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# Does Government Ownership Affect Bank Risk? Effects of Country Development and Financial Crisis

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**A B S T R A C T**

This study examines whether government ownership can affect bank risk. We use Moody's individual and issuer ratings as proxies for banks' operating and default risks. We find that whether government ownership increases or reduces default risk depends on where the banks are from and when the banks obtain government support. We find that government injections of funds into banks depends on this government's income level and whether the distressed banks are in crisis periods. Even during a crisis, we have to identify the nature of the crisis.



*Keywords:* bank default risk; individual credit rating; issuer credit rating, government ownership; financial crisis
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# 1. Introduction

**L**a Porta et al. (2002b) find that government ownership of banks was large and pervasive around the world and such ownership is particularly significant in countries with low levels of per capita income, underdeveloped financial systems. The early literature on government ownership finds that banks with larger government ownership are commonly less profitable or efficient than privately owned banks (La Porta et al., 2002a; Barth et al., 2004; Beck et al., 2004; Berger et al., 2005; Micco et al., 2007; Iannotta et al., 2007, Cornett et al., 2010; Kwan, 2004). For example, Mian (2003) confirms the underperformance of government-owned banks (GOBs) in developing countries. Iannotta et al. (2007) find that GOBs are inefficient relative to privately owned banks (POBs). Shen and Lin (2012) explain that the reason a GOB performs worse is due to its simultaneous pursuit of profit maximization and social welfare. Sapienza (2004) indicates GOBs mostly favour large firms and firms that are located in depressed areas. Hence, government ownership increases the operating risk of banks because its performance is inferior to that of POBs. This also explains why many countries try to privatize GOBs to increase the efficiency and therefore the competition of banks (Megginson, 2005; Berger et al., 2005; Weintraub and Nakane, 2005). [1]

The 2008 financial crisis reignited this issue by challenging the effect of government ownership on bank risk. In contrast with the conventional wisdom that the government should not intervene in bank operation, the severities of the crisis caused many distressed banks to welcome government intervention to protect them from bank runs. Many governments bailed out these distressed private banks through partial nationalization to avoid potential systematic crisis. For example, Iceland nationalized its five largest banks in 2008 and 2009, and the United Kingdom partially nationalized the Royal Bank of Scotland and HBOS Lloyds TSB in 2008 (refer to Section 2 for other cases). Thus, our preliminary result is contrary to previous studies that argued that government ownership increases bank risk because the 2008 crisis demonstrated that government ownership reduces bank risks. However, government ownership increased operating risk but reduced default risk.

Therefore, image of government ownership has changed since 2008 crisis given that government has conflicting roles toward risk: it reduces the banks' efficiency and profitability; but it provides more protection against default for the banks. Focusing on the mixed effects, Iannotta et al. (2013) use individual and issuer ratings to represent bank operating and default risks respectively. They define default risk as the probability that a bank's creditors suffer losses as a consequence of a delay in interest or principal payment, debt restructuring, or bankruptcy; and operating risk is the probability that a bank's asset value decreases below the value of its liabilities, thereby leading to negative equity capital. The issuer rating is the rating agency's opinion on the capacity of a bank to punctually repay its deposit obligations on the assumption of external support. Individual ratings reflect the intrinsic financial strength of a bank based on the assumption that no external support will be forthcoming. The difference between the two ratings is the external support, such as government intervention to rescue banks with negative equity capital from default. Using large banks from 16 advanced European countries, Iannotta et al. (2013) confirm that government ownership causes banks to have higher operating risk (i.e., worse individual rating) but lower default risk (i.e., better issuer rating). Their first finding that government ownership increases operating risk has been widely examined in the literature and is robust to different specifications. Our study focuses on their second finding that the government ownership decreases default risk. We refer to this finding as our benchmark.

[1] La Porta et al. (2000), Barth et al. (2000), Barnett (2000) and Andrews (2005) find evidence that policymakers in both developed and developing countries have an increased preference for private ownership of banks, especially in the aftermath of financial crises, and that privatization is usually associated with an improvement in macroeconomic performance and financial development.

We extend Iannotta et al.'s (2013) study to comprehensively examine where and when the benchmark is more likely to hold. The sample comprises 5,841 and 5,787 bank-year individual and issuer ratings respectively, from 65 countries over the period from 2002 to 2012. We exclude those countries without any GOB with more than 10% ownership. There are 97 countries with Moody's bank individual and issuer ratings over the period of 2002 to 2012, and we exclude 32 countries which have no banks with government ownership exceeding 10%. If the benchmark holds, we argue that government ownership decreases risks to the banks in this study. In our examination we find six conditions that affect the benchmark. First, we find that the benchmark exists for high-income countries during the 2008 crisis. However, we find that government ownership increases default risk for non-high-income countries during the 2008 crisis. Third, government ownership also increases default risk for high-income countries during non-crisis periods. Fourth, in non-high-income countries during non-crisis periods, the benchmark holds. Fifth, we find that government ownership reduces default risk only during the 2008 crisis period but does not do so in other country-specific banking crises. Sixth, we find that a weak fiscal condition of the government lessens the effect of its ownership on the two risks. Hence, contrary to Iannotta et al.'s (2013) result, our results find that government ownership might not always decrease default risk. Table 1 highlights the above six conditions and our expected results. Governments might increase or decrease bank risks depending on where the banks are located and when the support is given.

**Table 1 Effect of government ownership on operating and default risks**

| | High-income countries | | Non-high-income countries | |
|---|---|---|---|---|
| | Operating Risk | Default Risk | Operating Risk | Default Risk |
| 2008 financial crisis | ↗ | ↘ | ↗ | ↗ |
| Non-2008 financial crisis | ↗ | ↗ | ↗ | ↘ |
| Other country-specific banking crisis | ↗ | ? | ↗ | ? |
| Weak fiscal condition | ↗ | ↗ | ↗ | ↗ |

Benchmark: government ownership reduces the default risk. Our results show that this benchmark results hold depending on where and when a bank stays. Operating risk is referred to as the individual rating proxied by Moody's bank financial strength ratings, BFSRs. Default risk is referred to as the issuer rating proxied by Moody's bank deposit ratings, BDRs.

The remainder of this paper is organized as follows. Section 2 outlines our argument and presents our hypotheses. Section 3 presents the econometric model. Section 4 focuses on the data resources and the descriptive statistical analysis. This section also presents the empirical results of the investigation. In Section 5 we test for robustness. Section 6 concludes the paper.

## 2. Argument and hypotheses

### 2.1 Country-specific and crisis-specific effects

**M**any studies find that the behavior of firms differs in developed and developing countries. For example, the literature indicates that rating agencies commonly use different criteria to evaluate the firms in developed and developing countries (Ferri and Liu, 2004; Rojas-Suarez, 2001; Shen et al., 2012; Shen and Huang, 2013; Huang and Shen, 2015). Mixed results are likewise obtained when using different samples to investigate the effect of government ownership on bank risk (Iannotta et al., 2007, 2013;

Demirgüç-Kunt and Detragiache, 2002; Brown and Dinç, 2011). [2] In high-income countries, banks have advanced management skills and their information is transparent. Moreover, a high level of market discipline exists in these countries because of strong supervision and regulations. Also, the literature suggests that the banks' managerial behavior and performance are considerably different in crisis and non-crisis periods (Ivashina and Scharfstein, 2010; Beltratti and Stulz, 2012). Thus, the effect of a government guarantee on bank risk might also be different.

We posit that the benchmark hypothesis of government ownership on risks might be income-specific and crisis-specific across countries. Most of the studies use financial or market risk to measure various types of risks.3 Iannotta et al. (2013) is the only study that focuses operating and default risks. In doing so, the study uses data from large banks in 16 advanced European countries from 2000 to 2009 simultaneously.

### 2.2 Banks in high- and non-high-income countries during 2008 crisis

**W**e firstly discuss the effect for banks from high-income countries during the 2008 crisis. During this crisis, many banks in high-income countries were severely hurt because of their aggressive risk taking (Beltratti and Stulz, 2012; Fahlenbrach and Stulz, 2011). During this crisis, many banks with edging technological skill in Western society facing unprecedented high default risk. Hence, the majority of these rescues were banks from developed countries. For example, on September 30, 2008, the government of Ireland announced that it would guarantee all of the deposits of six of its biggest banks. Following the filing for bankruptcy of the investment bank Lehman Brothers in the United States in September 2008, European Union leaders announced their intention "to take decisive action and use all available tools to support systemically important financial institutions and prevent their failure." [4] This announcement was vindicated by subsequent actions; no major financial institution had to declare bankruptcy during the subsequent years. Also, on October 13, 2008, Britain announced it would spend £50 billion ($85 billion) to nationalize two of its five largest banks, Halifax Bank of Scotland and Royal Bank of Scotland. Then, it took partial ownership of the third largest bank, Lloyds TSB. A fourth, Barclays remained private when it raised an additional £7 billion itself. The fifth, HSBC is based in Hong Kong and remained private. Without government intervention, more banks from developed countries might have gone into default.

Given that default risk refers to the sum of negative operating risk and positive external support, the final effect depends on how much external support the government provides. Government ownership reduces default risk in high-income countries but not in non-high-income countries. Thus, governments provided great support for banks from high-income countries, thereby reducing default risk during the crisis on average. The reason is that governments of high-income countries usually have high sovereign ratings. Hence, their strong external support outweighs the negative operating risk they have caused, thereby reducing default risk. By contrast, on average, the sovereign ratings for non-high-income countries are relatively low. Therefore, the external government support does not outweigh the negative

[2] Iannotta et al. (2007) use a sample of large European banks and argue that public sector banks have poorer loan quality and higher insolvency risk than other types of banks. Brown and Dinç (2011) examine bank failures in 21 emerging market countries in the 1990s and report that defaults are less common for government-owned banks than privately owned banks.

[3] For instance, some studies consider the credit risk by using nonperforming loans or loan loss provisions to gross loans ratios as the proxies (Mansur et al., 1993; Hassan, 1993); other studies consider the leverage risk using equity-to-total assets ratio or capital adequacy ratio (Pettway, 1976; Brewer and Lee, 1986; Karels et al., 1989); and some studies consider asset risk using the standard deviation of return on assets (Barry et al., 2011) and market risk by using the standard deviation of stock returns. Most studies consider default risk using the Z-score (De Nicoló and Loukoianova, 2007; Boyd et al., 2006; De Nicoló, 2000; Cihák and Hesse, 2010; Maechler et al., 2007).

[4] Their announcement was made at the European Council meeting on 15-16 October 2008.

operating risk they have caused. Thus, our first two alterative hypotheses are as follows:

**Hypothesis 1 (supports benchmark results):** Government ownership reduces default risk for banks from high-income countries during the 2008 financial crisis period.

**Hypothesis 2 (refutes benchmark results):** Government ownership increases default risk for banks from non-high-income countries during the 2008 financial crisis period.

