavily criticized for putting financial stability at risk (see, e.g., Sy 2009 or White 2010). Rather than aiming to contribute to this discussion, this paper tackles a related issue. We elaborate on the value rating agencies assign to financial stability considerations through their evaluation of survival guarantees.

A great deal of attention has been paid to survival guarantees for banks. This also applies to Germany, a country that has weathered the financial crises of recent years fairly well. Discussion on these guarantees was in fact already intense around the turn of the millennium. Due to their origins in the public sector, German savings banks (Sparkassen) and Landesbanken enjoyed explicit state guarantees. Those guarantees were also recognized by the rating agencies, resulting in turn in rating evaluations at the very top end of the rating scale. This was said to provide Landesbanken with a funding advantage over their competitors from the private sector. Deemed incompatible with European competition law, it therefore no longer applied to liabilities taken on later than 2005 (see, e.g., Grossman 2006).

That is not to say that Landesbanken no longer enjoyed any state guarantee at all. The substantial weakness shown by some Landesbanken in the US subprime crisis required public intervention to support those institutions. Thus, the explicit guarantees in force for years now (partly) turned into implicit guarantees, reflecting the well-known 'Too Big to Fail' (TBTF) issue. Again, this implicit assumption of support to systemically important banks is included in the considerations of rating agencies as they usually differentiate between a bank's stand-alone financial strength and an all-in rating including support expectations.

Since then, there have been many regulatory initiatives all around the globe designed to avoid the use of taxpayers' money to support ailing banks (Fitch Ratings 2014a). The aim is to make banks more resilient while at the same time perceptibly reducing government guarantees. Considerable progress has been made in recent years, and this is also reflected in the rating agencies judgments and a gradual decline in their rating uplift intentions for governmental support.

Notwithstanding those issues, the rating agencies' reports reveal that guarantees for Landesbanken still exist. First, implicit governmental guarantees are persistent (Moody's 2014a). Second, and more important for our purposes, Landesbanken would be protected even in the complete absence of governmental support. This is because German Landesbanken belong to the German Savings Banks Association (DSGV). As such, they benefit from a strong cohesion within the German savings banks sector, which means that they are included in the 'institutional guarantee' (Institutssicherung) under the 'joint liability scheme' (Haftungsverbund).¹ Put very simply, the statutes of this insurance scheme confirm that the savings bank group as a whole is likely to help ailing group members requesting support.

As will be shown later, there has been much emphasis in the scientific literature on quantifying the value of implicit or explicit government support to banks using rating uplifts. However, to the best of our knowledge, no estimation exists of the network advantage enjoyed specifically by savings banks and Landesbanken and more generally by banking groups. Most empirical studies that aim to quantify the 'rating subsidy' look at intragroup² guarantees in combination with governmental support and thus do not differentiate between those two constituent parts of support.³ We therefore intend to quantify the group support value for German Landesbanken using Moody's rating judgments, because the ratings of this agency allow us to consider this component of their evaluation separately. We find a substantial rating advantage, amounting on average - expressed in monetary terms - to a multiple of the Landesbankens' aggregated annual profits. However, the aggregated observations mask a distinct heterogeneity, with some of the Landesbanken being far more exposed to the group support assumptions than others. Our results underscore the importance of group cohesion for Landesbanken in the future, in particular if we expect state guarantees to phase out over time, a scenario that has become increasingly probable. Given that governmental guarantees are declining, this paper puts less emphasis on the willingness of the state to bail-out troubled banks. As a result, the study largely disregards the individual systemic risk contribution that is usually ascribed to banks considered TBTF and measured by their individual rating

¹ In the wake of current regulatory initiatives, the German term 'Haftungsverbund' is probably going to be replaced. In addition, the English terms 'joint liability scheme' and 'institutional guarantee' are often used interchangeably with the term 'institutional protection scheme'. However, those terminological aspects do not affect our paper in a significant way. In general, this article refers to the legal circumstances at the end of 2014.

² The term 'intragroup' may be somewhat misleading as the German savings banks group does not consist of consolidated companies in the common sense. See also Ayadi et al. (2009) on this term.

³ To be clear, this is justified for their intentions because most banks do not operate under such a cohesive group as German savings banks and Landesbanken do.

uplift due to governmental support (see, e.g., Bullard et al. 2009, Moody's 2013b). Instead, the investigation asks for the market's evaluation of the funding advantage that can be ascribed to members of a mutual guarantee scheme. As members of a mutual insurance, individual institutions are protected against an idiosyncratic shock, which is in turn rewarded by the financial markets through a lower risk premium.

The paper is structured as follows. Section 2 provides a literature review on recent attempts to quantify support assumptions for banks. Section 3 briefly outlines the German banking system and the relationship between German savings banks and Landesbanken. Section 4 describes the methodology and the data. Section 5 presents our results, while section 6 discusses further important aspects. Section 7 concludes.

2. Literature review

In general, ratings serve as a condensed assessment of debtors' willingness and ability to serve their debt. This implies that the financial health of the debtor must be evaluated carefully, usually by rating agencies. In the case of banks, balance sheet data as well as income statement data serve as the main determinants of their rating. This relationship is confirmed in many studies and extended along several dimensions, for instance with country indicators (Caporale et al. 2012), regulatory and supervisory indicators (Pasiouras et al. 2006), or the banks' solicitation status (Poon and Firth 2005).

We are interested in systemic risk as a starting point for our research because it motivates the conventional research on the relationship between ratings and uplifts for governmental support. Only firms whose failure would severely impact on other firms can expect to be saved by the government. Hence, this issue is of particular importance for financial firms (Bullard et al. 2009), and as a result, support ratings are usually not assigned to enterprises outside of the financial sector. For the purpose of this paper, systemic risk describes the danger of a breakdown of the financial system. This breakdown may be due to large shocks to many participants in the financial or economic system as well as shocks to selected mar-

ket participants with a subsequent spillover to other institutions because of direct or third-party linkages (Kaufman and Scott 2003).⁴

In practice, the relationship between systemic risk and bank ratings is ambivalent. On the one hand, systemic risk – in the broader sense – is seen as a potential *exogenous* driver of bank ratings (Packer and Tarashev 2011). According to them, systemic risk considerations impact heterogeneously on the rating evaluations of the big three rating agencies, namely Standard and Poor's, Moody's, and Fitch Ratings. Besides balance sheet data, only a few studies go one step further and include external, potentially systemic elements in their research on the determinants of bank ratings. Pagratis and Stringa (2009) find procyclicality in Moody's bank ratings stemming from credit and business cycle fluctuations. Curry et al. (2008) confirm the importance of equity market variables and different macro indicators for banks' supervisory ratings.⁵

On the other hand, evaluations of an individual bank's *own* contribution to systemic risk may impact on single parts of the assigned rating notches. This is due to the agencies' practice of differentiating their judgments. Broadly speaking, bank ratings consist of two layers. The first is the stand-alone rating, which represents the probability of debt repayments out of the individual debtor's financial strength. However, although financial strength is important for the ability of banks to service their debt, it is not the only component. The second layer is their all-in rating, which includes support assumptions from governments, groups, or parents. This rating support summarizes the willingness and ability of any of those parties to protect the banks from default and hence serves as uplift to the stand-alone rating, thus improving the banks' overall creditworthiness. As a result, it represents the probability that the debt will be repaid, irrespective by which sponsor. As mentioned above, a rating uplift due to governmental support is often used as a direct measure of the banks systemic importance. It is assumed that governments would only prevent banks from collapsing if their default would pose a threat to the financial system, which is in accordance with the above

⁴ Extensive surveys on systemic risk are provided by Bisias et al. (2012) as well as De Bandt and Hartmann (2000). Bisias et al. (2012) also highlight the heterogeneity regarding possible systemic risk definitions. The general lack of concreteness seems to be an inherent shortcoming of the term 'systemic risk'.

⁵ With credit and asset price measures, Pagratis and Stringa (2009) as well as Curry et al. (2008) employ two indicators of financial (in)stability that have become prominent in the monetary policy literature on financial stability. Käfer (2014) provides a recent review on this topic.

definition of systemic risk (see, e.g., Bullard et al. 2009, Moody's 2013b). To oversimplify: these banks are considered to be 'Too Big to Fail'.

Again, this support assumption is tantamount to an implicit funding subsidy. Rating evaluations are an important determinant for the yields paid on a bank's debt (see, e.g., Sironi 2003). Acharya et al. (2013), for instance, provide an answer to the question of whether the market really acknowledges any support expectation and show that market prices are related to the all-in rating rather than to the stand-alone rating. As we will show in section 4.2, the better the rating, the lower the implied default risk, and the lower the interest rates debtor banks have to pay due to the lower risk premium demanded.

From an incentive point of view, support expectations lead to two prevalent but conflicting views concerning the risk taking of banks (Gropp et al. 2011). According to the market discipline view, anticipation of support leads to lower monitoring incentives of the banks' creditors because they expect a bail-out. This decrease of market discipline would, in turn, increase the risk-taking incentives of banks, thus representing a typical moral hazard issue (Damar et al. 2012). The charter value view, on the other hand, implies the opposite effect. The funding advantage provided by the implicit subsidy can be seen as an asset that is worth preserving. The fear of losing those future rents prevents the bank from taking on more risk. In sum, empirical results on this issue are mixed. For instance, Afonso et al. (2014) show that the risk of banks, reflected in impaired loans, increases with the expected government support. By contrast, Gropp et al. (2011) show that guarantees do not increase the risk taking of supported banks but that of their competitors. They ascribe this finding to the competitors' need of compensation for the funding disadvantage. As usual in finance, the return can be improved by increasing risk. In sum, however, they admit that the majority of the existing literature points to a dominance of the market discipline view, which means that the existence of guarantees increases risk-taking.⁶ This important finding seems at first glance to be counterintuitive, because it implies that the existence of guarantees leads to higher risks instead of reducing them. However, from a theoretical perspective, the above discussion corresponds to the economic meaning of insurance in general. This literature argues that the existence of insurance, which can be put on a level with the guarantees considered here,

⁶ This conclusion is also supported by Damar et al. (2012). Their own research points to a time-varying dominance of the two views.

may indeed foster risk taking (Sinn 1988). The joint liability scheme described later serves as a special form of deposit insurance with an institutional guarantee and is thus comparable to insurance in general.⁷ The participating member banks pay a premium and receive insurance against idiosyncratic shocks. Hence, insurance provides individual safety to the insured institution. Moreover, an increase in risk-taking is not necessarily a bad thing. According to Sinn (1988), insurance may provide the economy with risk as factor of production, and the opportunity to shift risk enables individuals or institutions to receive a higher utility, depending on their preferences. In this sense (and conditional on the assumption of a ‘healthy’ distribution), risk is desirable. Either way, the agencies support evaluation adds another component to the debate on bank rating and (systemic) risk, thus contributing to the above mentioned ambivalence.

