Do "too big to fail" expectations boost large banks issuer ratings?

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Abstract

We examine the possible effects of "too big to fail" (TBTF) expectations on issuer ratings for a sample of banks of various sizes in 21 industrialised countries. TBTF expectations are important because the existence of implicit state guarantees can significantly undermine market discipline. Moody's and Fitch assign two main types of ratings to banks: (i) an issuer rating that considers all factors influencing the capacity of the bank to repay its debt, *including a possible external support* and (ii) a financial strength or individual rating reflecting only the *intrinsic capacity of the bank to repay its debt*. To measure the effect of TBTF expectations, we regress banks issuer ratings on their financial strength ratings as well as on variables controlling for different types of external support (explicit state guarantee, TBTF related support). We find that our proxies of the TBTF status of a bank (size, market share) have a significant, positive impact on bank issuer ratings. The largest banks in the sample get a rating "bonus" of several notches.

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Key words: banks, ratings, too big to fail, market discipline

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1. Introduction

This paper examines the possible effect of "too big to fail" (TBTF) expectations on large banks issuer ratings. A bank can be considered TBTF when the adverse effects of its failure on the stability of the financial system and on real economic activity are expected to be so severe that a public support is likely.[1] When a bank's stakeholders expect that the availability of an implicit state guarantee will shield them from the consequences of its failure, market discipline is undermined. Hence, TBTF expectations can exacerbate moral hazard at large banks.

The notion of TBTF received its letters of infamy in 1984, as the US government – through the FDIC - purchased stock in Continental Bank Corporation, a holding company whose main assets, Continental Bank, the 8th largest in the country, was virtually bankrupt.[2] In the aftermath, the OCC admitted to the US Congress that "all 11 of the largest U.S. banks were equally essential to the financial system". Seven years later, the FDIC again invoked its TBTF policy to guarantee in full all uninsured depositors of the Bank of New England. Since then, the notion of TBTF has flourished, as banking systems have become more and more concentrated: in several European countries, the largest banks hold more than a third of the total assets of their home banking sector (see figure 1).[3] Remarkably, however, the history of banking crises has not provided clear, new evidence about TBTF.[4] In the context of system-wide crises, the governments of Japan, Sweden, Finland and Norway have granted blanket state guarantees to all banks, *regardless of their size*.[5] And

[1] Hoggarth and Saporta (2002) estimate that the real costs of systemic banking crises – measured in terms of cumulative output losses – can represent up to 20% of annual GDP.

[2] For a survey of issues related to TBTF, see Stern and Feldman (2004).

[3] Kane (2000) even provides evidence that TBTF considerations can be a motive for mergers and – therefore – a driver of financial consolidation.

[4] Detailed surveys of banking crises can be found in Basel Committee (2004), Hoelcher et al. (2003) and Honohan et al. (2000).

[5] A focus on larger banks was observed for recapitalizations involving tax-payers funds, though.

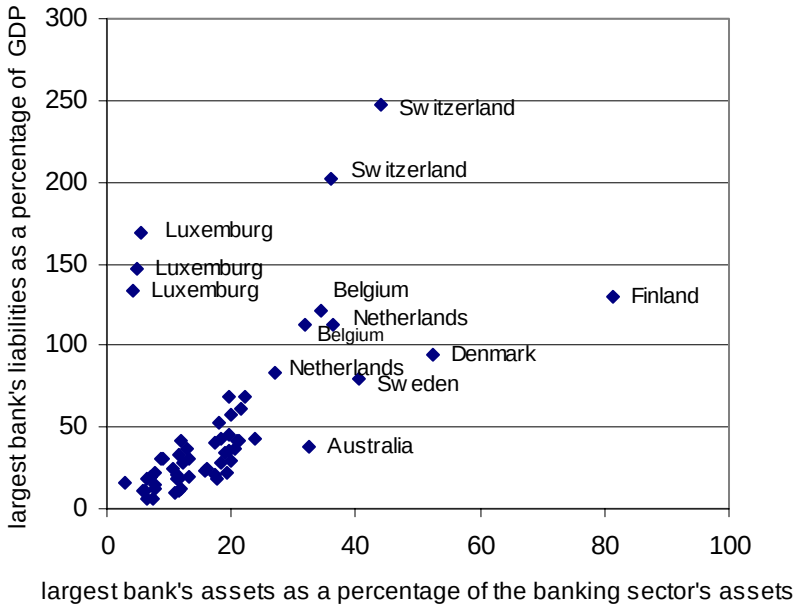
the bail-outs of Crédit Lyonnais and Banco di Napoli cannot be interpreted in terms of TBTF since these two banks were owned by the state.