Furthermore, for banks from high-income countries during the non-crisis periods, banks favor the financial deregulations so that they undertake all types of project, including the risky ones. For example, the Financial Modernization Act in 1999 removes gradually the regulation stipulated in Glass-Steagall Act in 1933 by allowing banking to conduct certain degree of security activities (Bentson, 1990; Kaufman and Mote, 1990). For these banks, government ownership commonly means ineffective and a retard to maximize the profit, therefore increases the operating risk significantly. In addition to have a strong strategic policy to earn profit, these banks are equipped with advanced operating management skill. Also, these banks obtain high credit ratings close to the sovereign ratings (Ferri et al., 2001), implying that governments provide little additional external support for them. In contrast, increasing government ownership might hinder the market discipline by asking banks to shift resources to social welfare, which aggravates operating risk. Thus, negative operating risk brought by government ownership outweighs the external support brought by them.

In contrast, in non-high-income countries during non-crisis periods, the benchmark result holds. This is because in these countries POBs perform only slightly better than GOBs on average, meaning that GOBs have slightly higher operating risk. Thus, government ownership provides external support for GOBs that can easily dominate the operating risk, and thus reduce default risk. Thus, our next two alterative hypotheses are as follows:

**Hypothesis 3 (refutes benchmark results):** Government ownership increases default risk for banks from high-income countries during the non-crisis periods.

**Hypothesis 4 (supports benchmark results):** Government ownership reduces default risk for banks from non-high-income countries during non-crisis periods.

### 2.3 Country-specific banking crisis

**W**e hypothesize that government ownership can reduce the default risk only at 2008 crisis period but not reduce other country-specific banking crises because the nature, severity and causes are dramatically different between 2008 and other crises. For example, during the Asian financial crisis in 1998, the prescription for government rescue of distressed banks was to stress a market mechanism more than a government bailout. Hence, government injects considerable amounts of funds to bail out banks in 2008, but they do not do the same thing during 1998 Asian crisis. Thus, benchmark results may be different in other country-specific banking crisis and in non-crisis period.

For example, on July 1999, Bank Negara Malaysia, proposed a major restructuring plan for its 71 domestic financial institutions to be consolidated into sixth. While the government provided some forbearance policies for these mergers, the scale is much smaller than the 2008 crisis. Also, in Taiwan, there is a so-called first financial reform that requires banks to increase their capital adequacy ratios and to decrease nonperformance loans (Shen, 2014). Taiwan does not inject funds to bail out failed banks. In Korea, the International Monetary Funds asked the banking market to open to foreigners (Takatoshi, 2007). Further, the causes and cures behind the U.S. saving and loan thrift crisis in 1988 were different from those of the 1998 Asian currency and banking crises. Thus, the fifth alterative hypothesis is as follows.

**Hypothesis 5 (refutes benchmark results):** Government ownership might not reduce default risk during country-specific banking crises.

### 2.4 Effects of governments' fiscal condition

**S**ix, we argue that a more serious fiscal condition for the government weakens the effect of its ownership on the two risks. A government without a strong fiscal condition is less able to provide suitable protection for their banks. Also, this government might ask banks to provide loans to distressed firms that further increases operating risk. During the 2008 financial crisis, the government ownership is most likely to reduce default risk for banks in countries with a sound fiscal condition. The results indicate that a higher ratio of fiscal debt worsens the positive effect of government ownership on default risk, especially after the 2008 financial crisis.

Government intervention in both risks depends on its capacity. A government in weak fiscal condition is less able to provide strong protection for its banks. Also, because these governments have less power to provide help, they might ask banks to do so, which increases operating risk. Thus, our sixth alterative hypothesis is as follows:

**Hypothesis 6 (refutes benchmark results):** Governments in a weak fiscal condition increase operating risk more and reduce default risk less than governments in a strong fiscal condition.

## 3. Econometric model

### 3.1 Measures of operating and default risks

**F**ollowing Stem and Feldman (2004), Toader (2013), Iannotta et al.'s (2013) specifications, our individual and issuer ratings reflect Moody's bank financial strength ratings (BFSRs) and bank deposit ratings (BDRs) respectively. We use the term of individual and issuer ratings throughout this study for simplicity. The better individual and issuer ratings mean lower operating and default risks respectively. The individual rating is commonly lower than the issuer rating. This difference reflects that banks benefit from government support. [5]

### 3.2 Model design

**T**he econometric analysis converts the long-term alphanumeric ratings issued by Moody's into numerical ratings. For example, we convert the BFSR alphanumeric ratings into 13 numerical ratings: A = 1, A– = 2,…, E+ = 12, and E = 13, and modify the BDR alphanumeric ratings into 21 numerical ratings: Aaa = 1, Aa1 = 2, Aa2 = 3,…, Ca = 20, and C = 21. A small number denotes a better rating and lower risk. Table 2 contains the details.

We investigate the procedure of how government ownership affects credit ratings by applying the dependent variable RATING to the individual ratings (BSFRs) or issuer ratings (BDRs). The model is as follows:

$$\begin{aligned}\mathrm{RATING}_{ijt} = {} & \beta_0 + \beta_1 \mathrm{GOV}_{ijt} \times \text{Crisis Dummy} \times \mathrm{D}_{\mathrm{HIC}} + \beta_2 \mathrm{SIZE}_{ijt} + \beta_3 \mathrm{LIST}_{ijt} + \beta_4 \mathrm{FOR}_{ijt} \\ & + \sum \beta_l \mathrm{BANK}_{ijt} + \sum \beta_m \mathrm{MACRO}_{it} + \beta_n \mathrm{SCR}_{it} + \sum\nolimits_o \mathrm{YEAR}_t + \sum\nolimits_p \mathrm{COUNTRY}_i + \varepsilon_{ijt}\end{aligned} \tag{1}$$

Where $i = 1,...,C, j = 1,...,B_i, t = 1,...,T$ ; $C$ denotes the number of countries; $B_i$ represents the number of banks in country *i*; $T$ represents the time span from 2002 to 2012; $\beta$ is the vector of estimated coefficients; and $\varepsilon$ is the error term. The data for this study generates an unbalanced panel. The fixed effects of years and countries are included in the current study to control for the year- and country-

[5] In November 2011, Moody's assigned a BFSR to 1,022 banks. Among them, 470 banks are assigned different BDRs, which could be benefitted from some type of support from central governments.

specific factors that might affect the decisions on the banks' ratings. This study applies an ordinary least squares with robust standard errors that are clustered at the country level (Petersen, 2009).[6]

The variable GOV denotes the percentage of government ownership of banks. In particular, we use government shares of 20% and 50% to conduct the test. Shen and Lin (2012), Dinç (2005) and Cornett et al. (2010) adopt the 20% share to separate POBs and GOBs. Micco and Panizza (2007) and Cornett et al. (2010) used 50% to distinguish government-owned banks. Thus, we use 20% as the baseline percentage and consider a 50% share to conduct the robustness tests.[7] The two different percentages of government ownership are denoted as GOV(20%) and GOV(50%). If GOBs have higher operating risk, then the coefficient for GOV is positive and indicates an unfavorable effect from the individual ratings. If GOBs enjoy an implicit form of protection, then the coefficient is negative and indicates a favorable issuer rating.

The Crisis Dummy denotes the crisis periods, which is proxied by $D_{2008}$ or $D_{BCRISIS}$. The dummy variable $D_{2008}$ describes 2008 crisis and is equal to unity for the crisis period (2008~2010) and zero for the non-crisis periods (2002~2007 and 2011~2012). The dummy variable $D_{BCRISIS}$ describes country-specific banking crises because the nature of a crisis may not be the same across regions and countries and equals unity when a country experiences its own banking crisis and zero otherwise. The dates for the banking crises of each country are mainly collected from Laeven and Valencia (2013), who provide the dates for 17 countries during 2002~2012. Given that we have 65 countries, to supplement the dates for the remaining 48 countries, we thus also collect the dates for banking crises from Demirgüç-Kunt and Detragiache (2005), Barajas et al. (2009), Dell'Ariccia et al. (2008) and Reinhart and Rogoff (2008).

The country income dummy variable $D_{HIC}$ denotes the high-income countries that is equal to unity if the bank is from high-income countries and zero if it is from non-high-income countries. The high- or non-high-income countries are obtained from the World Bank databank.

The variable SIZE is defined as the natural logarithm of the total assets. The related literature on the operating scale of banking has identified two conflicting effects on risk. The argument for a negative association between size and risk affirms that large-sized banks might finance riskier credits without immediate problems in liquidity. The portfolios of these banks are more diversified and represent higher profits than those realized by smaller institutions (Saunders et al., 1990; Boyd and Runkle, 1993; Demsetz and Strahan, 1997; Anderson and Fraser, 2000). A positive association between size and risk is based on the premise of "too big to fail," which asserts that the deposit insurance used by regulators to guarantee the stability of the banking system might have a perverse effect because large banks might have incentives to select riskier portfolios (Chumacero and Langoni, 2001; García and Robles, 2008). The dummy variable LIST is equal to unity when banks are listed, and zero otherwise. Iannotta et al. (2013) indicate that the banks' risk-taking behavior is affected whether or not they are listed.

We define FOR (20%) and FOR (50%) as unity when a bank is more than 20% or 50% owned by foreign banks respectively. These variables are expected to enhance the individual and issuer ratings if foreign bank ownership induces lower operating and default risks. This condition is signified by negative coefficients for FOR in the individual and issuer ratings. In the case when foreign bank ownership causes higher operating and default risks, the FOR must adversely affect the individual and issuer ratings, which suggests positive coefficients for FOR in the equations.

[6] Referring to Iannotta et al. (2013) and Becker and Milbourn's (2011) studies, we also use OLS to conduct estimation when the discrete dependent variable has large ranges. We also try the ordered logit model but the estimation does not coverage.

[7] We downloaded the ownership data of each bank from the BankScope's disks of January of each year. The data provided a specification function to specify the share scope of each bank. Subsequently, we downloaded these bank names and specified the dummy variable.

The control variable vector, BANK, is selected based on the studies on the determinants of banks' credit ratings (Poon et al., 1999; Poon and Firth, 2005; Rojas-Suarez, 2001; Poon et al., 2009; Shen et al., 2012; Shen and Huang, 2013; Huang and Shen, 2015). We also add five financial variables: capital ratio, asset quality, management efficiency, profitability, and liquidity. The CAR denotes the capital adequacy ratio, LLP represents the ratio of loan loss provisions to net interest revenues, CTI refers to the cost-to-income ratio, ROA depicts the ratio of net income to total assets, and the LIQ denotes the ratio of liquid assets to total deposits and borrowings. The financial ratios used in this study are averaged over the past three years to minimize the effect of the business cycle.