As a consequence of the potentially distortive effects of lower funding costs and blurred risk taking incentives, a great deal of attention has been paid to estimating the implicit subsidy around the world, especially against the backdrop of the financial crises in recent years.⁸ Different quantification approaches exist and are briefly presented here. According to the IMF (2014), there are three different options. A first (and insufficient) way to estimate the subsidy is to compare the yields paid on debt between banks with support expectations and those without such assumptions. However, Sironi (2003) correctly emphasizes that elements other than support assumptions impact on yields. The second quantification method is a contingent claims analysis. Under this approach, the IMF (2014) uses credit default swap (CDS) spread data and the relation between observed spreads including bail-out expectations and fair value spreads. Fair-value spreads are computed from equity price data, where bail-out expectations are not included. Thus, the gap between both spreads may serve as a measure of the implicit guarantee. This approach is superior to a simple yield comparison, but has its own shortcomings, e.g. the availability of CDS data. The third approach is the ratings-based approach already explained above. Its advantage compared to the second approach is that bond price data are more frequently available than CDS spreads. Conse-

⁷ It has to be mentioned that the joint liability scheme is not legally binding. According to Pehla (2006, p. 149), this feature is what differentiates the joint liability scheme from being insured *de jure*. Nevertheless, if we compare the joint liability scheme with insurance, we consider it to be insurance *de facto*.

⁸ Schich et al. (2014) add two further distortive effects. First, financial services may become too cheap due to lower funding costs which can lead to an inefficiently large banking sector. Second, in case of government guarantees, they represent a fiscal risk outside the budget of the sovereign.

quently, the ratings-based approach seems to be the preferred quantification method among national treasury departments and central banks (Schich and Aydin 2014).⁹

Quantifying the implicit subsidy of banks under the ratings-based approach is not a new idea. The work of Soussa (2000) serves as a starting point of this line of research. His evidence about 120 banks from 6 developed countries shows that banks considered TBTF receive on average a rating advantage of 3 notches compared to small banks. His subsidy table implies a funding advantage between 3 basis points for an A-rated bank and 80 basis points for a B-rated bank on a 10-year bond. According to Rime (2005), size is an important determinant of the TBTF status of banks from 21 industrialized countries, and the largest banks in his sample receive a rating uplift of 3 notches in Fitch's dimensions and 1 notch in Moody's scale. Research on the implicit subsidy became more important as a result of the US subprime crisis and the European sovereign debt crisis. Haldane (2010) quantifies the implicit subsidy of the UK banking system. He finds the average rating uplift to be over 1.5 notches in 2007 and 4 notches in 2009, thus reflecting a pronounced increase during the subprime crisis. Moreover, this uplift is larger for big banks. In monetary terms, this means an average annual funding advantage of over £ 50 billion for the top 5 UK banks. For the 29 most systemically important global banks, Haldane (2012) estimates the funding advantage to be on average 1.3 notches (\$ 70 billion per year) between 2002 and 2007 and more than 3 notches (\$ 700 billion per year) in 2009. A substantial increase in the subsidy of the 4 major UK banks is also observed by Noss and Sowerbutts (2012). On average, they observe an increase in support uplifts from around 2 notches in 2007 (less than £ 10 billion) to more than 3.5 notches in 2009 (more than £ 120 billion). In times of crisis, the uplift is again more pronounced for lower ratings. Bijlsma and Mocking (2013) estimate the average funding advantage for 151 large European banks to be at 1.1 notches in 2006, reach its maximum with

⁹ Schich and Aydin (2014) add event studies as a fourth quantification method. Event studies investigate the impact of e.g. mergers and acquisitions, regulatory initiatives, actual bank bail-outs or collapses, as well as sovereign rating changes on bank yields. Bijlsma and Mocking (2013) also use a slightly modified classification and provide a very detailed review on individual research along each quantification approach. Another well-known recent survey on methods and empirical work, including a thorough comparison of the approaches, is given by Noss and Sowerbutts (2012). We abstain from delving deeper into other quantification papers and focus on the ratings-based approach instead.

3.6 notches in 2010, and then decrease to 2.5 notches in 2012. The maximum funding advantage of all banks considered amounts to around € 150 billion.¹⁰

A common shortcoming of the literature mentioned above is that it does not account for different sources of support. The rating agencies uplift includes governmental support as well as support from parents or banking groups. Until recently, it seemed unnecessary to ask for a separation of those sources, and all support is implicitly ascribed to the government, thus resulting in an overestimation (Bijlsma and Mocking 2013). However, this distinction might become very important in the future. Regulatory progress has been made and a multitude of initiatives with the intention to credibly reduce government support expectations are underway. One of the ultimate goals is to refuse any governmental bail-out of banks to avoid using taxpayers' money for a collectivization of bank losses.¹¹ If those initiatives succeed, a rating uplift is no longer justified unless support is gathered from another sponsor.¹² Admittedly, it seems implausible that TBTF will be solved by all means, at least for very large banks. However, the public willingness to reduce the problem is obvious and also acknowledged by the agencies, and this is where a separation of the uplift becomes important.¹³

To our knowledge, only very little research exists that shows at least some awareness of this fact, and where some separation of the support exists, it is almost always done with the intention to estimate governmental support more precisely. Using Fitch ratings, Ueda and Weder di Mauro (2013) find that banks in major countries on average received uplifts from 1.8 to 3.4 notches (on average 60 basis points) at the end of 2007 and from 2.5 to 4.2 notches (on average 80 basis points) at the end of 2009. They also try to isolate parent support through a dummy variable and find that parent support is around two thirds of the size of

¹⁰ A peak in subsidies around 2009/2010 is also confirmed by the IMF (2014) for a number of countries. Schich et al. (2014) estimate a peak in 2011 (€ 120 billion) for more than 100 large European banks. Both studies agree on strongly decreasing funding advantages after their individual peaks.

¹¹ The construction of the Single Resolution Mechanism (SRM) is a crucial element of the banking union being pursued in Europe related to the bail-in/bail-out question. Howarth and Quaglia (2013), for instance, provide a basic overview on the banking union and also elaborate on the closely connected aspect of constructing the common deposit guarantee scheme, which impacts on the future design of the joint liability scheme.

¹² For instance, Moody's (2014a) gives a detailed overview on supported ratings' negative outlook due to the ongoing regulatory initiatives in Europe. Indeed, they explicitly emphasize that a completely successful implementation of resolution regimes may lead to any systemic support being withdrawn. Further support comes from Schich and Kim (2012). Among others, they emphasize that regulatory progress is one component of declining subsidy values. Their work also provides an overview on the progress of bank resolution regimes.

¹³ A recent example is the case of Heta, the 'bad bank' of Hypo Alpe Adria, where the Austrian government decided on a moratorium for the liabilities of Heta, which were originally backed by governmental guarantees (Handelsblatt 2015c, 2015d).

government support at end-2007 and yields no significant result at end-2009. Schich and Kim (2012) state that parent support for major European countries and the US accounts on average for 17% of total external support at the end of 2011. Alas, it is not made clear just how this number was derived.

Two recent papers are methodically close to our study. Schich and Lindh (2012) are the first to employ the adjusted stand-alone rating provided by Moody's since 2011, which includes parental or group support in addition to the initial bank strength. For 123 large European banks in March 2012, this add-on on average accounts for 0.4 notches uplift compared to 1.8 notches uplift due to governmental support. They also confirm the peaking support values around 2009/2010 with substantial reductions in funding costs. In addition, they observe distinct heterogeneity among the countries considered. The paper with the largest similarities to our work is Cariboni et al. (2013). They estimate the total implicit subsidy of 112 European banks to be between € 72-95 billion in 2011 and € 59-82 billion in 2012. Parental support accounts on average for slightly more than one quarter of total support. In addition, larger banks receive greater guarantees. Moreover, regressions suggest that parental support is a determinant for governmental support: The stronger the parent, the lower the sovereign support. This implies that parental support would serve as a substitute for governmental support. We will pick up on this aspect in our discussion in section 6. Importantly, both papers are mainly interested in a closer examination of the governmental guarantee. They did not intend to estimate a network advantage of banks. We approach the topic from another viewpoint and try to quantify the funding advantage for German Landesbanken.

3. German savings banks and Landesbanken

3.1 Basic information on the German Savings Banks Finance Group

The German banking system consists of three pillars.¹⁴ The first pillar comprises commercial banks from the private sector. They form the smallest pillar by numbers, but they are large in terms of total assets. This pillar includes a number of small and medium-sized private banks as well as branches of foreign banks, but also the few global banks in Germany. In general, they are purely profit-oriented private legal entities offering the whole range of

¹⁴ This paragraph refers to Dietrich and Vollmer (2012), Gilquin (2014), and Hackethal and Schmidt (2005). The latter two references also provide numbers on the relative importance of all pillars. Exact values depend strongly on the point in time and the balance sheet item being considered, which is why we have restricted our presentation of the pillars to the essential elements.

financial products from retail, corporate, wholesale and investment banking. The second pillar consists of public sector banks and subsumes regional savings banks and Landesbanken as (former) house banks of the respective German states (Länder). Their origins as public law institutions already hint at their intended function as supporters of regional economic development and providers of financial services to enterprises and customers in their respective region. This implies that public sector banks are not subject to pure profit maximization. Ayadi et al. (2009) refer to such banks as ‘dual-bottom line’ institutions. Cooperative banks form the third pillar of the German banking system, and although they represent the largest group by numbers, their total asset share is the smallest of the three pillars. Except for a few institutions (including the two cooperative central institutions), this implies that cooperative banks are on average very small, and even smaller than the average savings bank. Like savings banks, cooperative banks have a strong regional focus and a comparable organizational structure, but they are private legal entities with a strong focus on serving the interests of their cooperative members.

As was said before, the focus of this study is on savings banks and Landesbanken, which is why we elaborate on their structure more closely. As explained by their umbrella organization DSGV (2014a), savings banks are regional institutions with the objective of promoting public welfare in their respective home region.¹⁵ The limitation of their operations to a clearly defined business area is ensured by a ‘regional principle’.¹⁶ Regarding savings banks’ objectives, what they refer to as their ‘public mandate’ encompasses three main aspects. First, savings banks provide financial services to a broad range of customers and enterprises. In this respect, it is also their goal to promote a viable savings culture among the population. Second, their task is to strengthen competition. This is especially important in rural areas where the presence of large banks is scarce. Finally, savings banks are required to act as a sponsor of social activities. With those objectives, they are placed under public law with representatives from municipal parliaments supervising compliance with the public mandate. At the same time, the DSGV emphasizes that savings banks have no owners in a tradi-

¹⁵ The basic information on savings banks and Landesbanken provided in this subsection is also acknowledged by a number of (neutral) sources like e.g. Körner and Schnabel (2013) and Puri et al. (2011). More detailed information on financial results and market shares of the German Savings Banks Finance Group as of 2013 can be found in DSGV (2014b).

¹⁶ The regional principle of savings banks is frequently questioned from a competitive perspective (Monopolkommission 2014, pp. 676ff.). However, discussions about the regional principle are not pressing from the financial stability viewpoint, which is the reason we abstain from this discussion.

tional sense because the responsible municipality has no shares and thus cannot sell its savings bank.