Do TBTF expectations relate to a myth or to a reality? Public officers usually deny that any bank is TBTF. But at the same time, legal provisions in some countries suggest that some banks may be "more equal than others" with regard to the likelihood of a public support. In the US, for example, the FDICIA still allows to deviate from the least cost resolution principle in the case of failure of an "essential" bank.[6] An interesting example of ambiguity can also be found in the reply of the Swiss government (Bundesrat, 1998) to a parliamentary interpellation demanding that TBTF banks be subject to more stringent capital requirements: "In principle, no bank, whatever the dominance of its competitive position, is TBTF. Should public support be granted, the aim would not be the survival of the institution, but the maintaining of a sufficient credit supply and the protection of the reputation of the Swiss economy." At first sight, official disavowals of TBTF can be interpreted as attempts to mitigate moral hazard at large banking institutions. But they could also signal that from the stance of the authorities, the benefits of a TBTF policy do not necessarily outweigh its costs. After all, the costs and not only the benefits of a public support are an increasing function of the size (or the economic importance) of a bank. In some cases, the costs of a public support may just be unaffordable. Think for example of countries like Switzerland or the Netherlands, where the liabilities of the largest banks are as high as an annual GDP or even more (see figure 1). Those banks may be "too big to be rescued" rather than TBTF.[7]

[6] The conditions have become stricter though. Providing such support requires approval by two-thirds of the FDIC's directors, the Board of Governors of the Federal Reserve and concurrence of the Secretary of the Treasury.

[7] In a speech at the BIS on October 2000, the Director of the Swiss Federal Banking Commission argued that "Since a bailout of a very large bank can be extremely costly, the question could rather be, whether such a bank is "too big to be rescued"."

Figure 1: Relative importance of the 1-3 largest banks in industrialized countries



Sources: Largest banks assets and liabilities: Fitch; Banking sector total assets: OECD "Bank profitability"; GDP: IMF "International Financial Statistics".

Looking at the literature, most previous studies have tested for the existence of TBTF expectations by looking at the relationship between bank debt spreads, bank risk profile and, in some cases, bank size. Overall, the evidence is not conclusive.[8] Two studies deserve a special mention, as they provide opposite - and hard to reconciliate - pieces of evidence. First, Morgan and Stiroh (2002) find that the relationship between bond spreads and ratings is flatter for the *eleven US banks* identified by the OCC as TBTF than for the other banks. They conclude that TBTF expectations are present. Second, Sironi (2003) finds that *European banks* bond spreads are sensitive to indicators of bank risk such as

[8] Flannery and Sorescu (1996) find that during the eighties, large banks subordinated debts have become more sensitive to indicators of bank risk, such as accounting variables and ratings. The authors argue that this finding reflects the FDIC's increasingly hard treatment of this kind of debenture when restructuring large banks over the reference period. Morgan and Stiroh (2001) and Sironi (2004) find that bank bond spreads are sensitive to accounting indicators of bank risk and to ratings, respectively. But the authors do not control for bank size, so that their findings cannot be interpreted in terms of TBTF. Jagtiani et al. 2000 find that bond spreads for US banks are sensitive to accounting indicators of bank risk and that they decrease with bank size. But in the specification they use, the second result can reflect TBTF expectations as well as a true mitigation effect of size on bank risk.

accounting variables and ratings, but that they do not depend on bank size. He concludes that TBTF expectations are not material. These two findings are at odds with the observation that banking concentration - usually considered as a typical source of TBTF - is much higher in Europe than in the US. One explanation for this counterintuitive evidence could be that European banks are "too big to be rescued", rather than TBTF. Another explanation could be that Sironi's work does not allow for a proper identification of TBTF expectations, because the author uses a sample of banks that are too similar in terms of their possible TBTF status.

Our test of TBTF expectations significantly departs from the existing literature, in the sense that we focus on bank ratings rather than on bank spreads. Moody's and Fitch assign to banks (i) an *issuer rating* that considers all factors influencing the capacity of the bank to repay its debt, including a possible external support and (ii) a *financial strength or individual rating* reflecting only the *intrinsic* capacity of the bank to repay its debt. Starting from there, we use regression analysis to identify the factors explaining the differences between the two types of ratings. One of these factors is the possible TBTF status of a bank, proxied by various measures of its systemic importance.

In theory, issuer ratings represent a less direct measure of TBTF expectations - or market discipline - than bank spreads. But there are good reasons for focusing on ratings rather than on spreads. The first is purely technical. Ratings are not affected by liquidity premia and they are therefore easier to compare across banks of different size and from different countries. Hence, by focusing on ratings, we can work on a sample that is larger, more heterogeneous in terms of bank size and more international than previous studies focusing on spreads. This is an essential advantage for measuring TBTF expectations. The second reason relates to the economic and prudential role of ratings. Issuer ratings do not only affect spreads. They also play a role in the determination of collateral requirements and in the setting of credit limits. A good issuer rating can even be a necessary condition for entering some segments of the financial market. Finally, under Basel II, issuer ratings will directly enter into the calculation of the capital requirement for interbank claims under the standardised approach, and they will serve as a benchmark under the internal ratings approach.

With regard to the results, we do find that our proxies of the TBTF status of a bank (total assets and market share) have a positive and significant effect on large banks' issuer ratings, and that this effect is larger for banks with low intrinsic financial strength. The largest banks in our sample get a rating bonus of about 1 notch at Moody's and of about 3 notches at Fitch. For banks with low intrinsic financial strength, the bonus is larger than three notches at both agencies. We therefore cannot reject the hypothesis that TBTF expectations play an important role in the assignment of ratings and that they can substantially reduce market discipline.

The rest of this paper is organised as follows. Section 2 introduces the methodology and the data. Sections 3 and 4 present the estimates of the model explaining banks issuer ratings for different bank samples. Section 5 presents the estimates of the rating bonus. Section 6 concludes.