The control vector of macroeconomic variables (MACRO) is included in our investigation. Banks can improve their ratings if they are located in a country with good macroeconomic conditions. After referring to the research (Huang and Shen, 2015), we consider five macro variables, namely, the government's budget surplus relative to gross domestic product (GBS), the current account balance to gross domestic product (CAB), the gross domestic product per capita (GDP), the gross domestic product growth rate (GDPG), and the inflation rate (INFLA). Similar to the financial ratios, the macroeconomic variables are averaged over the past three years to minimize the effect of the business cycle. We use CR4 to measure the bank competition level of a country, where CR4 refers to the market share of the four largest banks of each country. Large CR4 indicates less competition in that country. Sovereign credit ratings (SCR) are also included as control variables. Sovereign credit ratings are similarly transformed from letter ratings into 21 numerical ratings. Borensztein et al. (2006) indicate that the sovereign effect is statistically and highly significant, especially in the banking industry.

# 4. Empirical results

### 4.1 Data sources and descriptive statistical analysis

**T**he study's sample comprises 5,841 and 5,787 bank-year individual and issuer ratings respectively, from 65 countries over the period from 2002 to 2012. We exclude those countries without any GOB with more than 10% ownership. There are 97 countries with Moody's bank individual and issuer ratings over the period of 2002 to 2012, and we exclude 32 countries which have no banks with government ownership exceeding 10%. The data are collected from various sources. The data on banks' credit ratings, sovereign credit ratings, government and foreign bank ownerships, and the financial information of banks are collected from Bankscope. The high- or non-high-income countries are obtained from the World Bank databank. The dates for the banking crises of each country are mainly collected from Laeven and Valencia (2013), Demirgüç-Kunt and Detragiache (2005), Barajas et al. (2009), Dell'Ariccia et al. (2008) and Reinhart and Rogoff (2008).

Table 2 lists the comparison between the alphanumerical and the corresponding numerical ratings of individual ratings (Panel A) and issuer ratings (Panel B). In the individual rating, the financial strength of the majority of the banks is low, which signifies bad credit ratings. The largest numbers of observations have ratings of E+ (1,046; 17.9%), followed by D+ (875; 15.0%), and C– (827; 14.2%). Meanwhile, the smallest number of observations have ratings of A (10; 0.2%), followed by A– (24; 0.4%), and B+ (88; 1.5%). However, the corresponding numerical ratings of the issuer ratings are better than those of the individual ratings. In particular, the majority of the observations in this case have ratings of A2 (709; 12.3%), followed by A3 (540; 9.3%), and A1 (494; 8.5%). Meanwhile, the smallest number of observations have ratings of Caa3 (2), C (7), and Ca (24).

**Table 2 Matching the alphanumerical ratings with numerical ratings and basic statistics**

**Panel A Individual rating: Moody's Bank Financial Strength Ratings (BFSR)**

| Individual rating (BFSR) | Numerical | Number | Percentage |
|---|---|---|---|
| A | 1 | 10 | 0.17% |
| A- | 2 | 24 | 0.41% |
| B+ | 3 | 88 | 1.51% |
| B | 4 | 209 | 3.58% |
| B- | 5 | 234 | 4.01% |
| C+ | 6 | 409 | 7.00% |
| C | 7 | 543 | 9.30% |
| C- | 8 | 827 | 14.16% |
| D+ | 9 | 875 | 14.98% |
| D | 10 | 692 | 11.85% |
| D- | 11 | 616 | 10.55% |
| E+ | 12 | 1046 | 17.91% |
| E | 13 | 268 | 4.59% |

**Panel B Issuer rating: Moody's Bank Deposit Ratings (BDR)**

| Issuer rating (BDR) | Numerical | Number | Percentage |
|---|---|---|---|
| Aaa | 1 | 33 | 0.57% |
| Aa1 | 2 | 81 | 1.40% |
| Aa2 | 3 | 210 | 3.63% |
| Aa3 | 4 | 464 | 8.02% |
| A1 | 5 | 494 | 8.54% |
| A2 | 6 | 709 | 12.25% |
| A3 | 7 | 540 | 9.33% |
| Baa1 | 8 | 449 | 7.76% |
| Baa2 | 9 | 334 | 5.77% |
| Baa3 | 10 | 225 | 3.89% |
| Ba1 | 11 | 221 | 3.82% |
| Ba2 | 12 | 326 | 5.63% |
| Ba3 | 13 | 308 | 5.32% |
| B1 | 14 | 319 | 5.51% |
| B2 | 15 | 383 | 6.62% |
| B3 | 16 | 410 | 7.08% |
| Caa1 | 17 | 204 | 3.53% |
| Caa2 | 18 | 44 | 0.76% |
| Caa3 | 19 | 2 | 0.03% |
| Ca | 20 | 24 | 0.41% |
| C | 21 | 7 | 0.12% |

The operating risk is proxied by individual rating, which is Moody's bank financial strength rating (BFSR). The default risk is proxied by issuer rating, which is Moody's bank deposit rating (BDR). The lower the numerical number denotes better credit rating.

Table 3 presents the landscape of the sample across countries, including the numbers of individual and issuer ratings. The majority of the banks receive ratings of both individual and issuer ratings. Russia (630, 624), Japan (364, 362), and Brazil (326, 325) are the three countries receiving the largest number of both ratings (the two numbers in parentheses pertain to the number of banks that receive two types of ratings), whereas El Salvador, Finland, and Bulgaria are the three countries receiving the smallest number of both ratings.

**Table 3 Samples across countries**

| Country | Individual Rating (BFSR) | Issuer Rating (BDR) | Country | Individual Rating (BFSR) | Issuer Rating (BDR) |
|---|---|---|---|---|---|
| ARGENTINA | 128 | 128 | KOREA REP. OF | 151 | 149 |
| AUSTRIA | 39 | 39 | KUWAIT | 42 | 41 |
| AZERBAIJAN | 21 | 21 | LATVIA | 60 | 60 |
| BAHRAIN | 47 | 46 | LEBANON | 40 | 40 |
| BELARUS | 23 | 23 | LUXEMBOURG | 66 | 66 |
| BELGIUM | 45 | 43 | MALAYSIA | 99 | 99 |
| BOLIVIA | 27 | 27 | MALTA | 15 | 15 |
| BRAZIL | 326 | 325 | MAURITIUS | 39 | 38 |
| BULGARIA | 13 | 13 | NETHERLANDS | 82 | 82 |
| CHILE | 76 | 74 | NORWAY | 69 | 69 |
| CHINA-PEOPLE'S REP. | 97 | 97 | OMAN | 16 | 16 |
| COLOMBIA | 15 | 15 | PAKISTAN | 26 | 26 |
| CYPRUS | 21 | 21 | PHILIPPINES | 144 | 139 |
| CZECH REPUBLIC | 32 | 30 | POLAND | 191 | 175 |
| EGYPT | 16 | 17 | PORTUGAL | 54 | 52 |
| EL SALVADOR | 1 | 1 | QATAR | 15 | 15 |
| ESTONIA | 11 | 11 | ROMANIA | 24 | 24 |
| FINLAND | 55 | 53 | RUSSIAN FEDERATION | 630 | 624 |
| FRANCE | 234 | 232 | SAUDI ARABIA | 85 | 80 |
| GERMANY | 146 | 148 | SLOVAKIA | 57 | 57 |
| GHANA | 14 | 14 | SLOVENIA | 102 | 100 |
| GREECE | 167 | 159 | SWEDEN | 54 | 53 |
| HONG KONG | 261 | 259 | SWITZERLAND | 53 | 53 |
| HUNGARY | 57 | 66 | TAIWAN | 148 | 149 |
| ICELAND | 28 | 29 | THAILAND | 190 | 170 |
| INDIA | 63 | 63 | TUNISIA | 103 | 101 |
| INDONESIA | 69 | 60 | TURKEY | 313 | 313 |
| IRELAND | 139 | 135 | UKRAINE | 249 | 240 |
| ISRAEL | 58 | 63 | UNITED ARAB EMIRATES | 79 | 76 |
| ITALY | 253 | 246 | URUGUAY | 88 | 86 |
| JAPAN | 364 | 362 | UZBEKISTAN | 18 | 18 |
| JORDAN | 17 | 17 | VENEZUELA | 31 | 30 |
| KAZAKHSTAN | 82 | 83 | VIETNAM | 19 | 19 |
| | | | TOTAL | 5841 | 5787 |

The observations are bank-year observations.

Table 4 reports the descriptive statistics of banks with high or low government ownership. We first classify government ownership into high or low government ownership using the threshold of 20%. The averages of the individual ratings are 9.48 and 8.97 for high and low government ownerships respectively and the difference is significant. Namely, the individual rating is higher for banks with high government ownership (GOV≥20%) than that of low government ownership (GOV<20%). This finding shows that government ownership is a determinant of individual ratings. This evidence is consistent with the finding in the literature that government ownership increases operating risk. Similarly, the averages of issuer ratings are 9.61 and 9.30 for high and low ownership regimes and the difference is significant. This finding signifies high default risk in a high ownership regime. Our results remain the same when we use 50% as the threshold. Thus, high government ownership is associated with worse

issuer ratings or equivalently speaking, GOBs have greater default risks. These results contradict the benchmark that GOBs should have lower default risk than POBs. However, these basic statistics mix different income countries and time periods together and may be misleading because they might have a missing third variable problem. Thus, our regression analysis overcomes this problem in the next section.