However, their regional limitation and the focus on retail customers and small to medium-sized enterprises also points to a limitation of the business model of savings banks. They need partners to conduct business that is either too large or too complex for them to provide it on a stand-alone basis. To this end, there exists a strong network inside the savings banks group as laid out by the DSGV (2014a).¹⁷ Regional savings banks associations provide, among other services, assistance to pursue a common risk management, and regional building and assurance societies support savings banks in their respective area of expertise. Another important group of partners inside this network structure are the Landesbanken. Originally, they served as central banks of the savings banks and house banks to the German states (Länder), but over time they added wholesale activities and international operations to their business model.

Besides common business activities, the group possesses an important feature from a financial stability viewpoint, because their deposit insurance is constructed as a 'joint liability scheme' (DSGV 2014a). This means that the different constituents of the group provide assistance to each other should one or some parts of the group experience financial difficulties. Moreover, the joint liability scheme operates as an 'institutional guarantee'.¹⁸ Contrary to a common deposit insurance scheme, which recoups depositors in case of bankruptcy and liquidation, an institutional guarantee is constructed to provide early assistance through e.g. guarantees, capital injections or liquidity assistance. The overriding goal of this approach is to avoid a situation where depositors have to be compensated at all.¹⁹

According to its statutes, the joint liability scheme of the German Savings Banks Finance Group can be described as follows (see, e.g., DSGV 2014a as well as Fieseler and Schack-

¹⁷ The DSGV (2014b) confirms the existence of 416 savings banks as of November 3, 2014, with total assets of € 1,111.6 billion. At the same time, there are 7 Landesbank Groups (LBBW, BayernLB, LBB, HSH Nordbank, Helaba, Nord/LB including Bremer Landesbank, SaarLB) with total assets of € 1,113 billion.

¹⁸ Nevertheless, this does not necessarily imply that an institution receiving support continues to work as a legally independent bank. It may also be forced to merge with other institutions.

¹⁹ See, e.g., Fieseler and Schackmann-Fallis (2013) for a comprehensive description of the savings banks group's institutional guarantee scheme. An example for the comparable scheme of the cooperative bank sector is provided by Benna and Fischer (2013). The deposit insurance scheme that applies for private banks does not entail an institutional guarantee. A description can be found in Massenbergh (2013).

mann-Fallis 2013).²⁰ If regional savings banks require financial assistance, they are first supported by the guarantee funds of the regional savings banks associations. If those resources prove to be insufficient (after additional contributions from the remaining institutions), supra-regional compensation is put into place. At this stage, the guarantee funds of ten other regional associations are used. If this additional support is still insufficient, the full scope of the joint liability scheme becomes obvious because the guarantee funds of the Landesbanken and regional building societies are additionally used. Importantly, this mechanism also works the other way round. Landesbanken may also expect support from the joint liability scheme if they get into financial difficulties.

The cohesion of the group under the joint liability scheme is what defines our research objective. If different parts of any financial system mutually guarantee each other's existence, this implies a positive value of that guarantee. In other words, we try to estimate the monetary equivalent of the guarantee that is provided by one part of the Savings Banks Finance Group to another.

3.2 Evaluation of the joint liability scheme's performance

Any provision of funds from a guarantee scheme requires the respective institution's owners to provide support first. The ownership structure of Landesbanken is more complex than that of the savings banks, because Landesbanken are primarily owned by the federal states and the different regional savings banks associations. With governmental entities acting as owners and support providers at the same time, this feature is particularly interesting because it implies that the power of the state is theoretically considered twice for those institutions. As a result, this further complicates the decomposition of different support sources. In practice, Moody's (2013b) includes such regional government ownership support as one of their different support layers and separates 'Support from a regional or local government' from 'Systemic (i.e., national government and/or central bank) support'. However, the bank rating methodology of Moody's (2013b) emphasizes that both support levels can be combined if they believe that support is granted through coordinated actions. In accordance with

²⁰ See also the website of the Savings Banks Finance Group for descriptions on the functioning of the joint liability scheme: <http://www.dsgv.de/en/savings-banks-finance-group/joint-liability-scheme.html> (07.02.2015) Still more detailed information can be found on the German version of this website and the linkages provided there: <http://www.dsgv.de/de/sparkassen-finanzgruppe/haftungsverbund/index.html> (07.02.2015) An English version of the statutes for the Savings Banks Finance Group's guarantee fund can be found under: https://www.sskduesseldorf.de/pdf/Banking_Relations/Rules_Guarantee_Fund.pdf (05.04.2015)

this methodology, we also expect this to be the relevant case and regard any governmental entity as a support provider instead of them being an owner of the banks.

Nevertheless, this relationship also impacts on the historical success of the joint liability scheme. On the one hand, the DSGV (2014a, 2014b) emphasizes that no depositor has suffered a loss through the problems of any savings bank or Landesbank since its launch in 1973. Nor have any of the scheme's institutions gone bankrupt. On the other hand, besides large banks from the private sector, some of the Landesbanken were among the institutions that transmitted the US subprime crisis to the German financial markets and had to be saved by their respective owners and regional governments (see, e.g., Monopolkommission 2014, pp. 542f., 580).²¹

This, in turn, challenges the real power of the joint liability scheme. If the government has to step in irrespective of the existence of this insurance, one might ask what value the scheme in fact has. One answer to this question is that the suitability has to be evaluated on a case-by-case basis. It might be highly appropriate to prevent the failure of rather small savings banks while being largely inappropriate to deal with the failure of a large Landesbank against the backdrop of a systemic crisis (see, e.g., DBRS 2014, Monopolkommission 2014, p. 580, or Pehla 2006, p. 151). Unfortunately, official information on the present volume of funds in the scheme is not available, but information from recent media suggests the existence of around € 1.6 billion (Börsen-Zeitung 2015). It is plausible that this amount will not suffice to deal with large and possibly systemic problems, even with additional payment liabilities by the members.

Current EU initiatives in the wake of the banking union demand a substantial increase in the amount covered by the joint liability scheme. Importantly, the scheme itself is going to be accepted even under the new EU legislation (DSGV 2014a), but the crucial question is how the additional burden is going to be distributed. At the time of writing, a substantial dispute was going on inside the Savings Banks Finance Group on this topic (see, e.g., Handelsblatt 2015a, 2015b). To be more precise, the question has been raised how the new contributions for each member bank will be calculated. The results of the debate indeed suggest that the

²¹ For an earlier critical investigation that challenges the role of the state in the German banking business in general see Sinn (1999).

burden decreased for savings banks and increased for Landesbanken, thus reflecting a rising awareness of their higher risks and funding advantages (DSGV 2015, Handelsblatt 2015e).

3.3 Related research on guarantees for savings banks and Landesbanken

This study is, to our knowledge, the first to provide estimations for the group support value of the German Savings Banks Finance Group. Importantly, this does not mean that support expectations were irrelevant for the group before. Until ten years ago, public banks were protected by two distinct state guarantees called ‘Gewährträgerhaftung’ and ‘Anstaltslast’. The first term describes an explicit state guarantee for the deposits of clients, while the second term refers to an assurance of the proper functioning of each bank’s business, i.e., a maintenance obligation (see, e.g., Ayadi et al. 2009 or Körner and Schnabel 2013). However, those two kinds of explicit state guarantees were deemed incompatible with European competition law because they were said to generate an unfair funding advantage for the protected institutions (see, e.g., Grossman 2006). They were abolished as a consequence, which means that new debt issued from July 2005 onwards no longer benefited from them. At the same time, debt issued before this date is still covered by those guarantees until the end of 2015.²²

This decision served as a starting point for a number of quantitative research papers examining the risk-taking implications of the abolition of explicit state guarantees. It is obvious that most of those considerations focus on Landesbanken because they are directly connected to the capital markets due to their funding structure. In contrast, (small) savings banks usually refund themselves through retail deposits, which implies only an indirect rating dependency if they have additional funding relationships with their respective Landesbank. According to Engerer and Schrooten (2004), the abolition of explicit state guarantees implies higher refinancing spreads of a magnitude that leads Landesbanken into the loss zone. However, in retrospect, their forecast turned out to be wrong, presumably due to the continuing existence of implicit guarantees and adjustments in their business model. In contrast to their ex ante paper, some ex post results are provided by more recent investigations. Körner and Schnabel (2013) examine the spillover effects from Landesbanken to savings banks, finding that funding costs increased moderately for savings banks vis-à-vis cooperative banks. This

²² A detailed overview on the abolition of explicit state guarantees from a legal perspective is provided by Pehla (2006). Her work also highlights the increasing importance of the joint liability scheme as a result of this development (p. 29).

increase in funding costs is more pronounced if their respective Landesbank experienced a larger downgrade. Moreover, they also investigate the risk-taking channel and show that the risk-taking of savings banks increased with the strength of the Landesbank downgrade. This result stands in contrast to the work of Gropp et al. (2014) who find less risk in savings banks after the abolition of the guarantees, thus implying a dominance of the market discipline view. At the same time, Fischer et al. (2014) find that Landesbanken increase their risk-taking by weakening the credit standards for corporate debtors, and the effect is stronger the larger the downgrade in the aftermath of the abolition of explicit guarantees. In addition, they document a strong increase in bond issuance and Asset Backed Commercial Paper activities of some Landesbanken as a result of the phase-out of explicit government guarantees.²³

The research mentioned above largely disregards two important aspects. First, it assumes that state guarantees cease to exist for Landesbanken. In practice, however, the explicit state guarantees provided through ‘Anstaltslast’ and ‘Gewährträgerhaftung’ did not vanish. Instead, they partially turned into implicit state guarantees, at least for the larger banks who received governmental support during the crisis. As a result, parts of the funding advantage persist if financial markets assume the government will further support systemically important banks when they are in financial difficulties. Second, because of group support expectations, funding advantages are expected to persist even if the current regulatory efforts to reduce the need of governmental bail-outs are about to succeed. Regardless of its historical performance, financial markets may share the view of rating agencies that the joint liability scheme is a credible and powerful mechanism to support ailing group members, which will be shown in the next section. In this case, the funding advantage provided through the joint liability scheme represents a quantifiable monetary value.

²³ Finally, the work of Puri et al. (2011) also belongs to risk-taking literature of the Savings Banks Finance Group, although their starting point is not the abolition of explicit state guarantees. They investigate the development of retail lending behavior of savings banks that had to support their Landesbanken in the US subprime crisis and show that savings banks with severely affected Landesbanken curtailed their supply of retail-lending.

4. Empirical approach

4.1 Methodology

As was mentioned above, it is our objective to estimate the value of the joint liability scheme for the German Savings Banks Finance Group.²⁴ Alas, it is problematic to do this for the group as a whole for several reasons. For instance, regional savings banks usually receive no individual rating (Fitch Ratings 2014b). Instead, they obtain a common rating, irrespective of their individual financial strength. This implies that a risk-adjusted pricing of their debt may not be warranted. Moreover, it has been mentioned above that savings banks refund themselves mainly through retail deposits. Hence, it would be difficult to motivate a funding advantage by their rating. In contrast, Landesbanken comply with both requirements, i.e., they receive individual ratings and have a market-oriented funding structure. This is why we restrict our estimation to the funding advantage of Landesbanken.