2. General specification and data

2.1 TBTF expectations and the issuer rating/financial strength rating relationship

Moody's and Fitch assign to a bank (i) an issuer rating[9] that considers all factors influencing the capacity of the bank to repay its debt, including a possible external support and (ii) a financial strength[10] or individual rating[11] reflecting only the intrinsic capacity of the bank to repay its debt.

[9] Fitch (2004) writes: "The essential basis for the issuer rating is an assessment of the individual financial strength of the financial institution itself, as well as the likelihood and source of external support should the financial institution experience financial difficulties."

[10] Moody's (2004) uses the following definition. "Financial strength ratings represent Moody's opinion of a bank's intrinsic safety and soundness and, as such, exclude certain external credit risks and credit support elements. Instead, financial strength ratings are a measure of the likelihood that a bank will require assistance from third parties such as its owners, its industry group, or official institutions. Factors considered in the assignment include bank-specific elements such as financial fundamentals, franchise

To measure the impact of TBTF expectations on issuer ratings, we regress the bank's issuer rating on its individual or financial strength rating as well as on variables controlling for different types of external support. To capture expectations regarding a possible state support related to the TBTF status of a bank, we use various variables measuring its systemic importance as well as the potential cost of its bail-out. We also control for the existence of explicit state guarantees and, in the case of bank subsidiaries, for a possible support by the parent bank. The general specification of the model is

Issuer rating= *f*(individual or financial strength rating, explicit state guarantee, TBTF proxy, issuer rating of the parent) + residual

2.2 Data and variables

Our data includes all banks rated both by Moody's and by Fitch IBCA in 21 industrialized countries for the period 1999-2003.[12] The sample covers a wide range in terms of bank size (1 billion to 1 trillion USD in total assets) and bank market share (less than 1% to nearly 100%).

For the purpose of estimation, we need to transform the alphanumerical ratings into numerical variables:

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value, and business and asset diversification. Although financial strength ratings exclude the external factors specified above, they do take into account other risk factors in the bank's operating environment, including the strength and prospective performance of the economy, as well as the structure and relative fragility of the financial system, and the quality of banking regulation and supervision."

[11] Fitch (2004) uses the following definition. "Individual ratings attempt to assess how a bank would be viewed if it were entirely independent and could not rely on external support. These ratings are designed to assess a bank's exposure to, appetite for, and management of risk, and thus represent our view on the likelihood that it would run into significant difficulties such that it would require support. The principal factors we analyze to evaluate the bank and determine these ratings include profitability and balance sheet integrity (including capitalization), franchise, management, operating environment, and prospects. Finally, consistency is an important consideration, as is a bank's size (in terms of equity capital) and diversification."

[12] We ignore Standard & Poor's ratings because this agency does not assign ratings measuring the intrinsic financial strength of a bank.

– *Issuer rating:* Fitch IBCA's issuer rating scale for not defaulted banks goes from AAA to C (21 notches). We transform the issuer rating into a numerical variable $ISSUER_{j,t}$ using the following rule (AAA=21, AA+=20... C=1). Moody's issuer rating scale goes from Aaa to C (21 notches). The issuer rating is transformed into a numerical variable using the same principle (Aaa=21, Aa1=20...).

– *Financial strength or individual rating:* Moody's financial strength rating scale goes from A to E (13 notches). The issuer rating is transformed into a numerical variable $FSR_{j,t}$ using the following rule (A=13, A-=12... E=1). Fitch IBCA's individual rating scale also goes from A to E, but it counts 9 notches. We transform the individual rating into a numerical variable using the same principle (A=9, A/B=8...).

The variables controlling for external support are defined as follows:

– *Explicit state guarantee:* To account for this type of support, we define a dummy variable $STATE_{j,t}$. This variable is equal to 1 when the bank benefits from an explicit state guarantee or when it is owned by a central government administration, and equal to 0 otherwise.

– *Implicit state guarantee related to a possible TBTF status of the bank:* We use two variables measuring the systemic importance of the bank. The first is the absolute size of the bank, as measured from its total assets ($ASSETS_{j,t}$). The second measure is the bank's share ($SHARE_{j,t}$) in the total assets of the banking sector of its home country. This measure has the advantage to control for the fact that for a same absolute size, a bank may be more or less important depending on the size of its home banking sector.[13] We complement the two TBTF proxies with a measure of the potential cost of its bail-out, defined as the ratio between the liabilities of the bank and the GDP of its home country ($LIABGDP_{j,t}$). This third variable can be considered as a "too big to be rescued" (TBTBR) proxy.

[13] Our measure of the size of national banking sectors is based on the statistics of the OECD "Bank profitability". The data for Japan and the US have been adjusted using national sources to account for the fact that these two countries use a very narrow definition of the banking sector when reporting to the OECD.

– *Possible support by the parent bank*. To account for this type of support, we build a variable $ISSUERPAR_{j,t}$ equal to the issuer rating of the parent bank. The variable is equal to 0 when the bank has no parent.

3. Estimates for the full data set

The full data set includes all banks rated both by Moody's and Fitch, i.e., independent banks, parent banks and bank subsidiaries, with or without explicit state guarantee. Banks with less than a billion USD of total assets are eliminated from the sample. This leaves us with 660 observations. Estimates based on the large data set allow us to compare the importance of the different sources of external support with regard to their impact on bank issuer ratings.