**Table 4 Basic statistics: High and low government ownership**

| | GOBs (GOV≥20%) | POBs (GOV<20%) | | GOBs (GOV≥50%) | POBs (GOV<50%) | |
|---|---|---|---|---|---|---|
| | Mean | Mean | Diff (*t*-stat) | Mean | Mean | Diff (*t*-stat) |
| Individual rating | 9.48 | 8.97 | 0.510*** (5.45) | 9.53 | 8.99 | 0.546*** (5.09) |
| Issuer rating | 9.61 | 9.30 | 0.306* (1.89) | 9.66 | 9.31 | 0.352* (1.93) |
| SIZE | 7.10 | 6.89 | 0.202*** (6.88) | 7.73 | 6.90 | 0.237*** (7.49) |
| LIST | 0.84 | 0.68 | 0.167*** (9.272) | 0.81 | 0.69 | 0.119*** (5.29) |
| CAR | 15.50 | 15.94 | -0.442 (-0.83) | 15.57 | 15.91 | -0.339 (-0.52) |
| LLP | 29.68 | 24.35 | 5.334** (2.55) | 31.04 | 24.38 | 6.662*** (2.60) |
| CTI | 56.41 | 56.72 | -0.318 (-0.20) | 57.38 | 56.61 | 0.775 (0.39) |
| ROA | 0.79 | 0.99 | -0.208** (-2.14) | 0.67 | 1.00 | -0.330*** (-2.80) |
| LIQ | 28.56 | 29.93 | -1.372 (-1.06) | 29.33 | 29.80 | -0.462 (-0.29) |
| GBS | -1.08 | -0.25 | -0.825** (-4.26) | -1.32 | -0.25 | -1.073*** (-5.28) |
| CAB | 2.35 | 2.30 | 0.054 (0.17) | 1.80 | 2.35 | -0.547* (-1.89) |
| GDPG | 5.50 | 3.97 | 1.532*** (10.15) | 5.51 | 4.02 | 1.491*** (9.90) |
| GDP | 3.71 | 4.03 | -0.321*** (-13.24) | 3.67 | 4.03 | -0.362*** (-12.93) |
| INFLA | 7.08 | 6.07 | 1.006*** (3.20) | 7.02 | 6.11 | 0.914*** (2.79) |
| SCR | 8.24 | 6.42 | 1.821*** (10.81) | 8.47 | 6.46 | 2.013*** (10.88) |

The dependent variables include operating risk (individual ratings proxied by Moody's bank financial strength ratings, BFSRs) and default risk (issuer rating proxied by Moody's bank deposit ratings, BDRs). Individual ratings are coded from 1 (A) to 13 (E), and issuer ratings are coded from 1 (AAA) to 21 (C). See Table 2 for details. We specify GOV(20%) and GOV(50%) as unity when the government owns the bank by more than 20% and 50% respectively. SIZE is defined as the natural logarithm of total assets. LIST equals 1 when the bank is listed, and 0 otherwise. The financial ratios and macroeconomic variables employed here are the average of the past three years to minimize the business cycle effect. CAR is the ratio of required capital to risky assets, LLP is the ratio of loan loss provisions to net interest revenues, CTI denotes the ratio of cost to income, ROA is the ratio of net income to total assets, and LIQ stands for the ratio of liquid assets to customer and short-term funding. Macroeconomic variables include the central government budget surplus relative to gross domestic product (GBS), the current account balance to gross domestic product (CAB), the gross domestic product per capita (GDP), the gross domestic product growth rate (GDPG), and inflation rate (INFLA). Sovereign credit ratings (SCR) are transformed from letter ratings into 21 numerical ratings. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

Table 5 presents the basic statistics of individual and issuer ratings and the GAP when considering country income and crisis. The GAP is the rating difference between issuer and individual ratings that represents the value of external support when the bank is in trouble.[8] In Panel A, we classify the sample banks into those from high-income and non-high-income countries. In high-income countries, GOBs still have higher operational and default risks and also higher external support than POBs regardless of the ownership thresholds. In contrast, in non-high-income countries, GOBs have similar operational risks but lower default risks and higher external support regardless of the thresholds.

Panel B illustrates the basic statistics when considering the country's income level and the crisis period. In high-income countries, the GOBs have higher operational and default risks during the crisis. Furthermore, the GAP increases during the crisis period. Government-owned banks obtain nearly a notch more external support during a crisis than a non-crisis period. In contrast, in non-high-income countries, GOBs have lower default risk. Interestingly, these banks obtain less external support especially during the 2008 crisis. This finding indicates that governments provide less implicit and explicit guarantees post 2007. The external support is even negative for POBs during the 2008 crisis. That is, some POBs even obtain external intervention (negative GAP) during the crisis. The results are consistent with hypothesis 4 that government ownership reduces the default risk for banks from non-high-income countries during the non-crisis periods.

Panel C considers a country's income level and a country's banking crisis. The main difference is between high-income countries and the crisis period. The GOBs have higher default risks and less additional external support and the results shows that a credit rating agency does not give a higher rating to banks located in a country suffering from a banking crisis.

[8] We refer to Iannotta et al.' (2013) mapping table.

**Table 5 Basic statistics of individual rating, issuer rating and GAP considering country income and crisis**

**Panel A Whole sample (without considering financial crisis)**

| | HIC | | | Non-HIC | | |
|---|---|---|---|---|---|---|
| | Individual rating | Issuer rating | GAP | Individual rating | Issuer rating | GAP |
| GOV≥20% | 8.64 | 6.85 | 1.77 | 9.96 | 9.37 | 0.59 |
| GOV<20% | 7.43 | 5.97 | 1.46 | 9.99 | 9.96 | 0.01 |
| Difference | 1.21 | 0.88 | 0.31 | -0.03 | -0.59 | 0.58 |
| GOV≥50% | 8.69 | 6.95 | 1.72 | 10.00 | 9.37 | 0.64 |
| GOV<50% | 7.44 | 5.97 | 1.47 | 9.98 | 9.94 | 0.03 |
| Difference | 1.25 | 0.98 | 0.25 | 0.02 | -0.57 | 0.61 |

**Panel B Considering 2008 financial crisis**

| | HIC and Non crisis period | | | HIC and Crisis period | | | Non-HIC and Non crisis period | | | Non-HIC and Crisis period | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Individual | issuer | GAP | Individual | issuer | GAP | Individual | issuer | GAP | Individual | issuer | GAP |
| GOV≥20% | 8.66 | 7.08 | 1.55 | 8.56 | 6.06 | 2.50 | 9.81 | 9.05 | 0.77 | 10.24 | 9.99 | 0.25 |
| GOV<20% | 7.56 | 6.37 | 1.19 | 7.18 | 5.15 | 2.01 | 9.77 | 9.63 | 0.11 | 10.39 | 10.56 | -0.17 |
| Difference | 1.10 | 0.71 | 0.36 | 1.38 | 0.91 | 0.49 | 0.04 | -0.58 | 0.66 | -0.15 | -0.57 | 0.42 |
| GOV≥50% | 8.64 | 7.09 | 1.53 | 8.91 | 6.36 | 2.55 | 9.86 | 9.09 | 0.77 | 10.31 | 9.94 | 0.36 |
| GOV<50% | 7.57 | 6.37 | 1.20 | 7.19 | 5.15 | 2.02 | 9.76 | 9.60 | 0.13 | 10.38 | 10.54 | -0.17 |
| Difference | 1.07 | 0.72 | 0.33 | 1.72 | 1.21 | 0.53 | 0.10 | -0.51 | 0.64 | -0.07 | -0.60 | 0.53 |

**Panel C Considering country-specific banking crises**

| | HIC and Non crisis period | | | HIC and Crisis period | | | Non-HIC and Non crisis period | | | Non-HIC and Crisis period | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Individual | issuer | GAP | Individual | issuer | GAP | Individual | issuer | GAP | Individual | issuer | GAP |
| GOV≥20% | 8.35 | 6.73 | 1.63 | 9.81 | 7.65 | 2.16 | 9.29 | 8.74 | 0.56 | 11.40 | 11.70 | 0.68 |
| GOV<20% | 7.32 | 6.04 | 1.28 | 7.52 | 5.67 | 1.84 | 9.39 | 9.34 | 0.04 | 10.21 | 11.24 | -0.06 |
| Difference | 1.03 | 0.69 | 0.35 | 2.29 | 1.98 | 0.32 | -0.10 | -0.60 | 0.52 | 0.19 | 0.46 | 0.74 |
| GOV≥50% | 8.35 | 6.77 | 1.59 | 10.24 | 8.31 | 1.93 | 9.31 | 8.73 | 0.60 | 11.84 | 11.10 | 0.72 |
| GOV<50% | 7.33 | 6.04 | 1.29 | 7.53 | 5.67 | 1.85 | 9.39 | 9.32 | 0.06 | 11.18 | 11.19 | -0.04 |
| Difference | 1.02 | 0.73 | 0.30 | 2.71 | 2.64 | 0.08 | -0.08 | -0.59 | 0.54 | 0.70 | -0.09 | 0.76 |

We consider 2008 global crisis and country-specific banking crises. Individual rating: BFSR (bank financial strength rating), issuer rates; BDR (bank deposit risk); GAP = issuer rating-individual rating. HIC: high-income countries, non-HIC; non-high-income countries.

Table 6 shows the correlation coefficient matrix. The coefficients for GOV are all significantly positive with the individual ratings and issuer ratings and indicate that GOBs have higher operating and default risks.

**Table 6 Correlation coefficient matrix**

| | Operating risk | Default Risk | GOV(20%) | GOV(50%) | FOR(20%) | FOR(50%) | SIZE | LIST | CAR | LLP | CTI | ROA | LIQ | GBS | CAB | GDP | GDP | INFLA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Default risk | .798*** | | | | | | | | | | | | | | | | | |
| GOV(20%) | .128*** | .081*** | | | | | | | | | | | | | | | | |
| GOV(50%) | .116*** | .073*** | .868*** | | | | | | | | | | | | | | | |
| FOR(20%) | -.011 | -.039*** | -.086*** | -.094*** | | | | | | | | | | | | | | |
| FOR(50%) | -.018 | -.055*** | -.100*** | -.087*** | .884*** | | | | | | | | | | | | | |
| SIZE | -.400*** | -.491*** | .028** | .036*** | -.011 | -.008 | | | | | | | | | | | | |
| LIST | -.078*** | -0.007 | .131*** | .084*** | -.035** | -.095*** | .063*** | | | | | | | | | | | |
| CAR | .043*** | .092*** | .008 | .010 | .052*** | .041*** | -.286*** | -.041*** | | | | | | | | | | |
| LLP | .163*** | .098*** | .052*** | .054*** | -.029** | -.017 | .021* | -.067*** | -.034*** | | | | | | | | | |
| CTI | .085*** | .089*** | -.001 | .007 | -.018 | .003 | -.086*** | -.083*** | .022* | .035*** | | | | | | | | |
| ROA | -.097*** | -.006 | -.035*** | -.046*** | -.008 | -.017 | -.115*** | .043*** | .322*** | -.156*** | -.161*** | | | | | | | |
| LIQ | .073*** | .124*** | .013 | .020 | .066*** | .060*** | -.200*** | -.006 | .345*** | -.062*** | -.137*** | .024** | | | | | | |
| GBS | .077*** | .051*** | -.027** | -.040*** | -.050*** | -.029** | -.200*** | .024 | .097*** | -.048*** | -.069*** | .083*** | .033** | | | | | |
| CAB | .070*** | -.009 | .072*** | .042*** | -.002 | -.017 | -.040*** | .015 | .102*** | .001 | -.075*** | .011 | .087*** | .606*** | | | | |
| GDPG | .204*** | .237*** | .186*** | .161*** | .018 | -.002 | -.311*** | .212*** | .074*** | -.028** | -.088*** | .122*** | .133*** | .397*** | .199*** | | | |
| GDP | -.431*** | -.532*** | -.252*** | -.241*** | .006 | .033*** | .410*** | -.252*** | -.041*** | -.076*** | -.057*** | .013 | -.148*** | .031** | -.055*** | -.470*** | | |
| INFLA | .306*** | .467*** | .085*** | .071*** | -.062*** | -.058*** | -.356*** | .027** | .126*** | .004 | .041*** | .054*** | .138*** | .325*** | .0295** | .163*** | -.418*** | |
| SCR | .473*** | .645*** | .191*** | .179*** | .032*** | -.004 | -.444*** | .178*** | .107*** | .101*** | .092*** | -.010 | .184*** | -.092** | .01509 | .305*** | -.801*** | .529*** |