Estimating the willingness and strength of group support is an important part of a rating agency's business. As a result, the rating reports of major agencies related to the Savings Banks Finance Group contain statements on their expectations regarding group support (DBRS 2014, Fitch Ratings 2014b, Moody's 2013a).²⁵ However, their methodologies, assumptions, and rated entities differ from one agency to another, which gives their analyses a different suitability for our research design. Thus, we decided to rely on Moody's ratings for two reasons: First, we need individual rating evaluations for each Landesbank, and Moody's is the only agency to currently rate all of the remaining Landesbanken. Second, the differentiation of Moody's rating notches is detailed enough to easily disaggregate state and group support assumptions.²⁶ Besides a stand-alone and an all-in rating, Moody's also assigns an adjusted stand-alone rating, which includes group or parent support but excludes governmental support as shown in figure 1, which is of particular importance for Landesbanken (see, e.g., Moody's 2014b).

²⁴ In principle, the methodology could be applied to the German cooperative bank sector in almost the same manner. For a detailed investigation concerning the cooperative banks' institutional guarantee see Hartmann-Wendels and Jäger-Ambrozewicz (2010).

²⁵ Current rating reports are available from the DSGV website: <http://www.dsgv.de/en/savings-banks-finance-group/rating.html> (15.02.2015)

²⁶ Fitch Ratings (2015) also assigns a separate support rating on a five-notch scale, but their final long-term rating is based on the higher of the individual viability rating and the support rating and is thus ill-suited for our purposes because it neither allows us to identify the additional impact of any support nor to disentangle different support sources.

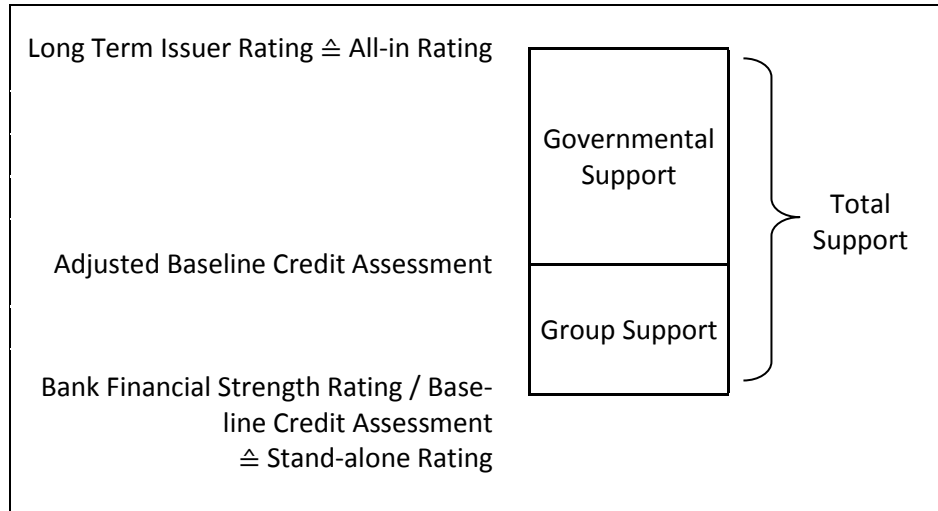


Figure 1: Moody's support rating scheme in the style of Cariboni et al. (2013)

Our methodological approach has recently been applied in a small number of other investigations to compute total support or governmental support as depicted in figure 1 (see, e.g., Cariboni et al. 2013). It is appealing because it does not require much information as can be seen from equation (1) below. Estimating the group support value requires details on the rating advantage provided through group support. This support is then multiplied by the spread advantage associated with the group rating advantage each bank could expect as uplift to its stand-alone rating. Finally, those two terms are multiplied by the share of rating-dependent liabilities. This results in an annual monetary value that represents the funding advantage each bank receives due to group support considerations.

(1) Group support value = Group rating support (in notches)

* spread advantage (in percentage points per notch)

* rated liabilities (in Euro)

4.2 Data

As was mentioned above, our empirical approach requires three different kinds of data. First, we need to quantify the rating gap between each considered Landesbank's stand-alone rating and its support rating.²⁷ Thus, we collected data on the (adjusted) baseline credit

²⁷ Our calculation includes LBBW, BayernLB, HSH Nordbank, Helaba, Nord/LB, and SaarLB. Bremer Landesbank is included in the Nord/LB group. LBB is excluded due to its role under complete ownership of the savings banks as well as the intended rebuilding from a Landesbank to a capital savings bank. Additional computations (not shown here) reveal that including LBB decreases the relative share of rating-dependent liabilities substantially across all estimation scenarios. However, we made our quantitative estimations anonymous to avoid inferences on individual banks.

assessment ((adjusted) BCA) as well as the long-term rating from the Moody's homepage and from the credit opinion publications for the selected Landesbanken from 2011 to 2014. From those data, we computed the uplift due to Moody's group support assumptions. Unfortunately, Moody's introduced the adjusted BCA in 2011, which implies that we cannot extend our study beyond this time frame. For simplicity's sake, we assume the adjusted BCA to apply for the whole of 2011 although it was first introduced in summer. If there has been any upgrade or downgrade during any year, we weighted each notch according to the time it was prevalent during that year.

Second, we have to identify the rating-dependent positions on the liabilities side of each Landesbank's balance sheet. From a very basic viewpoint, our approach seems justified because a typical Landesbank conducts a significant part of its refunding through the capital market, which implies a dependence on ratings. Unfortunately, there is no publicly available information on how much of a bank's balance sheet is rating-dependent, which gives us two options. One option is to use suggestions of rating-dependent liability shares from other investigations. However, those estimates are heterogeneous, depending on country, time, and banks' business model. Most research estimates the rating-dependent liabilities to be around one third of banks liabilities, which applies also to investigations regarding Landesbanken (see, e.g., Engerer and Schrooten 2004 as well as Cihak and Traa 2006).²⁸ The other option is to derive information on rating-dependent liabilities from the banks' balance sheets themselves. Most of the existing investigations determine the share of rating-dependent liabilities according to the maturity or the counterparty of the different balance sheet items. In general, those approaches assume that long-term debt is rating-dependent while short-term debt with maturity under one year is not. Moreover, wholesale borrowing and liabilities due to banks are assumed to be more rating-dependent than retail funding.²⁹ However, both approaches rely on simplifications, and a closer investigation yields the result that there may well be rating-independent liabilities due to banks and rating-dependent liabilities due to customers. In addition, not all of the wholesale borrowing is rating-dependent. This is why we employ a more detailed identification approach by looking at the

²⁸ More extreme estimates exist in both directions. Cariboni et al. (2013) assume rating-dependent liabilities of 15 – 20% of total liabilities, while Berge et al. (2006) assume on average around two-thirds of the balance sheet total to be rating-dependent. We use those extreme values for alternative calculations in our appendix.

²⁹ A short summary of different identification approaches for liabilities from previous investigations is given by Cariboni et al. (2013).

balance sheet data in the business reports of the Landesbanken more closely. We select the publicly available Landesbanken groups' annual reports from their websites and isolate the balance sheet items among the liabilities that seem to be rating-dependent.³⁰ Among the liabilities due to banks and customers, only promissory note loans are assumed to be rating-dependent. Although promissory note loans are not actively traded on the secondary market and are thus not required to have ratings, we nevertheless assume the rating agencies' judgment about the issuer serve as a pricing criterion for this kind of debt. Issued registered bonds, on the other hand, are not included because they encompass registered covered bonds, and covered bonds are subject to a special covered bond rating which is usually remarkably higher than the common long-term rating. More importantly, covered bonds benefit from a substantial underlying collateralization which justifies a separate rating evaluation. Hence, the agencies do not need to rely as much on support assumptions as they do in case of conventional bonds. Finally, repurchase agreements, forwarding loans as well as overnight and term money components are also excluded. The other main component for our purposes is the securitized liabilities. We assume that the conventional rating-dependent bank bonds are combined in the item 'other securitized liabilities'. Again, covered bonds are excluded due to their separate rating as mentioned above. The same applies to subordinated capital. Finally, items like trading liabilities, negative fair values, provisions, and other liabilities are also excluded.

Importantly, not all reports are completely unique, and some are more detailed and hence better-suited than others for our purposes. This applies especially to the information disclosed on liabilities due to banks and customers. Therefore, we perform an analysis using two different scenarios. Under the first scenario, we compute the rating-dependent liabilities due to banks and customers for the two banks with the most detailed information as described above and apply the average of those two banks to the liabilities to banks and

³⁰ A critical question is indeed whether one should consider Landesbank group reports or individual institutions' reports as the basis of our calculations. A typical Landesbank group includes the Landesbank itself but also other consolidated shareholdings. Importantly, some but not all consolidated shareholdings are protected by the joint liability scheme. While choosing group data contains the risk of including entities that are consolidated in the report but not protected by the joint liability scheme, selecting only individual Landesbank data would mean the opposite. Moreover, group members without direct protection of the joint liability scheme could nevertheless be expected to benefit from reputational group advantages. In addition, individual Landesbanken are usually by far the most important entities in their groups and group reports add to the variety in our data. Hence, we decide to accept this implicit overestimation tendency rather than the underestimation tendency that could result from relying on individual reports only.

customers of the remaining Landesbanken (the ‘average scenario’). Under the second scenario (the ‘maturity scenario’), we use the individual positions’ maturity data as an identification criterion and assume liabilities due to banks and customers with maturity above one year to be rating-dependent. This corresponds to the usual maturity criterion employed by other investigations.³¹ As a welcome side effect, the scenario analysis also allows us to reproduce the heterogeneity in rating-dependent liabilities from previous examinations. Because of the substantial uncertainty regarding the ‘true’ value of this item, this preserves us from producing undifferentiated numbers.

Third, we need to estimate the value of a rating notch. Using average yield spreads of former investigations is not a viable option. Berge et al. (2006) estimate the value of one rating notch to be around 20 basis points; while Schich et al. (2014) state that the value of one notch recently amounts to around 50 basis points on average. This shows that working with an average value would be as insufficient as working with uniform rating-dependent liabilities would be, because yield spreads are time-varying, depending on the current state of the financial markets. Moreover, usually yields do not increase in a straight line. Instead, the rise in yields is stronger the weaker is the rating (see, e.g., Engerer and Schrooten 2004).

We have therefore chosen to follow the approach of Schich and Lindh (2012) and use Senior Unsecured Bloomberg Europe Financial BVAL Curves to compare the funding costs of banks with different ratings. We obtain indices for the average yields of Euro-denominated financial bonds with a maturity of 5 years for banks rated AAA,³² AA, A, and BBB. Those indices are appealing because they provide us with the opportunity to observe the yields over time, which is especially important when markets are under pressure. Unfortunately, this data selection has its own shortcomings. The first one is that those indices are not available for each notch we are interested in. Hence, we use linear interpolation to obtain the missing values. A second shortcoming is that those indices are only available up to BBB simply because the majority of banks are not rated below this notch. This is usually sufficient if the

³¹ If possible, we also supplement the respective Landesbank group’s data with the individual Landesbank’s separate statement data to exclude as many irrelevant balance sheet items as possible. This means, for instance, that we subtract balance sheet items which are obviously irrelevant in the separate statement but not visible from the consolidated group data due to different disclosure requirements. Being aware of the fact that it is a simplification, this step can nevertheless reduce the implicit overestimation tendency mentioned above.