We begin with a specification omitting the TBTF proxy and we focus the analysis on the explanatory power of the model. The purpose of this first step is to evaluate the need to control for TBTF expectations. For parent banks and independent banks, we assume that the issuer rating is a function of the individual or financial strength rating as well as of the availability of an explicit state guarantee. For subsidiaries, we assume that the issuer rating also depends on the issuer rating of the parent. The specification is

$$\begin{aligned} ISSUER_{j,t} = &\left(1 - SUB_{j,t}\right) \cdot \left(c_1 + c_2 \cdot FSR_{j,t} + c_3 \cdot STATE_{j,t}\right) \\ &+ SUB_{j,t}\left(c_4 \cdot ISSUERPAR_{j,t} + \left(1 - c_4\right)\left(c_1 + c_2 \cdot FSR_{j,t} + c_3 \cdot STATE_{j,t}\right)\right) + \upsilon_{j,t} \end{aligned}$$

where $SUB_{j,t}$ is a dummy variable equal to 1 for a bank subsidiary and to 0 otherwise, and c_4 measures the relative weight of the parent's rating in the subsidiary's rating.

The model is estimated using non linear least squares.[14] The data of the different years are pooled together.[15] We do *not* use bank specific fixed or random effects since the variation of the variables over time is negligible compared to the variation across banks.[16]

[14] In the next section, we use a specification that is linear in the coefficients and we are thus able to present TOBIT and ordered PROBIT estimates that account for the fact that the issuer rating takes only integer values and that its distribution is truncated.

[15] We also conducted year by year estimations. The results were consistent with those of the pooled estimations.

The results are presented in the first block of table 2 for the two agencies. All explanatory variables are significant at the 1% level and have the expected sign. The coefficient of $STATE_{j,t}$ indicates that the presence of an explicit guarantee has a strong impact on the issuer rating, representing about 4 to 5 notches. The magnitude of the weight c_4 indicates that for subsidiaries, the rating of the parent plays an important role. But the relatively low levels of the r-squared indicate that a substantial part of the variations of the issuer rating remains unexplained.

We now introduce the TBTF proxy in the model. The specification is:

$$ISSUER_{j,t} = (1 - SUB_{j,t}) \cdot (c_1 + c_2 \cdot FSR_{j,t} + c_3 \cdot STATE_{j,t} + c_4 \cdot TBTF_{j,t}) + SUB_{j,t}(c_5 \cdot ISSUERPAR_{j,t} + (1 - c_5)(c_1 + c_2 \cdot FSR_{j,t} + c_3 \cdot STATE_{j,t} + c_4 \cdot TBTF_{j,t})) + \upsilon_{j,t}$$

where the logs of $ASSETS_{j,t}$ and $SHARE_{j,t}$ successively enter as a proxy for the TBTF status of a bank.[17]

The results are presented in the last two blocks of table 3. For the two rating agencies, the TBTF proxies have a significant and positive impact on bank issuer ratings. The t-values of the coefficients of the TBTF proxies and the increase in the explanatory power of the model (compared to the model omitting TBTF) indicate that TBTF expectations affect

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[16] An alternative is to use country specific fixed effects. The estimates obtained using country specific fixed effects are available from the author. They do not significantly differ from those presented here, and they do not lead to a significant improvement in the explanatory power of the model.

[17] Expressing the TBTF proxies in logs provides the best fit. One interpretation for this is that beyond some size threshold, the TBTF status of a bank becomes so obvious that a further size increase does not significantly affect TBTF expectations.

Fitch issuer ratings more than Moody's issuer ratings. Note, also, that the explanatory power of the model is comparable across the two TBTF proxies, indicating that both absolute and relative bank size affect the TBTF status of a bank and, consequently, its issuer rating.

Table 2: Estimates for the full data sample, without and with a TBTF proxy

	Without TBTF				With TBTF: log(ASSETS)				With TBTF: log(SHARE)			
	Moody's		Fitch		Moody's		Fitch		Moody's		Fitch	
Variable	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value	Coef.	t-value
Constant	13.736	75.01	8.460	24.93	8.713	17.51	-6.405	-8.65	15.006	66.30	10.385	38.39
FSR	0.824	40.23	0.944	18.79	0.756	37.80	1.066	27.31	0.762	37.23	0.990	25.98
STATE	4.754	24.53	5.728	18.57	4.333	23.48	5.086	21.33	4.576	24.70	5.532	23.57
ISSUERPAR	0.568	12.78	0.430	6.34	0.497	13.06	0.365	8.17	0.495	12.15	0.618	12.91
TBTF					0.317	10.73	0.795	21.54	0.177	8.59	0.533	21.66
adj. r-sq.	0.76		0.51		0.80		0.71		0.79		0.71	

4. Estimates for the restricted data set

The presence of state-owned banks and of subsidiaries in the sample can bias our estimates for two reasons. For subsidiaries, the impact of TBTF expectations can be partially masked by the fact that this factor is taken implicitly into account in the issuer rating of the parent bank. And for state-owned banks, it is not clear how/whether TBTF expectations interact with explicit guarantees. We therefore conduct the rest of our estimations for a sample that includes only parent banks and independent banks (456 observations).