The sample period is from 2002 until 2012. The dependent variables include operating risk (individual ratings proxied by Moody's bank financial strength ratings, BFSRs) and default risk (issuer ratings proxied by Moody's bank deposit ratings, BDRs). See Table 2 for details. The independent variables are as follows. GOV(20%) and GOV(50%) equal 1 when the bank is owned by government for more than 20% and 50% respectively, and 0 otherwise. FOR(20%) and FOR(50%) equal 1 when the bank is owned by foreign banks for more than 20% and 50% respectively, and 0 otherwise. SIZE is defined as the natural logarithm of total assets. LIST equals 1 when the bank is listed, and 0 otherwise. The financial ratios and macroeconomic variables employed here are the average of the past three years to minimize the business cycle effect. CAR is the ratio of required capital to risky assets, LLP is the ratio of loan loss provisions to net interest revenues, CTI denotes the ratio of cost to income, ROA is the ratio of net income to total assets, and LIQ stands for the ratio of liquid assets to customer and short-term funding. Macroeconomic variables include the central government budget surplus relative to gross domestic product (GBS), the current account balance to gross domestic product (CAB), the gross domestic product per capita (GDP), the gross domestic product growth rate (GDPG), and inflation rate (INFLA). Sovereign credit ratings (SCR) are transformed from letter ratings into 21 numerical ratings. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

## 4.2 Regression analysis

### 4.2.1 Benchmark results: using more banks from 65 countries

This section repeats Iannotta et al.'s (2013) work by considering more banks from 65 countries. Hence, we do not consider Crisis Dummy and $D_{HIC}$ in Equation (1). Panels A and B in Table 7 present the estimated results using individual and issuer ratings as the dependent variables respectively.

**Table 7 Effect of ownership structures on bank risks (ratings)**

| | Panel A Using Operating risk as dependent variables | | Panel B Using Default risk as dependent variables | |
|---|---|---|---|---|
| | GOV(20%) FOR(20%) | GOV(50%) FOR(50%) | GOV(20%) FOR(20%) | GOV(50%) FOR(50%) |
| GOV | 0.236* | 0.362* | -0.133 | -0.140 |
| | (1.66) | (1.88) | (-0.54) | (-0.49) |
| SIZE | -0.001*** | -0.001*** | -0.002*** | -0.002*** |
| | (-4.12) | (-4.09) | (-3.67) | (-3.65) |
| LIST | -0.545** | -0.568*** | -0.151 | -0.192 |
| | (-3.49) | (-3.76) | (-1.01) | (-1.33) |
| FOR | -0.371*** | -0.472*** | -0.339** | -0.531*** |
| | (-3.48) | (-3.02) | (-2.55) | (-3.13) |
| CAR | -0.018 | -0.019 | -0.017 | -0.018 |
| | (-1.46) | (-1.52) | (-1.32) | (-1.41) |
| LLP | 0.003** | 0.003** | 0.002 | 0.002 |
| | (2.01) | (2.03) | (0.90) | (0.99) |
| CTI | 0.013*** | 0.013*** | 0.008** | 0.008** |
| | (4.76) | (4.78) | (2.06) | (2.06) |
| ROA | -0.063 | -0.062 | -0.101** | -0.100** |
| | (-1.50) | (-1.44) | (-2.16) | (-2.16) |
| LIQ | 0.005 | 0.006 | 0.009 | 0.009 |
| | (1.22) | (1.32) | (1.37) | (1.43) |
| CR4 | 1.632** | 1.665** | 2.125** | 2.166** |
| | (2.26) | (2.33) | (2.37) | (2.40) |
| GBS | -0.090* | -0.086 | -0.080 | -0.075 |
| | (-1.66) | (-1.56) | (-0.79) | (-0.75) |
| CAB | 0.014 | 0.014 | -0.026 | -0.028 |
| | (0.48) | (0.49) | (-0.43) | (-0.47) |
| GDPG | 0.051 | 0.050 | 0.138 | 0.137 |
| | (0.95) | (0.93) | (1.31) | (1.30) |
| GDP | 1.376 | 1.415 | 7.570** | 7.556** |
| | (0.93) | (0.97) | (2.56) | (2.55) |
| INFLA | -0.031 | -0.028 | 0.184* | 0.187* |
| | (-0.49) | (-0.45) | (1.75) | (1.79) |
| SCR | 0.220*** | 0.221*** | 0.433*** | 0.435*** |
| | (5.79) | (5.83) | (4.45) | (4.45) |
| Constant | 1.237 | 0.989 | -26.581* | -26.600* |
| | (0.20) | (0.16) | (-2.09) | (-2.09) |
| Year dummies | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes |
| R-square | 0.476 | 0.477 | 0.647 | 0.647 |
| Observations | 2077 | 2077 | 2070 | 2070 |

Each column presents the coefficient estimates from an ordinary least squares (OLS). The sample period is from 2002 until 2012. The dependent variables include operating risk (individual ratings proxied by Moody's bank financial strength ratings, BFSRs) and default risk (issuer ratings proxied by Moody's bank deposit ratings, BDRs). See Table 2 for details. The independent variables are as follows. GOV(20%) and GOV(50%) equal 1 when the bank is owned by government for more than 20% and 50% respectively, and 0 otherwise. FOR(20%) and FOR(50%) equal 1 when the bank is owned by foreign banks for more than 20% and 50% respectively, and 0 otherwise. SIZE is defined as the natural logarithm of total assets. LIST equals 1 when the bank is listed, and 0 otherwise. The financial ratios and macroeconomic variables employed here are the average of the past three years to minimize the business cycle effect. CAR is the ratio of required capital to risky assets, LLP is the ratio of loan loss provisions to net interest revenues, CTI denotes the ratio of cost to income, ROA is the ratio of net income to total assets, and LIQ stands for the ratio of liquid assets to customer and short-term funding. Macroeconomic variables include the central government budget surplus relative to gross domestic product (GBS), the current account balance to gross domestic product (CAB), the gross domestic product per capita (GDP), the gross domestic product growth rate (GDPG), and inflation rate (INFLA). Sovereign credit ratings (SCR) are transformed from letter ratings into 21 numerical ratings. *t*-statistics are in parenthesis and are based on the standard errors adjusted for clustering on each country. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

In Panel A, the coefficients for GOV are significantly positive that indicate government ownership increases operating risk. This result that government ownership increases operating risks is robust to different specifications, periods and sample banks throughout our estimation in Tables 8-13. Hence, our study discusses little about it.

Our focus is on Panel B when the issuer rating (i.e., default risk) is used as the dependent variable. The coefficients for GOV are all insignificantly negative that indicate government ownership does not significantly reduce default risk. Hence, because of the increased size of our sample (65 countries), we find that government ownership neutrally affects default risk, which differs from Iannotta et al. (2013) who find government ownership decreases default risk.

The coefficients for the control variables in the operating risk equation are consistent with the theoretical expectations of this study. For instance, the coefficients for SIZE are significantly negative, which indicates that banks with a larger size have lower operating risks. The coefficients for LIST are significantly negative and show that listed banks obtain better individual ratings and have lower operating risk. The coefficients for FOR are significantly negative regardless of the adopted thresholds. Hence, foreign bank ownership reduces operating risk. All of the coefficients of LLP and CTI are significantly positive, which indicate that higher loan loss provisions and cost-to-income ratios adversely affect individual ratings. The coefficients of CAR and ROA are all significantly negative and that the higher capital adequacy ratio and higher return on total assets benefit the individual ratings. The positive coefficients for SCR disclose a positive relation between sovereign and bank ratings.

The coefficients for the control variables in the default risk specification are slightly different from those in the operating risk specification. For instance, the coefficients for LIST become insignificant, which indicates that a listed status does not guarantee that banks obtain good issuer ratings or decrease their default risk. Only one financial ratio (CAR) is significant, which indicates that financial ratios can explain individual ratings more than issuer ratings. The coefficients for GDP, GDPG, and INFLA are significantly positive in the default risk specifications, which show that the macroeconomy of a country affects a bank's issuer ratings more than individual ratings.

**4.2.2 Considering income levels and 2008 financial crisis**

**P**anel A of Table 8 presents the effects of government ownership on the two risks when considering countries' income levels for 2008 crisis and non-crisis periods. Further, to examine our first four hypotheses, we consider different interaction terms, that is, $GOV \times D_{HIC}$, $GOV \times D_{2008}$ and $GOV \times D_{HIC} \times D_{2008}$. We investigate the effect of government ownership on risks in high-income countries during the 2008 crisis.

For operating risk (Columns 1 and 2), the coefficients for $GOV \times D_{HIC}$ are significantly positive, whereas GOV, $GOV \times D_{2008}$, and $GOV \times D_{HIC} \times D_{2008}$ are insignificant. Hence, government ownership increases operating risk for banks in high-income countries regardless of the crisis period. Simply put, GOBs perform worse than POBs in high-income countries but their performance is equal in non-high-income countries regardless of the periods. The first part's results that GOBs are less efficient than POBs in advanced countries are commonly found in the literature.

When considering our focus of default risk (Columns 3 and 4), the coefficients for $GOV \times D_{HIC}$, $GOV \times D_{2008}$, and $GOV \times D_{HIC} \times D_{2008}$ are significantly positive, positive, and negative respectively. We calculate the "net effect" of government ownership on default risk, where the net effect is the sum of the coefficient for GOV and its interaction terms, we use the ownership threshold of 50% (i.e., GOV(50%)) to illustrate four conditions:

(a) For high-income countries during the 2008 crisis ($D_{HIC}$=1 and $D_{2008}$=1), the net coefficient is −0.532[9] that shows government ownership reduces the default risk, which supports hypothesis 1.

(b) For non-high-income countries during the 2008 crisis ($D_{HIC}$=0 and $D_{2008}$=1),[10] the net effect is 0.600 that shows government ownership increases the default risk, which supports hypothesis 2.

(c) For high-income countries during non-crisis periods ($D_{HIC}$=1 and $D_{2008}$=0), the net effect is 1.342[11] that shows government ownership increases the default risk, which supports hypothesis 3.

[9] When $D_{HIC}$=1 and $D_{2008}$=1, the net effect of GOV is –0.532 (=−1.310+2.652+1.920−3.794).
[10] When $D_{HIC}$=0 and $D_{2008}$=1, the net effect of GOV is 0.600 (=−1.310+1.920).
[11] When $D_{HIC}$=1 and $D_{2008}$=0, the net effect of GOV is 1.342 (=−1.310+2.652).

(d) For non-high-income countries during non-crisis periods ($D_{HIC}$=0 and $D_{2008}$=0), the net effect is significantly negative (−1.310) that shows government ownership decreases default risk, which supports hypothesis 4.