³² Banks are rarely rated AAA. Thus, we assume the yields of bonds from the KfW (Kreditanstalt für Wiederaufbau) to be representative for this rating class. The KfW is state-owned and thus benefits from the AAA-rating assigned to the Federal Republic of Germany.

final long-term rating is considered, but we are interested in the much weaker (adjusted) stand-alone ratings. Hence, we decided to extrapolate the change that was observed between A and BBB downwards, although this implies an underestimation tendency in this part of the study due to the non-linearity in the rating/yield relationship mentioned above.³³ Figure 2 shows the weekly development of yields in the rating categories AAA, AA, A, and BBB from 2011 to the end of 2014. It is clearly visible that yields decreased in absolute values and spreads decreased relative to each other, thus confirming the need of a time-varying estimation. As shown, our yield data are of a weekly frequency. We compute an average annual yield for each rating notch to estimate the funding advantage for German Landesbanken during every year from 2011-2014. Table 1 shows that average yields decline over time across all rating classes.

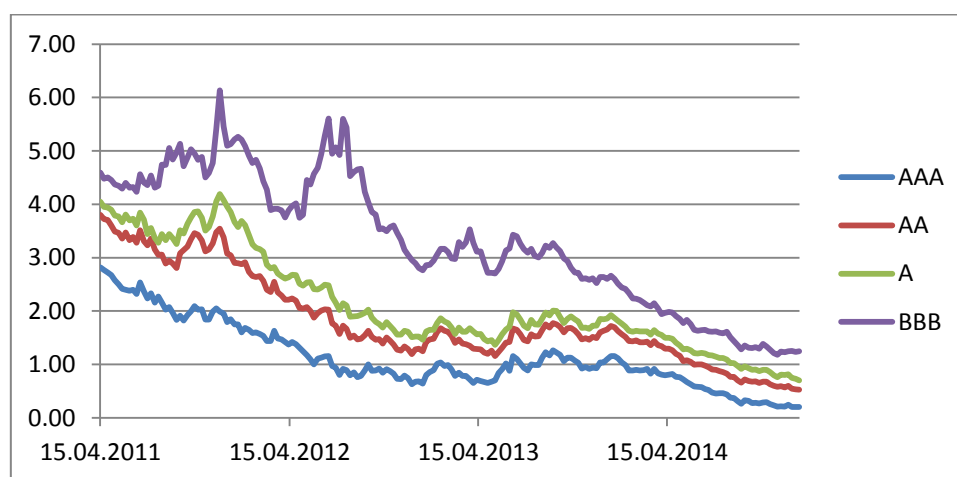


Figure 2: Average weekly financial bond yields at different rating classes in percent
Data source: Bloomberg

	2011	2012	2013	2014
AAA	2.15	1.10	0.97	0.57
AA	3.35	1.90	1.51	1.00
A	3.73	2.32	1.73	1.22
BBB	4.66	4.21	2.99	1.71

Table 1: Average annual financial bond yields in percent
Data source: Bloomberg, own calculations

³³ Alternatively, we could also follow Schich and Lindh (2012) and try to select bonds with comparable characteristics and a rating below this threshold. However, this still results in very few observations. Again, most of those banks' ratings have not been consistently within the scope of narrow rating limits. Instead, they have been downgraded from 2011 on and are thus not representative for a single rating class for the whole time span. We believe it is dangerous to rely on the few remaining observations, which is the reason we think our extrapolation approach is superior even though it disregards the nonlinear rise in yields at the lower end of the rating scale. We relax this assumption in the appendix.

5. Results

The first result we obtain refers directly to the notch uplift in the rating agencies judgments on the six selected German Landesbanken. Figure 3 displays the respective shares of sovereign and group support from 2011 to 2014, calculated according to the differentiation depicted in figure 1. It is clearly visible that group support is regularly representing the smaller support share, accounting on average for around two thirds of the size of governmental support. It is noticeable that this share is significantly larger than the share of group support estimated in most of the other studies presented in section 2. This indicates that group support assumptions are extraordinarily high for members of the Savings Banks Finance Group. For most of the period, group support amounts to two notches for the majority of Landesbanken, which is true in 83% of all cases. The computation over multiple years also shows that the individual shares are time-varying with a particularly pronounced sovereign support assumption in 2011. Alas, although we already elaborated on the tendency of decreasing governmental support assumptions, a clear tendency towards increase or decrease among any of the two support providers is not yet visible from the data.

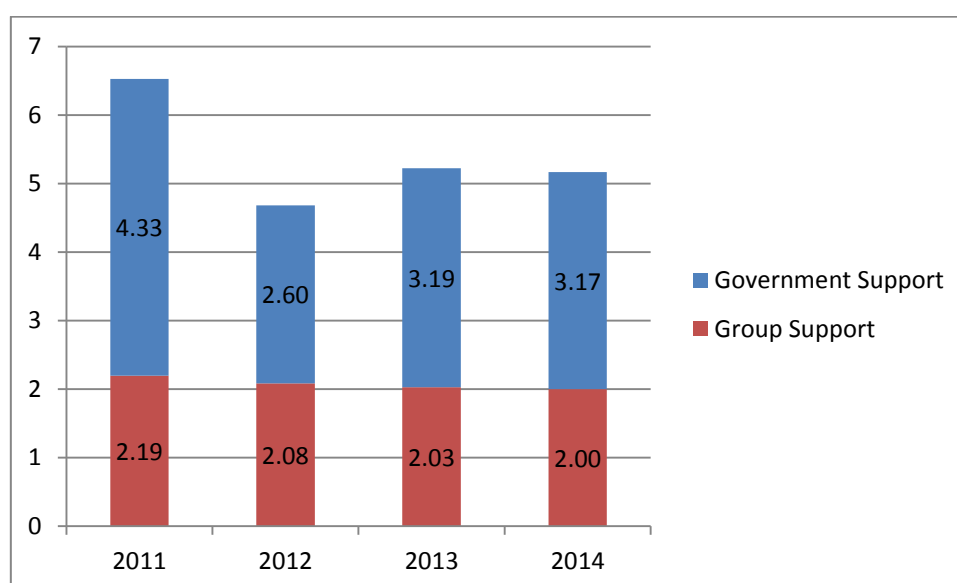


Figure 3: Support rating shares in notches

Data source: Moody's homepage and Moody's credit opinion publications, own calculations

With respect to the share of rating-dependent liabilities, table 2 provides a summary of our estimation for the aggregate of all considered Landesbanken under both scenarios from 2011 to 2014. It shows that the heterogeneity of estimations is considerable, depending on

the applied research method and the respective assumptions.³⁴ With respect to the absolute values of balance sheet totals and rating-dependent liabilities, it is obvious that both positions are consistently decreasing over time, reflecting the need to scale down their balance sheets in the aftermath of the US subprime crisis. Importantly, the share of rating-dependent liabilities remains largely unaffected by the balance sheet contraction trend from 2011 to 2013, which implies that time-varying results cannot be attributed to changes in the relative composition of liabilities during this time frame. In contrast, the share of rating dependent liabilities decreased significantly from 2013 to 2014, thus signaling a change in funding structures.

We observe that both scenarios yield at least plausible rating-dependent liabilities according to most of the previous literature. The results are placed in the lower middle range of previous investigations. However, especially under the average scenario, it becomes clear that the share of rating-dependent liabilities is smaller than commonly reported in the literature. This may be the case for two reasons: First, we excluded covered bonds from our estimation. Covered bonds are an important funding source for Landesbanken. Thus, not including them significantly affects our results. Second, it is well-known that the German financial system is less market-based than in other countries. This may lead to a lower share of rating-dependent liabilities for German banks.

	Maturity scenario			
	2011	2012	2013	2014
Balance sheet total	1,229,484	1,197,340	1,034,011	1,002,068
Rating-dependent liabilities	415,456	406,082	352,015	303,480
Percentage share	33.79%	33.92%	34.04%	30.29%
	Average scenario			
	2011	2012	2013	2014
Balance sheet total	1,229,484	1,197,340	1,034,011	1,002,068
Rating-dependent liabilities	297,250	282,637	232,698	192,240
Percentage share	24.18%	23.61%	22.50%	19.18%

Table 2: Rating-dependent liabilities

Note: Monetary amounts in € million

³⁴ See the appendix for additional robustness checks underlining the importance of differing assumptions.

Finally, table 3 provides our estimation of the monetary funding advantage of German Landesbanken due to the joint liability scheme from 2011 to 2014. This represents our main research interest, and the results are impressive. The monetary funding advantage was estimated by multiplying the group rating uplift by the respective annual average yield spread and the rated liabilities under both scenarios. The funding advantage is substantial and ranges between € 0.63 billion and € 5.25 billion per year, depending on the year and the respective scenario. Those numbers equal the value of the joint liability scheme for the total of the considered German Landesbanken. To provide a relative estimation, table 3 also shows the profits before taxes for the aggregate of our considered Landesbanken. We took that information from the same annual publications as was considered for the rating-dependent liabilities to employ a consistent computation base. A simple comparison of both values shows that the aggregated funding advantage is always larger than the annual profit, except for 2014. This implies that the funding advantage provided through the expectation of group support is significant. In turn, it means that an additional abolition of group support would be particularly severe for them if there is no longer a governmental support expectation. Our results confirm the expectations of Engerer and Schrooten (2004) from a decade ago. As already mentioned, their analysis showed that the absence of survival guarantees could force the German Landesbanken - ceteris paribus - into the loss zone. We confirm their results through our estimation, at least for the years 2011-2013.

	Maturity Scenario			
	2011	2012	2013	2014
Monetary funding advantage	2,899.19	5,252.58	2,976.56	990.67
Profit before taxes	1,487.00	1,560.00	888.00	1,378.00
Funding advantage relative to profit before taxes	1.95	3.37	3.35	0.72
	Average Scenario			
	2011	2012	2013	2014
Monetary funding advantage	2,071.00	3,651.15	1,962.54	627.54
Profit before taxes	1,487.00	1,560.00	888.00	1,378.00
Funding advantage relative to profit before taxes	1.39	2.34	2.21	0.46

Table 3: Annual funding advantage
Note: Monetary amount in € million

However, those aggregated values mask a substantial heterogeneity across banks and years. Figure 4 builds on the individual banks' values underlying table 3 and plots the funding advantage relative to profits before taxes over time and across banks. It is easily observable that the six Landesbanken are exposed to differing degrees. For most of the time, the funding advantage does not exceed three times the individual profit before taxes. However, both charts underline once more that this advantage is substantially relative to the annual profits before taxes. Again, the shares of individual banks are significantly lower in 2014 compared to 2011-2013.