4.1 Basic specification including the TBTF proxy

When bank subsidiaries and banks with an explicit guarantee are excluded, the model can be simplified to

$$ISSUER_{j,t} = c_1 + c_2 \cdot FSR_{j,t} + c_3 \cdot TBTF_{j,t} + \upsilon_{j,t},$$

where the logs of $ASSETS_{j,t}$ and $SHARE_{j,t}$ again successively enter as a proxy for the TBTF of the bank.

Because the model is linear in the coefficients, it can be estimated with methods that account for the fact that the independent variable is truncated (TOBIT) and that it takes only integer values (ordered PROBIT). Tables 3a and 3c present the results obtained using TOBIT, OLS and ordered PROBIT. The two TBTF proxies have a significant and positive impact on bank issuer ratings. And this result is robust to the use of the three estimation methods. Overall, the results are very similar to those obtained for the full sample.

Table 3c presents the results for the specification combining the two TBTF proxies. The coefficients of the two proxies are significant. The explanatory model increases moderately at both rating agencies. This indicates that absolute and relative size represent, to a limited extent, complementary information in the appreciation of the TBTF status of a bank.

Table 3a: Estimates of the basic model explaining ISSUER with Log(ASSETS) as the TBTF proxy

	TOBIT				LS				ORDERED			
	Moody's		Fitch		Moody's		Fitch		Moody's		Fitch	
Variable	Coefficient	z-value	Coefficient	z-value	Coefficient	t-value	Coefficient	t-value	Coefficient	z-value	Coefficient	z-value
Constant	7.301	13.01	-9.157	-11.39	7.425	13.47	-8.777	-11.18				
FSR	0.740	34.62	1.073	26.37	0.727	34.91	1.054	26.54	0.843	21.86	0.916	19.54
Log(ASSETS)	0.402	12.02	0.948	23.41	0.401	12.17	0.932	23.54	0.454	11.18	0.828	18.39
adj. r-squared	0.80		0.71		0.80		0.71		0.41		0.30	

Table 3b: Estimates of the basic model explaining ISSUER with Log(SHARE) as the TBTF proxy

	TOBIT				LS				ORDERED			
	Moody's		Fitch		Moody's		Fitch		Moody's		Fitch	
Variable	Coefficient	z-value	Coefficient	z-value	Coefficient	t-value	Coefficient	t-value	Coefficient	z-value	Coefficient	z-value
Constant	15.492	61.80	10.876	36.97	15.589	63.43	10.932	37.87	0.000	0.00	0.000	0.00
FSR	0.736	32.83	0.966	23.50	0.722	33.07	0.949	23.63	0.809	21.45	0.787	18.05
Log(SHARE)	0.250	10.61	0.619	22.55	0.249	10.75	0.609	22.66	0.260	9.44	0.507	17.37
adj. r-squared	0.79		0.70		0.79		0.70		0.39		0.28	

Table 3c: Estimates of the basic model explaining ISSUER with Log(ASSETS) and Log(SHARE) as TBTF proxies

	TOBIT				LS				ORDERED			
	Moody's		Fitch		Moody's		Fitch				Fitch	
Variable	Coefficient	z-value	Coefficient	z-value	Coefficient	t-value	Coefficient	t-value	Coefficient	z-value	Coefficient	z-value
Constant	9.579	8.92	-0.762	-0.55	9.707	9.18	-0.515	-0.38				
FSR	0.729	33.64	1.032	26.52	0.716	33.86	1.014	26.65	0.839	21.67	0.933	19.48
Log(ASSETS)	0.300	5.66	0.562	8.61	0.298	5.71	0.553	8.60	0.383	6.36	0.565	9.17
Log(SHARE)	0.090	2.48	0.315	7.27	0.090	2.52	0.311	7.27	0.065	1.58	0.252	6.24
adj. r-squared	0.81		0.74		0.81		0.74			0.41		0.32

4.2 Interaction between the TBTF proxy and the FSR

The basic specification implies that the impact of TBTF expectations on the issuer rating is independent of the intrinsic financial strength of a bank. But since the issuer rating cannot be higher than AAA (Fitch) or Aaa (Moody's), its potential for improvement is smaller for banks that would receive a good issuer rating anyway because of their high intrinsic financial strength. To account for this, we let the TBTF proxy interact with the individual or financial strength rating of the bank. The specification is now

$$ISSUER_{j,t} = c_1 + c_2 \cdot FSR_{j,t} + c_3 \cdot TBTF_{j,t} + c_4 \cdot FSR \cdot TBTF_{j,t} + \upsilon_{j,t}$$

The results are presented in tables 4a and 4b. The coefficients of the TBTF proxies remain positive and significant. The coefficient of the interaction term is negative and significant. This implies that the positive impact of the TBTF proxies on issuer rating is smaller for banks with a high individual or financial strength rating. The explanatory model substantially increases compared to the explanatory power obtained with the basic specification (tables 3a and 3b), especially at Moody's. We do not present the results of the specification combining the two TBTF proxies in interaction with the individual rating. This specification is subject to severe colinearity problems and it does not bring a substantial increase in the explanatory power.