In sum, the results of (a) and (d) are consistent with the benchmark result for high-income countries during the 2008 crisis or for non-high-income countries during a non-crisis period. This is consistent with our reasoning that during the crisis, many big banks in European countries were bailed out by the government. However, the benchmark result is not applicable for (b) and (c). For (b), government ownership increases the default risk in non-high-income countries during the 2008 crisis. This increase shows that the support from these governments is weak and hence does not surpass the strongly negative operating risk that ownership creates, even during the 2008 crisis. For (c), government ownership increases default risk for high-income countries during non-crisis periods. This increase shows that GOBs are weak and even when they receive government support, the issuer rating is still weak.

**4.2.3 Considering income levels and country-specific financial crises**

**W**e also use banking crises that are specific to each country ($D_{BCRISIS}$) to investigate the same issue. In Panel B of Table 8, when the default risk is the dependent variable (Columns 3 and 4), the coefficients for GOV and GOV×$D_{HIC}$ are significantly negative and positive respectively, whereas the coefficients for GOV×$D_{BCRISIS}$ and GOV×$D_{HIC}$×$D_{BCRISIS}$ become insignificant. Hence, the country-specific banking crises do not affect the benchmark result; the country's income level does. The "net effects" of government ownership on default risk in non-high-income and high-income countries are negative and positive respectively during the non-crisis period.[12] Hence, different from those results using the 2008 financial crisis, government ownership decreases the default risk for non-high-income countries but increases the default risk in high-income countries regardless of the banking crisis.[13] The results show that governments' bailout policies during country-specific banking crises are affected by the country's income level only. Thus, we cannot reject hypothesis 5.

Thus, the past results that government ownership can reduce default risk mainly occur for the 2008 financial crisis but not for other country's specific crisis. In other words, rating agencies regarded government bailouts as reducing the banks' default risk during the 2008 financial crisis.

[12] The net coefficient for GOV (20%) on default risk is 0.666 (–0.720+1.486) when $D_{HIC}$=1 and $D_{BCRISIS}$=0.

[13] The net coefficient for GOV (20%) on default risk is 0.729 (–0.720+1.486+1.003–1.040) when $D_{HIC}$=1 and $D_{BCRISIS}$=1.

## Table 8 Bank risk considering country development and crisis

**Panel A Considering 2008 financial crisis**

| | Using Operating risk as dependent variables | | Using Default risk as dependent variables | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | GOV(20%) FOR(20%) | GOV(50%) FOR(50%) | GOV(20%) FOR(20%) | GOV(50%) FOR(50%) |
| GOV | -0.178 | 0.037 | -1.192*** | -1.310*** |
| | (-0.52) | (0.11) | (-2.98) | (-3.14) |
| GOV*$D_{HIC}$ | 0.970** | 0.871** | 2.136*** | 2.652*** |
| | (2.52) | (2.02) | (3.46) | (3.23) |
| GOV*$D_{2008}$ | 0.260 | 0.126 | 1.715*** | 1.920*** |
| | (0.79) | (0.53) | (4.19) | (4.69) |
| GOV*$D_{HIC}$*$D_{2008}$ | -0.026 | 0.303 | -2.765*** | -3.794*** |
| | (-0.07) | (0.66) | (-4.29) | (-4.56) |
| SIZE | -0.001*** | -0.001*** | -0.002*** | -0.002*** |
| | (-4.10) | (-4.09) | (-3.61) | (-3.59) |
| LIST | -0.566*** | -0.588*** | -0.192 | -0.245* |
| | (-3.76) | (-4.04) | (-1.30) | (-1.72) |
| FOR | -0.378*** | -0.473*** | -0.351*** | -0.522*** |
| | (-3.46) | (-2.94) | (-2.63) | (-2.97) |
| Financial variables | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes |
| R-square | 0.479 | 0.479 | 0.652 | 0.653 |
| Observations | 2077 | 2077 | 2070 | 2070 |

**Panel B Considering country-specific banking crisis**

| | | | | |
|---|---|---|---|---|
| GOV | -0.102 | 0.022 | -0.720* | -0.797* |
| | (-0.33) | (0.07) | (-1.67) | (-1.67) |
| GOV*$D_{HIC}$ | 0.835** | 0.793* | 1.486** | 1.847** |
| | (2.14) | (1.68) | (2.30) | (2.21) |
| GOV*$D_{BCRIRIS}$ | 1.437*** | 1.327** | 1.003 | 1.057 |
| | (2.88) | (2.56) | (1.50) | (1.59) |
| GOV*$D_{HIC}$*$D_{BCRISIS}$ | -1.208** | -0.818 | -1.040 | -1.137 |
| | (-2.31) | (-1.45) | (-1.49) | (-1.56) |
| SIZE | -0.001*** | -0.001*** | -0.002*** | -0.002*** |
| | (-3.93) | (-3.90) | (-3.56) | (-3.53) |
| LIST | -0.604*** | -0.643*** | -0.172 | -0.235* |
| | (-4.02) | (-4.49) | (-1.18) | (-1.67) |
| FOR | -0.527*** | -0.620*** | -0.433*** | -0.635*** |
| | (-4.53) | (-3.61) | (-2.89) | (-3.10) |
| Financial variables | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes |
| R-square | 0.395 | 0.395 | 0.571 | 0.573 |
| Observations | 1739 | 1739 | 1733 | 1733 |

Each column presents the coefficient estimates from an ordinary least squares (OLS). The sample period is from 2002 until 2012. The dependent variables include operating risk (individual ratings proxied by Moody's bank financial strength ratings, BFSRs) and default risk (issuer ratings proxied by Moody's bank deposit ratings, BDRs). See Table 2 for details. The independent variables are as follows. GOV(20%) and GOV(50%) equal 1 when the bank is owned by government for more than 20% and 50% respectively, and 0 otherwise. FOR(20%) and FOR(50%) equal 1 when the bank is owned by foreign banks for more than 20% and 50% respectively, and 0 otherwise. SIZE is defined as the natural logarithm of total assets. LIST equals 1 when the bank is listed, and 0 otherwise. We specify $D_{HIC}$ as unity when the country is classified as high-income countries, and zero otherwise. $D_{2008}$ is equal to unity for the crisis period (2008~2010) and zero for non-crisis period (2002~2007 and 2011~2012). $D_{BCRISIS}$ equals unity when a country experiences its own banking crisis and zero otherwise. Intercepts, financial variables, macro-economic variables, year dummies, and country dummies are not reported. *t*-statistics are in parenthesis and are based on the standard errors adjusted for clustering on each country. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

### 4.2.4 Considering government fiscal condition

**W**e postulate that a government's weak fiscal condition has a detrimental effect on the credit ratings of banks that increases risks.

We use the debt-to-GDP ratio (DEBT) as the proxy for a country's fiscal condition. We create two new interaction terms: GOV×DEBT and GOV×DEBT×$D_{2008}$. We expect a positive coefficient for the former that supports our postulation and also a positive coefficient for the latter because of the greater adverse effect of high government debt after the financial crisis.

Table 9 presents the estimated results. In terms of operating risk (Columns 1 and 2), the coefficients for GOV, GOV×DEBT, and GOV×DEBT×$D_{2008}$ are all insignificant. This finding indicates that the government's fiscal condition has a neutral effect on the relation between its ownership and operating risk. The reason is that operating risk focuses on banks' efficiency and profitability, and therefore government debt at the country level does not have a significant effect on the efficiency of banks at the bank level.

The results change dramatically in terms of default risk (Columns 3 and 4). The coefficients for GOV and GOV×DEBT are significantly negative and positive respectively when the ownership threshold is 50%. Reinhart and Rogoff (2009) use a 90% debt-to-GDP ratio as the threshold to evaluate whether debt can hinder economic growth. We thus calculate the net effect of GOV by assuming that DEBT equals 90%. Hence, in a country with a high debt burden, the net effect becomes positive.[14] Hence, a government's higher fiscal debt ratio worsens the beneficial effect of its ownership on the banks' default risk. The results are consistent with hypothesis 6: Governments in a weak fiscal condition worsen the default risk though to a lesser degree.

Panel B presents the estimated results when we consider a banking crisis in each nation. The results for operating risk are similar to those reported in Panel A for the 2008 financial crisis. The results are still similar for default risk. The coefficients for GOV and GOV×DEBT are significantly negative and positive respectively, and the coefficients for GOV×DEBT×$D_{BCRISIS}$ are insignificant. The results still indicate that government ownership reduces default risk but a worsened fiscal condition reduces the positive effect of its ownership on default risk.

## 5. Robust testing

### 5.1 Excluding foreign banks

**T**o avoid the effect of a heterogeneous sample on the empirical results, Table 10 reports the results excluding banks that are more than 50% foreign owned. Columns 1 and 2 consider operating risk, and Columns 3 and 4 consider default risk. Columns 1 and 3 use 20% government ownership as the threshold, and Columns 2 and 4 use 50% as the threshold.

In Panel A of Table 10, without considering a country's income level and the 2008 financial crisis, the results are similar to Table 7 in that government ownership increases operating risk and neutrally affects default risk. In Panel B.1, when considering a country's income level and the 2008 crisis, the results are similar to Panel A of Table 8. When considering a banking crisis in each country (Panel B.2), the effect of government ownership on the two risks is unchanged. In Panel C, when considering government debt, the results are similar. The coefficients for GOV×DEBT are insignificantly positive in Panel C.1 when considering default risk, and the net coefficients of GOV are significantly positive by assuming that DEBT equals 90% when $D_{2008}$ equals one. These coefficients show that government ownership decreases default risk but higher government debt decreases the ownership's positive effect, especially during 2008 crisis. When considering a banking crisis in each country (Panel C.2), the results do not change.

[14] The net effect of GOV (50%) on default risk is 0.461 (= –1.969+0.027×90) for high fiscal debt ratio countries.