Figure 4: Relation between funding advantage and annual profit before taxes across banks over time
Notes: Bank names were made anonymous with the letters A to F to avoid inferences on individual banks. The graph has been capped to avoid the graphically distortive effects of outliers, which eliminates one single observation. Outliers are possible if one bank reports a comparatively small profit that is contrasted with a substantial funding advantage. Negative relations result if the bank reports a loss.

While the rating agencies group support assumption has remained roughly constant over time, two reasons explain why the funding advantage is significantly lower in 2014 than in the years before. A first explanation can be found in figure 2. The low interest rate environment and the narrowing yield spreads imply that risk is no longer priced at the level it was priced in the years before. In addition, both estimation approaches showed the tendency to reduce the rating-dependent liabilities of the Landesbanken (table 2).

6. Discussion

The previous section showed estimations of the group support for German Landesbanken. Of course, those estimations are subject to some words of caution. The assumptions of our model, the relationship between savings banks and Landesbanken, and the structure of the joint liability scheme are too multifaceted to be represented by one single number. Several important aspects shall be discussed in what follows.

Besides the already mentioned aspects related to yield spreads and rating-dependent liabilities, a first concern relates to additional assumptions regarding the endogeneity of funding and rating structures. As outlined by the European Commission (2014), estimations of any implicit guarantee are based on the assumption that the funding structure is given. When the liability composition of the banks concerned would change towards cheaper alternatives if no guarantee existed at all, this would endogenously impact on the funding structure and thus reduce funding costs. Moreover, an abolition of any funding advantage would not only make the liabilities side more expensive, it would presumably also increase the interest earnings from the asset side due to possible assets from other Landesbanken. From this perspective, our investigation is subject to an overestimation tendency.³⁵ At the same time, more balance sheet items than we already factored in might also be affected by the evaluations of the group support assumptions. Moody's (2013b) outlines that the rating of subordinated bank obligations is based on the adjusted stand-alone rating and then adjusted downwards according to their individual risk properties. Under certain special circumstances outlined by Moody's (2014c), covered bonds are also subject to evaluations based on the adjusted stand-alone rating. If we were to include subordinated bonds and covered bonds based on those assumptions, the rating-dependent part of the liabilities, and hence the funding advantage, would further increase.³⁶ From this perspective, our investigation is subject to an underestimation tendency.

At the same time, the endogeneity issue relates to the support rating structure as well. Ratings and their methodologies are usually criticized for being a 'black box' (see, e.g., Sy

³⁵ The residual existence of some grandfathered debt issued before the abolition of explicit state guarantees in 2005 may also impact on our estimation of rating-dependent liabilities.

³⁶ We abstain from doing so because the multifaceted notching rules for subordinated debt and covered bonds do not allow us to estimate even an approximately correct value. Indeed, including them would be particularly interesting because subordinated debt is usually expected to be excluded from any kind of systemic governmental support (Moody's 2013b).

2009). The exact impact of every single rating determinant is not clear, and as a result, interpreting the elements of this black box is difficult. This also applies to the support assumptions embodied in the ratings. In addition to this rather conventional criticism, the discussion concerning risk taking as a function of guarantees leads us to believe that the stand-alone rating must be endogenous. The decision of whether banks increase or decrease their risk taking is case-dependent and relies, among other things, on their individual expectation of receiving support. In other words, the support value estimation may be influenced by the expectation of its own existence.

As a second concern, we address the question of whether governmental support and group support are substitutes or complements. This assessment is more important than it might look at first sight, because it decides whether the estimated funding advantage is real or hypothetical. If both kinds of support were substitutes, as suggested by Cariboni et al. (2013), then group support would even have to increase in the future to compensate for vanishing governmental support. In addition, the estimated funding advantage would be hypothetical because its size depends on the existence of governmental support. This means that our study would suffer from another underestimation tendency. However, own random samples show that Moody's governmental support uplift to global banks in solvent countries usually amounts to three notches, irrespective of any additional group support or support from the parent. This fact leads us to support the complement hypothesis, which implies that the estimated funding advantage due to group support is real because its size is independent of the degree of governmental support. Moreover, from a political economy viewpoint, it seems reasonable to assume subsidiarity with states expecting banking groups to solve their problems on their own before any governmental support is granted. In turn, it would be implausible if governmental support were to substitute missing group support, which is again indicative for the complement hypothesis. In sum, however, the discussion points considered so far illustrate that our study does not suffer from either a systematic overestimation- or underestimation tendency.

Our third concern is that the funding advantage provided through the joint liability scheme represents just one aspect of the relationship between Landesbanken and savings banks. Landesbanken do not only benefit from the scheme, they would also be powerful supporters if savings banks get into difficulties. In addition, Landesbanken are important service provid-

ers to savings banks, as outlined for instance by Körner and Schnabel (2013). In this way, they serve as liquidity distributors or partners for business that is either too large or too complex to be conducted on a local basis by small savings banks. Additionally, savings banks and their customers could benefit from the international expertise of the Landesbanken. Importantly, their close relationships and the ‘natural tendency’ of savings banks and Landesbanken to conduct business with other Landesbanken may result in funding structures that are not completely market-driven. Seen on the whole, those aspects imply some substantial complications for a detailed cost-benefit analysis, indicating that both sides benefit from their close cooperation. As a result, the opportunity to compute a ‘compensatory fee’ for this support mechanism and the accompanying funding advantage from Landesbanken to savings banks is clearly constrained. This issue also applies to the computation of each institution’s individual burden from the additional funding requirements demanded by the EU as outlined in section 3.2.

Finally, from a financial stability perspective, it is sometimes criticized that the joint liability scheme is not legally binding. Indeed, the statutes explicitly exclude legal claims of any member. This leads opponents to argue that this scheme is not as strong as it suggests and unable to deal even with small crises, let alone large and systemic crises. However, the refusal of legal claims is beneficial from a moral hazard perspective. Incentives to take on excessive risks are reduced if support is case dependent. Moral hazard concerns are also addressed by some of the remaining rules of the joint liability scheme, for instance the risk-dependent contributions to the scheme’s funding as laid out by Fieseler and Schackmann-Fallis (2013). This latter point is important from the perspective of our estimations, because the fees paid into the scheme are designed to reflect the risk situation of the individual institutions. This, in turn, may serve as an argument that the funding advantage of the riskier Landesbanken is partly balanced by a higher premium. Again, those risk-adjusted contributions do not come without a cost from a general financial stability viewpoint. If the individual fees increase due to a worsening of a bank’s risk situation, this may put an additional strain on them (Fieseler and Schackmann-Fallis 2013).

From a micro ‘systemic risk’ perspective, the joint liability scheme might be beneficial in terms of financial stability because it could be argued that the absence of legal commitments *even adds* to its strength. The statutes emphasize that the mutual support mechanisms may

not lead institutions providing support into financial difficulties of their own. As a result, direct financial contagion among the group members themselves is unlikely as systemic spillovers of affected institutions to healthy banks are diminished. At the same time, the scheme can nevertheless be assumed to be powerful in its own interest. Even small but prominent failures inside the group may imply a micro ‘systemic risk’ due to reputational considerations for the ‘System Savings Banks Finance Group’ if the financial difficulties are assigned in public perception to additional group members (see, e.g., DBRS 2014 or Pehla 2006, p. 147). To conclude, this discussion point highlights the fact that financial stability, a term that is usually employed at the macro perspective and connected with large banks, is also of importance for banking groups predominantly consisting of small institutions initially not considered TBTF. This statement holds irrespective of the additional existence of larger group members like the Landesbanken. The size of the Savings Banks Finance Group as a whole would, for instance, easily exceed the € 30 billion asset criterion even without the Landesbanken as group members. This criterion is currently applied for the ECB to consider single banks to be systemically important.

7. Conclusions

This paper estimates the funding advantage afforded by the joint liability scheme to German Landesbanken. The advantage is estimated by computing the difference between Moody’s baseline credit assessment (BCA), representing the stand-alone rating, and the adjusted BCA incorporating group support assumptions. This notch advantage is then multiplied by time-varying yield spreads between the respective notches and the rating-dependent liabilities. Our methodology estimates the funding advantage that remains when governmental support for banks formerly considered ‘Too Big to Fail’ (TBTF) is substantially reduced or even abolished. We find a substantial monetary funding advantage due to group support assumptions, amounting on average to a multiple of the Landesbanken’s aggregated annual profits. The aggregated observations mask a distinct heterogeneity, with some of the banks being significantly more exposed to the funding advantage than others.

We believe that our investigation matters for at least four reasons. The first reason refers to systemic risk considerations. Although deposit insurance systems in general are neither intended nor appropriate to prevent systemic crises from occurring, the joint liability scheme may nevertheless be important from a micro ‘systemic risk’ perspective. Reputational con-

cerns ensure that the system has strong incentives to avoid the failure of system members. At the same time, it is constructed as a scheme that prevents unaffected banks from suffering from serious financial contagion. If properly implemented, the absence of legal claims, mutual monitoring, risk-dependent contributions, and case-dependent support ensure that incentives to take on excessive risks are minimized. If such schemes are adequately shaped, they may in the end contribute to financial stability while at the same time reducing the widely distortive effects of governmental support. Admittedly, it seems to be too optimistic to assume that group support schemes can serve as a serious alternative to governmental support, given that their current financial firepower seems insufficient to cope with the failure of very large banks. Nevertheless, a properly designed group support scheme seems superior from a financial stability viewpoint compared to a situation without any chance of banks receiving guarantees. In other words, insurance has an economic value.

Closely connected to the first aspect, our investigation refers to the prospects for governmental support assumptions. As was mentioned above, regulatory reforms to bail in bank creditors and thus minimize the use of taxpayers' money to support ailing banks are underway. As a result, governmental support expectations are decreasing. If this trend is sustainable, then governmental guarantees could be reduced in a dimension that attaches increasing importance to group support assumptions irrespective of its de facto suitability to promote financial stability.

Irrespective of the difficulties in estimating the exact funding advantage, the results of our study also serve as another argument in the discussion of whether Landesbanken are efficient, a question that has already been addressed around the abolition of explicit state guarantees. In other words, one is inclined to ask how their annual results would develop in a situation without the different support assumptions, and if they would be able to survive without those funding subsidies. However, it is easily imaginable that this question is highly hypothetical because a situation without any guarantees would have a significant impact on the yield structure as a whole. It is beyond the scope of this paper to evaluate the consequences of a total abolition of any kind of survival guarantee on the financial markets.

Finally, this paper may be of importance for practitioners in any bank that expects parental or group support. To them, this estimation method may serve as an additional tool to com-

ply with the supervisory decrees concerning the stress testing for extraordinary but plausible events. All four aspects remain interesting fields for further research.