Table 4a: Estimates of the model explaining ISSUER with Log(ASSETS) as a TBTF proxy in interaction with FSR

	TOBIT				LS				ORDERED			
	Moody's		Fitch		Moody's		Fitch		Moody's		Fitch	
Variable	Coefficient	z-value	Coefficient	z-value	Coefficient	t-value	Coefficient	t-value	Coefficient	z-value	Coefficient	z-value
Constant	-13.297	-8.78	-23.250	-7.89	-13.299	-8.95	-23.473	-8.11				
FSR	3.414	18.16	3.384	7.24	3.412	18.54	3.458	7.55	3.865	12.15	1.905	4.24
Log(ASSETS)xFSR	-0.146	-14.30	-0.125	-4.97	-0.146	-14.65	-0.130	-5.26	-0.158	-9.65	-0.053	-2.22
Log(ASSETS)	1.532	18.31	1.705	10.82	1.536	18.71	1.721	11.12	1.740	12.30	1.154	7.49
adj. r-squared	0.87		0.72		0.87		0.72		0.46		0.30	

Table 4b: Estimates of the model explaining ISSUER with Log(SHARE) as a TBTF proxy in interaction with FSR

	TOBIT				LS				ORDERED			
	Moody's		Fitch		Moody's		Fitch		Moody's		Fitch	
Variable	Coefficient	z-value	Coefficient	z-value	Coefficient	t-value	Coefficient	t-value	Coefficient	z-value	Coefficient	z-value
Constant	19.477	53.69	15.798	29.24	19.603	55.32	15.959	30.22				
FSR	0.286	7.48	0.213	2.63	0.271	7.27	0.182	2.30	0.445	8.11	0.217	2.58
Log(SHARE)xFSR	-0.113	-13.39	-0.206	-10.40	-0.115	-13.92	-0.211	-10.90	-0.119	-9.07	-0.183	-7.71
Log(SHARE)	1.198	16.29	1.967	14.89	1.212	16.87	1.995	15.42	1.304	10.88	1.764	10.54
adj. r-squared	0.86		0.76		0.86		0.76		0.43		0.31	

4.3 Specification including a "too big to be rescued" proxy

Rating agencies may consider that a bank is too big to be rescued (TBTBR) if there is a disproportion between the potential cost of its bail-out and the financial capacity of its home country. This implies that for some large banks, TBTBR and TBTF expectations could entirely or partially neutralize one another with regard to their impact on issuer ratings. To account for this, we include the ratio between the bank's liability and the GDP of its home country ($LIABGDP_{j,t}$) as a TBTBR proxy in our model. We expect the coefficient of $LIABGDP_{j,t}$ to be negative. By symmetry with the treatment of the TBTF proxy, we also let $LIABGDP_{j,t}$ interact with the individual or financial strength rating of the bank. We expect the coefficient of the interaction term to be positive, because the negative impact of TBTBR expectations on issuer ratings should be smaller for banks with a high individual or financial strength rating.

We estimate the following equation:

$$ISSUER_{j,t} = c_1 + c_2 \cdot FSR_{j,t} + c_3 \cdot TBTF_{j,t} + c_4 \cdot FSR \cdot TBTF_{j,t} + c_5 \cdot TBTBR_{j,t} + c_6 \cdot FSR \cdot TBTBR_{j,t} + \upsilon_{j,t}$$

where the logs of $ASSETS_{j,t}$ and $SHARE_{j,t}$ successively enter as a TBTF proxy and the log of $LIABGDP_{j,t}$ enters as a TBTBR proxy.

The results are presented in tables 5a and 5b.[18] At Moody's, the coefficient of $LIABGDP_{j,t}$ is not significant when combined with $ASSETS_{j,t}$. But it is negative and significant when combined with $SHARE_{j,t}$.[19] The latter result prevents us from rejecting the hypothesis that this agency incorporates some TBTBR considerations in issuer ratings. Note however, that the explanatory power of the model including the TBTBR in addition to the TBTF proxy is only marginally higher than the one we obtained with the model

[18] Similar results where obtained with a specification where the TBTF and TBTBR proxies do not interact with the individual or the financial strength rating.

[19] In this case, the coefficient of the interaction term involving the TBTBR proxy and the individual rating is positive, as expected.

including only the TBTF proxy. At Fitch, the coefficient of $LIABGDP_{j,t}$ is not significant when combined with $SHARE_{j,t}$ and significant but *positive* when combined with $ASSETS_{j,t}$.[20] These two results lead us to reject the hypothesis that Fitch incorporates TBTBR considerations in issuer ratings.

[20] In this case, the coefficient of the interaction term involving the TBTBR proxy and the individual rating is negative. This is not surprising, considering the fact that for Fitch, our TBTBR proxy seems to behave like a TBTF proxy.