## Table 9 Considering central government debt ratio

**Panel A Considering 2008 global financial crisis**

| | Using Operating risk as dependent variables | | Using Default risk as dependent variables | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| | GOV(20%) FOR(20%) | GOV(50%) FOR(50%) | GOV(20%) FOR(20%) | GOV(50%) FOR(50%) |
| GOV | -0.062 | -0.331 | -1.057* | -1.969** |
| | (-0.19) | (-0.84) | (-1.90) | (-2.04) |
| GOV*DEBT | 0.003 | 0.011** | 0.011 | 0.027 |
| | (0.58) | (2.22) | (0.86) | (1.27) |
| GOV*DEBT*$D_{2008}$ | 0.002 | 0.003 | 0.010 | 0.013 |
| | (0.39) | (0.64) | (0.98) | (1.13) |
| SIZE | -0.001*** | -0.001*** | -0.002*** | -0.002*** |
| | (-3.78) | (-3.73) | (-3.34) | (-3.29) |
| LIST | -0.569*** | -0.599*** | 0.058 | -0.008 |
| | (-3.98) | (-4.25) | (0.39) | (-0.05) |
| FOR | -0.375*** | -0.419*** | -0.260* | -0.422** |
| | (-3.37) | (-2.68) | (-1.74) | (-2.09) |
| Financial variables | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes |
| R-square | 0.548 | 0.550 | 0.703 | 0.705 |
| Observations | 1343 | 1343 | 1337 | 1337 |

**Panel B Considering country-specific banking crisis**

| | | | | |
|---|---|---|---|---|
| GOV | -0.060 | -0.068 | -1.389** | -2.231*** |
| | (-0.18) | (-0.15) | (-2.34) | (-2.86) |
| GOV*DEBT | 0.005 | 0.006 | 0.023** | 0.038** |
| | (1.56) | (1.11) | (1.96) | (2.18) |
| GOV*DEBT*$D_{BCRISIS}$ | 0.008 | 0.008 | 0.001 | -0.004 |
| | (1.46) | (1.14) | (0.12) | (-0.44) |
| SIZE | -0.001*** | -0.001*** | -0.002*** | -0.002*** |
| | (-3.67) | (-3.63) | (-3.13) | (-3.08) |
| LIST | -0.595*** | -0.626*** | 0.015 | -0.058 |
| | (-3.83) | (-4.08) | (0.09) | (-0.33) |
| FOR | -0.391*** | -0.467*** | -0.232 | -0.500** |
| | (-3.09) | (-2.61) | (-1.28) | (-2.07) |
| Financial variables | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes |
| R-square | 0.479 | 0.480 | 0.651 | 0.653 |
| Observations | 1144 | 1144 | 1139 | 1139 |

Each column presents the coefficient estimates from an ordinary least squares (OLS). The sample period is from 2002 until 2012. The dependent variables include operating risk (individual rating proxied by Moody's bank financial strength ratings, BFSRs) and default risk (issuer rating proxied by Moody's bank deposit ratings, BDRs). See Table 2 for details. The independent variables are as follows. GOV(20%) and GOV(50%) equal 1 when the bank is owned by government for more than 20% and 50% respectively, and 0 otherwise. FOR(20%) and FOR(50%) equal 1 when the bank is owned by foreign banks for more than 20% and 50% respectively, and 0 otherwise. SIZE is defined as the natural logarithm of total assets. LIST equals 1 when the bank is listed, and 0 otherwise. We specify $D_{HIC}$ as unity when the country is classified as high-income countries, and zero otherwise. $D_{2008}$ is equal to unity for the crisis period (2008~2010) and zero for non-crisis period (2002~2007 and 2011~2012). $D_{BCRISIS}$ equals unity when a country experiences its own banking crisis and zero otherwise. Intercepts, financial variables, macro-economic variables, year dummies, and country dummies are not reported. *t*-statistics are in parenthesis and are based on the standard errors adjusted for clustering on each country. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

## Table 10 Excluding foreign banks samples

**Panel A Without considering income level and financial crisis**

| | Using operating risk as dependent variables | | Using default risk as dependent variables | |
|---|---|---|---|---|
| | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) |
| GOV | 0.250* | 0.343* | -0.158 | -0.161 |
| | (1.66) | (1.77) | (-0.66) | (-0.59) |
| Financial variables | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes |
| R-square | 0.488 | 0.489 | 0.649 | 0.649 |
| Observations | 1733 | 1733 | 1729 | 1729 |

**Panel B Considering income level and crisis**

| | Panel B.1 2008 financial crisis | | | | Panel B.2 Banking crisis | | | |
|---|---|---|---|---|---|---|---|---|
| | Using operating risk as dependent variables | | Using default risk as dependent variables | | Using operating risk as dependent variables | | Using default risk as dependent variables | |
| | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) |
| GOV | -0.214 | 0.011 | -1.224*** | -1.364*** | -0.086 | 0.045 | -0.721* | -0.782* |
| | (-0.60) | (0.03) | (-3.12) | (-3.24) | (-0.27) | (0.13) | (-1.76) | (-1.69) |
| GOV*$D_{HIC}$ | 0.939** | 0.786 | 2.147*** | 2.609*** | 0.772* | 0.704 | 1.459** | 1.754** |
| | (2.25) | (1.64) | (3.52) | (3.22) | (1.85) | (1.45) | (2.22) | (2.09) |
| GOV*CRISIS DUMMY | 0.344 | 0.220 | 1.752*** | 2.009*** | 1.297*** | 1.188** | 1.041 | 1.011 |
| | (0.98) | (0.85) | (4.13) | (4.68) | (2.65) | (2.35) | (1.48) | (1.54) |
| GOV*$D_{HIC}$*CRISIS DUMMY | 0.156 | 0.664 | -2.447*** | -3.308*** | -0.713 | -0.281 | -1.114 | -1.122 |
| | (0.37) | (1.20) | (-3.71) | (-3.99) | (-1.30) | (-0.46) | (-1.15) | (-1.57) |
| Financial variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-square | 0.492 | 0.492 | 0.655 | 0.656 | 0.415 | 0.415 | 0.590 | 0.590 |
| Observations | 1733 | 1733 | 1729 | 1729 | 1448 | 1448 | 1444 | 1444 |

**Panel C Considering a country's government debt**

| | Panel C.1 2008 financial crisis | | | | Panel C.2 Banking crisis | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) |
| GOV | -0.126 | -0.364 | -1.026* | -1.847* | -0.188 | -0.170 | -1.459** | -2.144*** |
| | (-0.31) | (-0.83) | (-1.74) | (-1.93) | (-0.47) | (-0.35) | (-2.06) | (-2.61) |
| GOV*DEBT | 0.004 | 0.011 | 0.010 | 0.024 | 0.008 | 0.008 | 0.024* | 0.036** |
| | (0.53) | (1.86) | (0.80) | (1.18) | (1.82) | (1.27) | (1.77) | (2.03) |
| GOV*DEBT*CRISIS DUMMY | 0.004 | 0.004 | 0.011 | 0.015 | 0.008 | 0.008 | 0.000 | -0.003 |
| | (0.68) | (1.09) | (1.18) | (1.38) | (1.50) | (1.11) | (0.02) | (-0.31) |
| Financial variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-square | 0.568 | 0.569 | 0.709 | 0.711 | 0.511 | 0.511 | 0.674 | 0.675 |
| Observations | 1110 | 1110 | 1107 | 1107 | 944 | 944 | 941 | 941 |

Each column presents the coefficient estimates from an ordinary least squares (OLS). The sample period is from 2002 until 2012. The dependent variables include operating risk (Moody's bank financial strength ratings, BFSRs) and default risk (Moody's bank deposit ratings, BDRs). See Table 2 for details. The independent variables are as follows. GOV(20%) and GOV(50%) equal 1 when the bank is owned by government for more than 20% and 50% respectively, and 0 otherwise. We specify $D_{HIC}$ as unity when the country is classified as high-income countries, and zero otherwise. CRISIS DUMMY includes $D_{2008}$ and $D_{BCRISIS}$. $D_{2008}$ is equal to unity for the crisis period (2008~2010) and zero for non-crisis period (2002~2007 and 2011~2012). $D_{BCRISIS}$ equals unity when a country experiences its own banking crisis and zero otherwise. We use debt-to-GDP ratio (DEBT) as the proxy for the fiscal condition. Intercepts, financial variables, macro-economic variables, year dummies, and country dummies are not reported. *t*-statistics are in parenthesis and are based on the standard errors adjusted for clustering on each country. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

### 5.2 Considering only the ten largest banks in each country

To avoid the effect of a heterogeneous sample on the empirical results, Table 11 reports the results using the ten largest banks in each country. Iannotta et al. (2013) also consider the large banks only. We also exclude those banks that are more than 50% foreign owned.

### Table 11 Considering only ten largest banks in each country

**Panel A Without considering income level and financial crisis**

| | Using operating risk as dependent variables | | Using default risk as dependent variables | |
|---|---|---|---|---|
| | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) |
| GOV | 0.364 | 0.799* | -0.492 | -0.201 |
| | (0.93) | (1.75) | (-1.06) | (-0.33) |
| Financial variables | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes |
| R-square | 0.551 | 0.553 | 0.678 | 0.678 |
| Observations | 1005 | 1005 | 1002 | 1002 |

**Panel B Considering income level and crisis**

| | Panel B.1 2008 financial crisis | | | | Panel B.2 Banking crisis | | | |
|---|---|---|---|---|---|---|---|---|
| | Using operating risk as dependent variables | | Using default risk as dependent variables | | Using operating risk as dependent variables | | Using default risk as dependent variables | |
| | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) |
| GOV | -0.548 | 0.230 | -2.504*** | -2.071** | 0.045 | 0.563 | -1.286 | -0.981 |
| | (-0.73) | (0.34) | (-2.93) | (-1.97) | (0.08) | (0.84) | (-1.50) | (-0.96) |
| GOV*$D_{HIC}$ | 1.634* | 1.046 | 3.635*** | 3.723*** | 1.134 | 0.732 | 1.818* | 1.835 |
| | (1.78) | (1.06) | (3.40) | (2.65) | (1.12) | (0.65) | (1.68) | (1.37) |
| GOV*CRISIS DUMMY | 1.211 | 0.697 | 3.853*** | 3.827*** | 1.482 | 1.049 | 2.861 | 2.633 |
| | (1.42) | (1.23) | (3.80) | (3.31) | (1.53) | (1.01) | (1.62) | (1.50) |
| GOV*$D_{HIC}$*CRISIS DUMMY | -0.203 | 0.989 | -5.497*** | -6.127*** | -0.680 | 0.361 | -2.631 | -1.910 |
| | (-0.21) | (0.90) | (-5.19) | (-4.86) | (-0.74) | (0.33) | (-1.63) | (-1.26) |
| Financial variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-square | 0.555 | 0.555 | 0.686 | 0.684 | 0.512 | 0.513 | 0.651 | 0.650 |
| Observations | 1005 | 1005 | 1002 | 1002 | 832 | 832 | 830 | 830 |

**Panel C Considering a country's government debt**

| | Panel C.1 2008 financial crisis | | | | Panel C.2 Banking crisis | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) |
| GOV | -0.881 | -0.861 | -1.708* | -2.301** | -0.878 | -0.529 | -2.157*** | -2.548*** |
| | (-0.87) | (-0.92) | (-1.66) | (-2.05) | (-0.99) | (-0.46) | (-3.28) | (-3.15) |
| GOV*DEBT | 0.012 | 0.021 | 0.007 | 0.024 | 0.024 | 0.024 | 0.031*** | 0.041*** |
| | (0.65) | (1.73) | (0.44) | (1.30) | (1.85) | (1.45) | (4.64) | (4.15) |
| GOV*DEBT*CRISIS DUMMY | 0.012 | 0.012 | 0.025* | 0.026 | 0.008 | 0.005 | 0.002 | -0.003 |
| | (0.89) | (1.28) | (1.74) | (1.54) | (0.70) | (0.38) | (0.19) | (-0.26) |
| Financial variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-square | 0.615 | 0.617 | 0.729 | 0.729 | 0.594 | 0.595 | 0.724 | 0.724 |
| Observations | 652 | 652 | 651 | 651 | 550 | 550 | 549 | 549 |