References

- Acharya, Viral V.; Deniz Anginer and A. Joseph Warburton (2013): The End of Market Discipline? Investor Expectations of Implicit State Guarantees, Working Paper, December
- Afonso, Gara; Joao Santos and James Traina (2014): Do 'Too-Big-to-Fail' Banks Take On More Risk?, Federal Reserve Bank of New York Economic Policy Review 20(2), March
- Ayadi, Rym; Reinhard H. Schmidt, Santiago Carbó Valverde, Emrah Arbak and Francisco Rodriguez Fernandez (2009): Investigating Diversity in the Banking Sector in Europe: The Performance and Role of Savings Banks, Centre for European Policy Studies, Brussels
- Benna, Ralf and Ralf Fischer: Das institutsbezogene Sicherungssystem des genossenschaftlichen Bankensektors, in: Hölscher, Reinhold and Thomas Altenhain (eds.): ,Handbuch Aufsichts- und Verwaltungsräte in Kreditinstituten: Rechtlicher Rahmen – Betriebswirtschaftliche Herausforderungen – Best Practices': 825-853
- Berge, Klaus; Ralf Berger and Hermann Loracek-Junge (2006): Deutsche Landesbanken: Status Quo und Strategien vor dem Hintergrund des Wegfalls der Staatsgarantien, DIW Quarterly Journal of Economic Research 04/2006: 73-92
- Bijlsma, Michiel J. and Remco J. M. Mocking (2013): The private value of too-big-to-fail guarantees, CPB Netherlands Bureau for Economic Policy Analysis, Discussion Paper No. 240
- Bisias, Dimitrios; Mark Flood, Andrew W. Lo and Stavros Valavanis (2012): A Survey of Systemic Risk Analytics, *Annual Review of Financial Economics* 4: 255-296
- Börsen-Zeitung (2015): Sparkassen und Landesbanken vor Einigung über Haftungsverbund, No. 57, March 24

- Bullard, James; Christopher J. Neely and David C. Wheelock (2009): Systemic Risk and the Financial Crisis: A Primer, *Federal Reserve Bank of St. Louis Review* 91(5, Part 1), September/October: 403-417
- Caporale, Guglielmo Maria; Roman Matousek and Chris Stewart (2012): Ratings assignments: Lessons from international banks, *Journal of International Money and Finance* 31(6): 1593-1606
- Cariboni, Jessica; Henrik Joensson, Laleh Kazemi Veisari, Dimitrios Magos, Evangelia Papanagioutou, Christophe Planas (2013): Annex 4.2: Size and determinants of implicit state guarantees to EU banks, JRC Scientific and Policy Reports, JRC84687, European Commission
- Cihak, Martin and Bob Traa (2006): Landesbanken: A Measure of the Costs for Taxpayers, IMF Country Report No. 09/436: 76-98
- Curry, Timothy J.; Gary S. Fissel and Gerald A. Hanweck (2008): Is there cyclical bias in bank holding company risk ratings?, *Journal of Banking and Finance* 32(7): 1297-1309
- Damar, Evren; Reint Gropp and Adi Mordel (2012): The Ex-Ante Versus Ex-Post Effect of Public Guarantees, Bank of Canada Working Paper 2012-22, July
- DBRS (2014): Sparkassen-Finanzgruppe: Rating Report, April 3
- De Bandt, Olivier and Philipp Hartmann (2000): Systemic Risk: A survey, European Central Bank Working Paper 35
- Dietrich, Diemo and Uwe Vollmer (2012): Are universal banks bad for financial stability? Germany during the world financial crisis, *The Quarterly Review of Economics and Finance* 52(2): 123-134
- DSGV (2014a): Inside the Savings Banks Finance Group, Deutscher Sparkassen- und Giroverband, Berlin
- DSGV (2014b): Financial Report 2013: Our results – Our contribution, Deutscher Sparkassen- und Giroverband, Berlin

- DSGV (2015): DSGV-Mitgliederversammlung beschließt einstimmig Neuregelung des Sicherungssystems – Kundeneinlagen bei Instituten geschützt, Pressemitteilung 30/2015, April 21
- Engerer, Hella and Mechthild Schrooten (2004): Änderung der Haftungsbedingungen für öffentlich-rechtliche Kreditinstitute: Kaum Probleme für Sparkassen – große Herausforderung für Landesbanken, DIW Weekly Report No. 25/2004: 367-370
- European Commission (2014): Annex A4.1: Implicit subsidies: Drivers, Distortions, and Empirical Evidence, Accompanying the document ‘Proposal for a Regulation of the European Parliament and of the Council on structural measures improving the resilience of EU Credit Institutions and the Proposal for a Regulation of the European Parliament and of the Council on reporting and transparency of securities financing transactions’
- Fieseler, Bernd M. and Karl-Peter Schackmann-Fallis (2013): Die Institutssicherung der Sparkassen und Landesbanken – Praktische Ausgestaltung, Herausforderungen und zukünftige Entwicklungen, in: Hölscher, Reinhold and Thomas Altenhain (eds.): ‚Handbuch Aufsichts- und Verwaltungsräte in Kreditinstituten: Rechtlicher Rahmen – Betriebswirtschaftliche Herausforderungen – Best Practices‘: 803-823
- Fischer, Markus; Christa Hainz, Jörg Rocholl and Sascha Steffen (2014): Government Guarantees and Bank Risk Taking Incentives, CESifo Working Paper No. 4706, March
- Fitch Ratings (2014a): Sovereign Support for Banks – Rating Path Expectations: Special Report, March 27
- Fitch Ratings (2014b): Sparkassen-Finanzgruppe (Sparkassen): Full Rating Report, April 30
- Fitch Ratings (2015): Global Bank Rating Criteria: Master Criteria, March 20
- Gilquin, Guillaume (2014): Der deutsche Bankensektor, *Wirtschaftsdienst* 94(6): 420-427
- Grossman, Emiliano (2006): Europeanization as an Interactive Process: German Public Banks Meet EU State Aid Policy, *Journal of Common Market Studies* 44(2): 325-348
- Gropp, Reint; Hendrik Hakenes and Isabel Schnabel (2011): Competition, Risk-shifting, and Public Bail-out Policies, *The Review of Financial Studies* 24(6): 2084-2120

- Gropp, Reint; Christian Gruendl and Andre Guettler (2014): The Impact of Public Guarantees on Bank Risk-Taking: Evidence from a Natural Experiment, *Review of Finance* 18(2): 457-488
- Hackethal, Andreas and Reinhard H. Schmidt (2005): Structural Change in the German Banking System?, Working Paper Series Johann-Wolfgang-Goethe-Universität Frankfurt am Main, Finance and Accounting, No. 147
- Haldane, Andrew G. (2010): The \$100 billion question, BIS Review 40/2010, Bank for International Settlements
- Haldane, Andrew G. (2012): On being the right size, Speech given at the Institute of Economic Affairs` 22nd Annual Series, The 2012 Beesley Lectures, October 25
- Handelsblatt (2015a): Machtkampf im Sparkassenlager, No. 13, January 20
- Handelsblatt (2015b): Solidarität mit Sonderrechten, No. 50, March 12
- Handelsblatt (2015c): Das Fünf-Milliarden-Loch, No. 60, March 26
- Handelsblatt (2015d): Für Investoren ist das eine neue Welt, Interview with Stefan Best (Standard & Poor's), No. 60, March 26
- Handelsblatt (2015e): Ein erster Kompromiss, No. 58, March 24
- Hartmann-Wendels, Thomas and Manfred Jäger-Ambrozewicz (2010): Bedeutung und Zukunftsfähigkeit von Institutssicherungssystemen, Gutachten im Auftrag des Bundesverbandes der Deutschen Volks- und Raiffeisenbanken (BVR)
- Howarth, David and Lucia Quaglia (2013): Banking Union as Holy Grail: Rebuilding the Single Market in Financial Services, Stabilizing Europe's Banks and 'Completing' Economic and Monetary Union, *Journal of Common Market Studies* 51(S1): 103-123
- IMF (2014): How Big is the Implicit Subsidy for Banks Considered Too Important to Fail?, International Monetary Fund Global Financial Stability Report, April, Chapter 3
- Käfer, Benjamin (2014): The Taylor Rule and Financial Stability – A Literature Review with Application for the Eurozone, *Review of Economics* 65(2): 159-192

- Kaufman, George G. and Kenneth E. Scott (2003): What Is Systemic Risk, and Do Bank Regulators Retard or Contribute to It?, *The Independent Review* 7(3): 371-391
- Körner, Tobias and Isabel Schnabel (2013): Abolishing Public Guarantees in the Absence of Market Discipline, Ruhr Economic Papers No. 437, August
- Massenberg, Hans-Joachim (2013): Die Einlagensicherung der Kreditbanken – Praktische Ausgestaltung, Herausforderungen und zukünftige Entwicklungen, in: Hölscher, Reinhold and Thomas Altenhain (eds.): ,Handbuch Aufsichts- und Verwaltungsräte in Kreditinstituten: Rechtlicher Rahmen – Betriebswirtschaftliche Herausforderungen – Best Practices‘: 789-802
- Monopolkommission (2014): Chapter VI: Competition in the Financial Markets, Excerpt from the XXth Biennial Report (2012/2013): 511-731
- Moody’s (2013a): Credit Analysis: Sparkassen-Finanzgruppe, March 5
- Moody’s (2013b): Rating Methodology: Global Banks, May 31
- Moody’s (2014a): Reassessing Systemic Support for EU Banks – Outlook changed to negative for 82 banks’ supported debt and deposit ratings, May 29
- Moody’s (2014b): Credit Opinion: Landesbank Hessen-Thüringen GZ, June 2
- Moody’s (2014c): Rating Methodology: Moody’s Approach to Rating Covered Bonds, March 12
- Noss, James and Rhiannon Sowerbutts (2012): The implicit subsidy of banks, Bank of England Financial Stability Paper No. 15, May
- Packer, Frank and Nikola Tarashev (2011): Rating methodologies for banks, BIS Quarterly Review, June: 39-52
- Pagratīs, Spyros and Marco Stringa (2009): Modeling Bank Senior Unsecured Ratings: A Reasoned Structured Approach to Bank Credit Assessment, *International Journal of Central Banking* 5(2): 1-39

- Pasiouras, Fotios; Chrysovalantis Gaganis and Constantin Zopounidis (2006): The impact of bank regulations, supervision, market structure, and bank characteristics on individual bank ratings: A cross-country analysis, *Review of Quantitative Finance and Accounting* 27(4): 403-438
- Pehla, Inken (2006): Der Haftungsverbund der Sparkassen-Finanzgruppe, Stuttgart
- Poon, Winnie P.H. and Michael Firth (2005): Are Unsolicited Credit Ratings Lower? International Evidence From Bank Ratings, *Journal of Business Finance and Accounting* 32(9-10): 1741-1771
- Puri, Manju; Jörg Rocholl and Sascha Steffen (2011): Global retail lending in the aftermath of the US financial crisis: Distinguishing between supply and demand effects, *Journal of Financial Economics* 100(3): 556-578
- Rime, Bertrand (2005): Do 'too big to fail' expectations boost large banks issuer ratings?, Swiss National Bank Working Paper, May
- Schich, Sebastian and Byoung-Hwan Kim (2012): Developments in the Value of Implicit Guarantees for Bank Debt: The Role of Resolution Regimes and Practices, OECD Journal: Financial Market Trends, Vol. 2012/2
- Schich, Sebastian and Sofia Lindh (2012): Implicit Guarantees for Bank Debt: Where Do We Stand?, OECD Journal: Financial Market Trends, Vol. 2012/1
- Schich, Sebastian and Yesim Aydin (2014): Measurement and analysis of implicit guarantees for bank debt: OECD survey results, OECD Journal: Financial Market Trends, Vol. 2014/1
- Schich, Sebastian; Michiel Bijlsma and Remco J. M. Mocking (2014): Improving the monitoring of the value of implicit guarantees for bank debt, OECD Journal: Financial Market Trends, Vol. 2014/1
- Sinn, Hans-Werner (1988): Gedanken zur volkswirtschaftlichen Bedeutung des Versicherungswesens, *Zeitschrift für die gesamte Versicherungswissenschaft* 77: 1-27
- Sinn, Hans-Werner (1999): The German State Banks: Global Players in the International Financial Markets, Cheltenham, UK