Table 5a: Estimates of the model explaining ISSUER and including Log(ASSETS) as a TBTF proxy and Log(LIABGDP) as a TBTBR proxy in interaction with FSR

	TOBIT				LS				ORDERED			
	Moody's		Fitch		Moody's		Fitch				Fitch	
Variable	Coefficient	z-value	Coefficient	z-value	Coefficient	t-value	Coefficient	t-value	Coefficient	z-value	Coefficient	z-value
Constant	-12.715	-4.48	-3.286	-0.69	-11.219	-4.07	-1.613	-0.35				
FSR	3.509	10.57	1.824	2.61	3.332	10.37	1.609	2.36	4.469	9.33	1.624	2.46
Log(ASSETS)xFSR	-0.151	-9.654	-0.071	-2.145	-0.144	-9.469	-0.063	-1.955	-0.185	-8.262	-0.055	-1.756
Log(ASSETS)	1.508	11.515	0.889	4.055	1.449	11.363	0.824	3.843	1.901	10.004	0.824	3.964
Log(LIABGDP)xFSR	0.004	0.385	-0.091	-3.913	-0.003	-0.267	-0.103	-4.544	0.021	1.366	-0.062	-2.519
Log(LIABGDP)	0.017	0.176	0.904	5.404	0.078	0.827	0.983	6.039	-0.123	-0.877	0.662	3.728
adj. r-squared	0.87		0.77		0.87		0.77		0.47		0.33	

Table 5b: Estimates of the model explaining ISSUER and including Log(SHARE) as a TBTF proxy and Log(LIABGDP) as a TBTBR proxy in interaction with FSR

	TOBIT				LS				ORDERED			
	Moody's		Fitch		Moody's		Fitch				Fitch	
Variable	Coefficient	z-value	Coefficient	z-value	Coefficient	t-value	Coefficient	t-value	Coefficient	z-value	Coefficient	z-value
Constant	17.846	40.433	16.359	25.654	18.160	42.589	16.606	26.715				
FSR	0.438	9.641	0.123	1.288	0.403	9.230	0.079	0.854	0.696	9.833	0.114	1.171
Log(SHARE)xFSR	-0.270	-10.909	-0.230	-4.632	-0.257	-10.663	-0.222	-4.547	-0.334	-9.464	-0.209	-4.457
Log(ASSETS)	2.624	11.483	1.806	5.087	2.505	11.239	1.743	5.008	3.252	9.984	1.635	4.889
Log(SHARE)xFSR	0.142	6.741	0.009	0.217	0.129	6.293	-0.004	-0.096	0.196	6.614	0.007	0.193
Log(LIABGDP)	-1.327	-6.521	0.198	0.671	-1.198	-6.071	0.280	0.970	-1.812	-6.416	0.191	0.702
adj. r-squared	0.87		0.76		0.87		0.76		0.46		0.31	

4.4 Summary of the models estimates

The results obtained by combining various specifications, estimations methods and TBTF proxies indicate that bank size, measured in terms of total assets and market share, has a positive and significant impact on issuer ratings. And that this impact is larger for banks with low intrinsic financial strength. Hence, we cannot reject the hypothesis that TBTF expectations significantly boost large bank issuer ratings. By contrast, the evidence for TBTBR expectations is weak.

A comparison across the two agencies of the increases in the explanatory power between the model omitting the TBTF proxy and the basic model including the TBTF proxy indicates that TBTF expectations play a more substantial role at Fitch than at Moody's (see table 2). Conversely, a comparison of the increases in the explanatory power between the basic model including the TBTF proxy (tables 3a and 3b) and the model where the TBTF proxy interacts with FSR (tables 4a and 4b) indicates that controlling for intrinsic financial strength is more important at Moody's than at Fitch for an appropriate quantification of the impact of TBTF expectations.

5. Quantification of the rating bonus

In this section, we translate the models estimates of the previous section into a rating "bonus". To do this, we focus on the estimates of the specification including $ASSETS_{j,t}$ as a TBTF proxy and $LIABGDP_{j,t}$ as a TBTBR proxy, both in interaction with the intrinsic financial strength $FSR_{j,t}$ of the bank (table 5a). This specification has the highest explanatory power and captures most aspects that are a priori relevant for the assignment of issuer ratings. Note that the quantification of the rating bonus is robust to the use of $SHARE_{j,t}$ instead of $ASSETS_{j,t}$ as a TBTF proxy.

We quantify the average rating bonus for different asset classes. The average rating bonus for an asset class is defined as the difference between (i) the issuer rating predicted by the model when the TBTF and TBTBR proxies are calculated at the average of this asset class and (ii) the issuer rating predicted by the model when the TBTF and TBTBR proxies are calculated at the average of the entire sample.

Table 6 presents the bonus estimates for a bank with an intrinsic financial strength corresponding to the sample average. For the purpose of comparison, we also indicate the average difference between the actual issuer rating and the rating predicted by the model when the TBTF and TBTBR proxies are calculated at the average of the entire sample. On average, banks in the two largest asset classes get a rating bonus comprised between 0.25 and 0.98 of a notch at Moody's and between 1.75 and 3.07 notches at Fitch. By comparison, the estimates in section 3 indicated that the availability of an *explicit* state guarantee was associated with a bonus representing 4 to 5 notches. For both agencies, the rating bonus fits well with the difference between actual issuer ratings and ratings calculated at the whole sample average for the TBTF and TBTBR proxies.