- Sironi, Andrea (2003): Testing for Market Discipline in the European Banking Industry: Evidence from Subordinated Debt Issues, *Journal of Money, Credit, and Banking* 35(3): 443-472
- Soussa, Farouk (2000): Too Big To Fail: Moral Hazard and Unfair Competition, in Halme, Liisa; Christian Hawkesby, Juliette Healey, Indrek Saapar and Farouk Soussa (Eds.): 'Financial Stability and Central Banks: Selected Issues for Financial Safety Nets and Market Discipline', Bank of England, Chapter 1: 5-31
- Sy, Amadou N.R. (2009): The Systemic regulation of Credit Rating Agencies and Rated Markets, IMF Working Paper WP/09/129
- White, Lawrence J. (2010): Markets: The Credit Rating Agencies, *Journal of Economic Perspectives* 24(2): 211-226

Appendix

Appendix A – Extreme values for rating-dependent liabilities

It has been mentioned that different assumptions would significantly impact on the results of this paper. Although our rating-dependent liabilities coincide with most of the existing literature, we identify this assumption as the most critical one. In addition to our ‘maturity’ and ‘average’ scenarios shown above, this appendix conducts our estimation using both extreme values from Cariboni et al. (2013) as well as Berge et al. (2006). This provides us with the opportunity to show estimation results for rating-dependent liabilities between 15% and 66% in table A1 below. Figure A1 reports the individual banks’ shares.

	Rating-dependent liabilities at 15%			
	2011	2012	2013	2014
Balance sheet total	1,229,484.00	1,197,340.00	1,034,011.00	1,002,068.00
Rating-dependent liabilities	184,422.60	179,601.00	155,101.65	150,310.20
Monetary funding advantage	1,281.03	2,317.42	1,307.90	490.67
Profit before taxes	1,487.00	1,560.00	888.00	1,378.00
Funding advantage relative to profit before taxes	0.86	1.49	1.47	0.36
	Rating-dependent liabilities at 66%			
	2011	2012	2013	2014
Balance sheet total	1,229,484.00	1,197,340.00	1,034,011.00	1,002,068.00
Rating-dependent liabilities	811,459.44	790,244.40	682,447.26	661,364.88
Monetary funding advantage	5,636.55	10,196.65	5,754.76	2,158.93
Profit before taxes	1,487.00	1,560.00	888.00	1,378.00
Funding advantage relative to profit before taxes	3.79	6.54	6.48	1.57

Table A1: Estimation results for rating-dependent liabilities of 15% and 66%

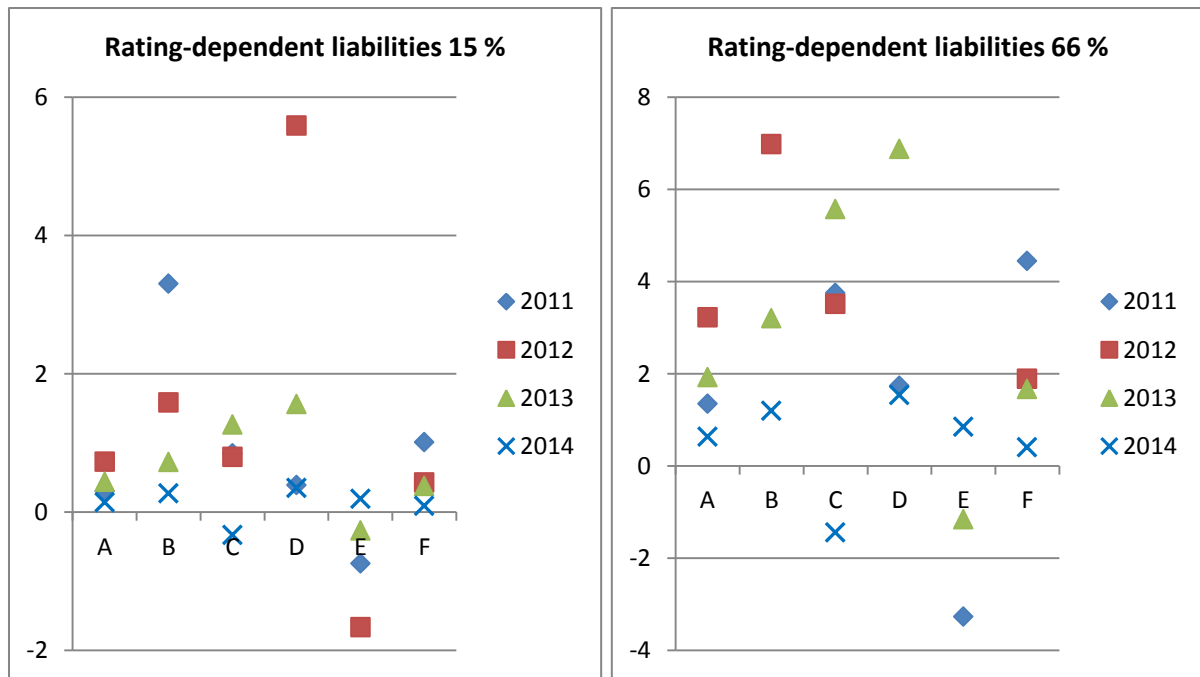


Figure A1: Relation between funding advantage and annual profit before taxes across banks over time
Notes: Bank names were made anonymous with the letters A to F to avoid inferences on individual banks. The right-hand graph has been capped to avoid the graphically distortive effects of outliers, which eliminates three observations. Outliers are possible if one bank reports a comparatively small profit that is contrasted with a substantial funding advantage. Negative relations result if the bank reports a loss.

Appendix B – Nonlinear yields for rating notches below BBB

Our yield data require us to work with linear interpolation between our supporting points AAA, AA, A, and BBB to receive the missing yields between those notches. As mentioned in section 4.2, we opted for linear extrapolation beyond BBB. However, this assumption is also critical because it disregards the nonlinear increase of yields at the lower end of the rating scale. As an additional robustness check, this appendix reproduces our estimation under the assumption of a nonlinear rise in yields below BBB. To this end, we compared the average rise in yield spreads between AA and A as well as between A and BBB. Yields for the A rating are on average 1.16 times higher than yields for the AA rating, while yields for the BBB rating are on average 1.51 times higher than for the A rating. We thus add the average difference between both factors ($1.51 - 1.16 = 0.35$) on the BBB factor and assume that yields in the BB class are on average 1.86 times higher than in the BBB class ($1.51 + 0.35 = 1.86$). Finally, we extend this factor computation further down the rating scale to cover all required rating notches. This reduces the underestimation tendency mentioned in section 4.2 and leads to the funding advantages in table A2. Figure A2 reports the individual banks' shares.

	Maturity Scenario			
	2011	2012	2013	2014
Monetary funding advantage	9,367.75	10,668.10	8,444.32	3,782.31
Profit before taxes	1,487.00	1,560.00	888.00	1,378.00
Funding advantage relative to profit before taxes	6.30	6.84	9.51	2.74
	Average Scenario			
	2011	2012	2013	2014
Monetary funding advantage	6,829.68	7,384.79	5,219.35	2,291.61
Profit before taxes	1,487.00	1,560.00	888.00	1,378.00
Funding advantage relative to profit before taxes	4.59	4.73	5.88	1.66

Table A2: Estimation results for nonlinear yield extrapolation below BBB

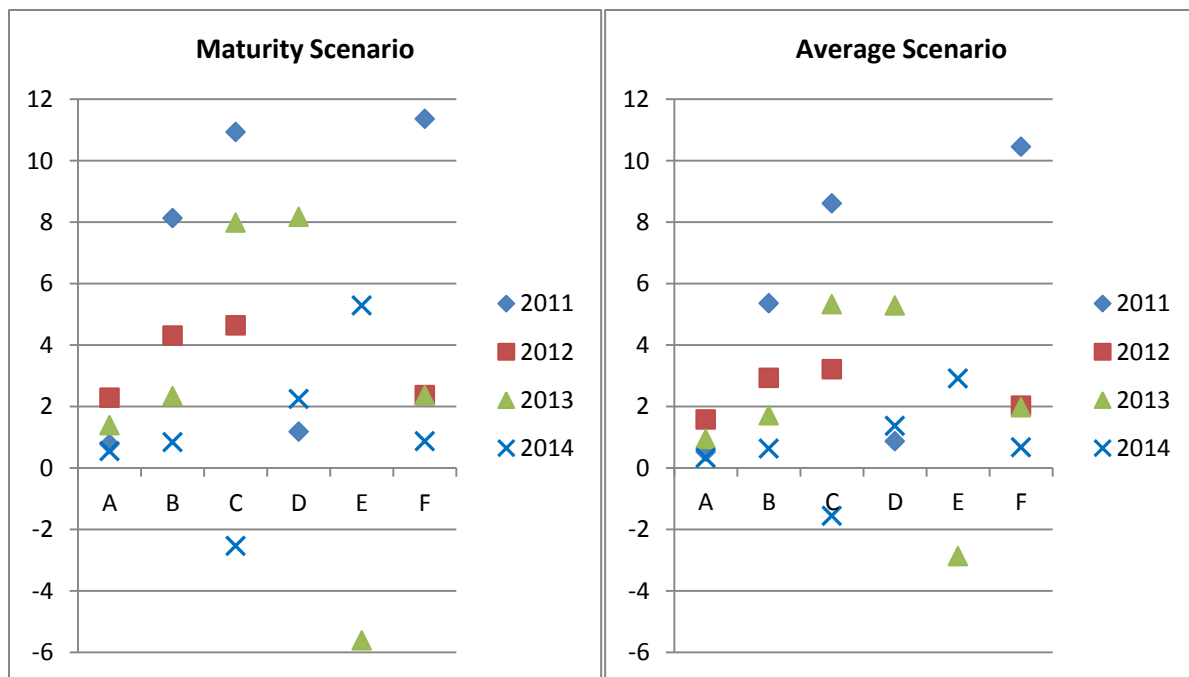


Figure A2: Relation between funding advantage and annual profit before taxes across banks over time
Notes: Bank names were made anonymous with the letters A to F to avoid inferences on individual banks. Both graphs have been capped to avoid the graphically distortive effects of outliers, which eliminates three observations for each scenario. Outliers are possible if one bank reports a comparatively small profit that is contrasted with a substantial funding advantage. Negative relations result if the bank reports a loss.