Table 6: Average rating bonus in notches by assets class (1999-2003)

	Moody's				Fitch			
	Size in billions USD				Size in billions USD			
	1-10 billions	10 - 100 billions	100-400 billions	400-1100 billions	1-10 billions	10 - 100 billions	100-400 billions	400-1100 billions
Issuer rating bonus	-0.81	-0.01	0.25	0.98	-1.21	-0.09	1.76	3.07
Difference between actual issuer rating and rating calculated at the whole sample average for the TBTF and TBTBR proxies	-0.65	-0.09	0.04	1.31	-1.45	0.00	1.52	3.55

Rating notches are not money. To approximate the impact of the rating bonus on bank refinancing costs, we use the relationship between bond spreads and issuer ratings estimated by Sironi (2004) for large banks. This relationship, documented in table 7, indicates that the value of a notch in terms of spreads varies across the rating spectrum. Transposing the rating bonus into spreads involves the following steps. First, compute the average issuer rating (and the corresponding alphanumerical rating) predicted by the model when the TBTF and TBTBR are calculated at the average of the whole sample. Second, calculate the average issuer rating (and the corresponding alphanumerical rating) predicted by the model when the TBTF and TBTBR proxies are calculated at the average of the assets class. Then, using table 7, compute the change of the spread implied by the change of the alphanumerical rating.

Table 7: Relationship between spreads and Moody's ratings (Sironi, 2004, figures have been rounded)

Aaa	Aa1	Aa2	Aa3	A1	A2	A3	Baa1	Baa2	Baa3
0 bp	10 bp	15 bp	20 bp	30 bp	40 bp	50 bp	60 bp	80 bp	130 bp

The results are presented in table 8 and 9. We have bifurcated the sample between banks with low and high intrinsic financial strength to account for the fact that the rating bonus is not independent from the bank's financial strength. Table 8 indicates that banks with low intrinsic financial strength (B- and lower at Moody's and C and lower at Fitch) receive a rating bonus comprised between 1 and 3 notches. This corresponds to a spread reduction of 20 to 80 bp. Table 9 indicates that banks with high intrinsic financial strength (B and higher at Moody's and B/C and higher at Fitch) receive no rating bonus at

Moody's. At Fitch, the bonus in the two largest asset classes still represents 1 to 2 notches, which corresponds to a spread reduction of 10 to 20 bp.

Table 8: Average rating bonuses and estimated impact on spreads by assets class: banks with low intrinsic financial strength (B- and lower at Moody's and C and lower at Fitch)

	Moody's				Fitch			
	Size in billions USD				Size in billions USD			
	1-10 billions	10 - 100 billions	100-400 billions	400-1100 billions	1-10 billions	10 - 100 billions	100-400 billions	400-1100 billions
Rating predicted by model when TBTF and TBTBR are calculated at the whole sample average	14.54	15.33	15.26	11.58	14.36	14.62	14.29	13.66
-> Corresponding alphanumerical rating	A3	A3	A3	Baa3	BBB+	A-	BBB+	BBB+
Rating predicted by model when TBTF and TBTBR are calculated at the average of the asset class	13.67	15.05	16.69	15.24	13.27	14.25	17.46	16.97
-> Corresponding alphanumerical rating	Baa1	A3	A1	A3	BBB	BBB+	A+	A+
Estimated impact on spread in bp derived from improvement of the alphanumerical rating	40	0	-20	-80	20	10	-30	-30

Table 9: Average rating bonuses and estimated impact on spreads by assets class: banks with high intrinsic financial strength (B and higher at Moody's and B/C and higher at Fitch)

	Moody's				Fitch			
	Size in billions USD				Size in billions USD			
	1-10 billions	10 - 100 billions	100-400 billions	400-1100 billions	1-10 billions	10 - 100 billions	100-400 billions	400-1100 billions
Rating predicted by model when TBTF and TBTBR are calculated at the whole sample average	17.77	17.93	18.44	18.79	17.09	17.11	17.09	17.21
-> Corresponding alphanumerical rating	Aa3	Aa3	Aa3	Aa2	A+	A+	A+	A+
Rating predicted by model when TBTF and TBTBR are calculated at the average of the asset class	17.30	18.28	18.51	18.63	15.69	17.13	18.46	19.56
-> Corresponding alphanumerical rating	A1	Aa3	Aa2	Aa2	A	A+	AA-	AA+
Estimated impact on spread in bp derived from improvement of the alphanumerical rating	10	0	-5	0	10	0	-10	-20

6. Conclusions

The analysis in this paper indicates that proxies of the TBTF status of a bank (total assets and market share) have a positive and significant effect on large banks' issuer ratings, and that this effect is larger for banks with low intrinsic financial strength. Transposed into spreads, the rating bonus also implies a substantial reduction of the refinancing costs of those banks that are regarded as TBTF by rating agencies.

The boosting of bank issuer ratings through TBTF expectations has three main prudential implications. First, it may undermine the effects of market discipline on bank risk-taking. This provides a strong rationale to regulators for imposing a stricter prudential treatment on large banking institutions (capital adequacy, liquidity management, crisis management). A second implication is that the use of issuer ratings for the calculation of the risk-weights on interbank claims, as specified by Basel II, may have the unintended effect of rewarding large banks ability to externalise part of the cost of their failure on taxpayers. The third implication is that supervisors and central banks should consider issuer ratings with caution in their assessment of the solidity of large banking institutions and of the stability of the banking system. Individual or financial strength ratings are more appropriate, because they are less likely to be biased by TBTF expectations.

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