Each column presents the coefficient estimates from an ordinary least squares (OLS). The sample period is from 2002 until 2012. The dependent variables include operating risk (Moody's bank financial strength ratings, BFSRs) and default risk (Moody's bank deposit ratings, BDRs). See Table 2 for details. The independent variables are as follows. GOV(20%) and GOV(50%) equal 1 when the bank is owned by government for more than 20% and 50% respectively, and 0 otherwise. We specify $D_{HIC}$ as unity when the country is classified as high-income countries, and zero otherwise. CRISIS DUMMY includes $D_{2008}$ and $D_{BCRISIS}$. $D_{2008}$ is equal to unity for the crisis period (2008~2010) and zero for non-crisis period (2002~2007 and 2011~2012). $D_{BCRISIS}$ equals unity when a country experiences its own banking crisis and zero otherwise. We use debt-to-GDP ratio (DEBT) as the proxy for the fiscal condition. Intercepts, financial variables, macro-economic variables, year dummies, and country dummies are not reported. *t*-statistics are in parenthesis and are based on the standard errors adjusted for clustering on each country. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

In Panel A, without considering a country's income level and a crisis period, the results show that 50% government ownership increases operating risk and neutrally affects default risk. In Panel B.1, when considering a country's income level and the 2008 crisis, the results of government ownership on the two risks are still similar with the previous results (Panel A of Table 8). When considering a banking crisis in each country (Panel B.2), the results are slightly different. Most of coefficients become insignificant, suggesting that income level and country-specific crises do not affect the effect of ownership on operating and defaults risks. In Panel C.1 when considering government debt and the 2008 financial crisis, the results show that government ownership decreases default risk but higher government debt decreases the positive effect of its ownership on default risk especially in a crisis period. When considering a country's banking crisis (Panel C.2), government ownership decreases default risk but higher government debt decreases the ownership's positive effect in crisis and non-crisis periods.

### 5.3 Endogeneity problems

**T**o avoid the potential reverse causality and omitted variable bias problems, as well as the unobservable effects, we considered two methods in minimizing the endogeneity problem. The first approach used the Heckman two-stage method in estimating the model, and the empirical results did not change. The second approach involved matching.

Endogeneity could arise due to self-selection bias. A government-owned bank might not be random, but a bank's deliberate decision created the selection bias problem. For example, the government that decides to own a bank is frequently performance driven. The government bailouts the bank by injecting capital. Thus, we minimized the endogeneity problem by using Heckman's (1979) two-stage selection model. The first stage estimates the determinant equation for being a government-owned bank by using a logit model to yield the inverse Mills ratio (IMR), where the dependent variable is equal to one if the bank is under more than 20% (or 50%) government ownership, and zero if otherwise. We included bank financial information and the sovereign rating of the country as independent variables. We also included a dummy variable SPE and specified as unity when the bank was assigned with a speculative-grade issuer rating, and zero if otherwise. The second stage uses IMR as an additional explanatory variable in the RATING equation (Wu and Shen, 2013; Li and Prabhala, 2007; Hamilton and Nickerson, 2003).

In Panel A of Table 12, the results remain the same as those that did not consider IMR.[15] For example, the coefficients for GOV20 (GOV50) are significantly positive in deciding the operating risk and insignificant in deciding the default risk.

[15] For the sake of space, the results in the first stage are available upon request. In the first stage of the Heckman model, the coefficients for CTI and LIQ are significantly negative, and LLP is significantly positive. These coefficients suggest that government-owned banks are more likely to emerge when the bank has poor asset quality or low cost to income or low liquidity ratios. In the second stage, we estimated our RATING equation by including IMR in the model.

## Table 12 Using Heckman two stage method to estimate

**Panel A Without considering income level and financial crisis**

| | Using operational risk as dependent variables | | Using default risk as dependent variables | |
|---|---|---|---|---|
| | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) |
| GOV | 0.250* | 0.343* | -0.158 | -0.161 |
| | (1.66) | (1.77) | (-0.66) | (-0.59) |
| Financial variables | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes |
| R-square | 0.476 | 0.477 | 0.647 | 0.647 |
| Observations | 2077 | 2077 | 2070 | 2070 |

**Panel B Considering income level and crisis**

| | Panel B.1 2008 financial crisis | | | | Panel B.2 Banking crisis | | | |
|---|---|---|---|---|---|---|---|---|
| | Using operational risk as dependent variables | | Using default risk as dependent variables | | Using operational risk as dependent variables | | Using default risk as dependent variables | |
| | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) |
| GOV | -0.019 | 0.067 | -0.902** | -1.307*** | 0.044 | 0.0380 | -0.460 | -0.809* |
| | (-0.057) | (0.22) | (-2.52) | (-3.32) | (0.17) | (0.12) | (-1.38) | (-1.80) |
| GOV*$D_{HIC}$ | 0.798** | 0.882** | 1.794*** | 2.651*** | 0.679* | 0.803* | 1.179* | 1.854** |
| | (2.03) | (2.07) | (2.67) | (3.26) | (1.87) | (1.76) | (1.79) | (2.26) |
| GOV*CRISIS DUMMY | 0.002 | 0.082 | 1.239*** | 1.914*** | 0.922** | 1.305** | 0.774 | 0.772 |
| | (0.01) | (0.37) | (2.79) | (4.86) | (1.97) | (2.57) | (1.51) | (3.90) |
| GOV*$D_{HIC}$*CRISIS DUMMY | 0.242 | 0.249 | -2.258*** | -3.799*** | -0.674 | -0.799 | -1.290 | -1.244 |
| | (0.63) | (0.56) | (-2.81) | (-4.50) | (-1.37) | (-1.42) | (-1.55) | (-1.62) |
| Financial variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-square | 0.479 | 0.479 | 0.652 | 0.653 | 0.395 | 0.395 | 0.571 | 0.573 |
| Observations | 2077 | 2077 | 2070 | 2070 | 1739 | 1739 | 1733 | 1733 |

**Panel C Considering a country's government debt**

| | Panel C.1 2008 financial crisis | | | | Panel C.2 Banking crisis | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) |
| GOV | -0.062 | -0.331 | -0.062 | -0.331 | -0.060 | -0.068 | -1.389** | -2.231*** |
| | (-0.19) | (-0.84) | (-0.19) | (-0.84) | (-0.18) | (-0.15) | (-2.34) | (-2.86) |
| GOV*DEBT | 0.003 | 0.011** | 0.003 | 0.011** | 0.005 | 0.006 | 0.023** | 0.038** |
| | (0.58) | (2.22) | (0.58) | (2.22) | (1.56) | (1.11) | (1.96) | (2.18) |
| GOV*DEBT*CRISIS DUMMY | 0.002 | 0.003 | 0.002 | 0.003 | 0.008 | 0.008 | 0.001 | -0.004 |
| | (0.39) | (0.64) | (0.39) | (0.64) | (1.46) | (1.14) | (0.12) | (-0.44) |
| Financial variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-square | 0.548 | 0.550 | 0.703 | 0.705 | 0.479 | 0.480 | 0.651 | 0.653 |
| Observations | 1343 | 1343 | 1337 | 1337 | 1144 | 1144 | 1139 | 1139 |

Each column presents the coefficient estimates from an ordinary least squares (OLS). The sample period is from 2002 until 2012. The dependent variables include operating risk (Moody's bank financial strength ratings, BFSRs) and default risk (Moody's bank deposit ratings, BDRs). See Table 2 for details. The independent variables are as follows. GOV(20%) and GOV(50%) equal 1 when the bank is owned by government for more than 20% and 50% respectively, and 0 otherwise. We specify $D_{HIC}$ as unity when the country is classified as high-income countries, and zero otherwise. CRISIS DUMMY includes $D_{2008}$ and $D_{BCRISIS}$. $D_{2008}$ is equal to unity for the crisis period (2008~2010) and zero for non-crisis period (2002~2007 and 2011~2012). $D_{BCRISIS}$ equals unity when a country experiences its own banking crisis and zero otherwise. We use debt-to-GDP ratio (DEBT) as the proxy for the fiscal condition. Intercepts, financial variables, macro-economic variables, year dummies, and country dummies are not reported. *t*-statistics are in parenthesis and are based on the standard errors adjusted for clustering on each country. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

Panel B presents the effects of government ownership on the two risks when considering countries' income levels for the 2008 crisis and banking crises that are specific to each country. In Panel B.1, for operating risk (Columns 1 and 2), the coefficients for $GOV \times D_{HIC}$ are significantly positive; whereas GOV, $GOV \times D_{2008}$ and $GOV \times D_{HIC} \times D_{2008}$ are insignificant. The coefficients for $GOV \times D_{HIC}$, $GOV \times D_{2008}$ and $GOV \times D_{HIC} \times D_{2008}$ when focused on default risk (Columns 3 and 4) are significantly positive, positive and negative respectively. In Panel B.2, we also used banking crises that were specific to each country ($D_{BCRISIS}$) to investigate the same issue. When the default risk is the dependent variable (Columns 3 and 4), the coefficients for GOV and $GOV \times D_{HIC}$ are significantly negative and positive respectively; whereas, the coefficients for $GOV \times D_{BCRISIS}$ and $GOV \times D_{HIC} \times D_{BCRISIS}$ become insignificant.

In Panel C.1, the coefficients for GOV, GOV×DEBT and $GOV \times DEBT \times D_{2008}$ are all insignificant in terms of operating risk (Columns 1 and 2) when considering government debt and the 2008 crisis. The results change in terms of default risk (Columns 3 and 4). The coefficients for GOV and GOV×DEBT when the ownership threshold is 50% are significantly negative and positive respectively. When considering a country's banking crisis (Panel C.2), government ownership decreases default risk. However, high government debt decreases the ownership's positive effect during crisis and non-crisis periods.

Next, we used matching method. Matching theory, which was originally developed in the fields of medical and biological research, had been widely applied in economics, finance and accounting. The basic concept of matching theory is that the treated sample should have characteristics similar to those of the controlled sample, except for treatment. If we control the similar characteristics of the treated and controlled samples, then they are considered from the same distribution, and any observation from the two groups can be considered randomly sampled when making a comparison. The resulting difference between the two matched observations is called the treatment effect (see Rubin (1973) for a detailed econometric analysis and Glick, Guo and Hutchison (2006), Shen and Chang (2008) and Wu and Shen (2013) for economic applications).

Table 13 shows that the results are still robust when the matching method is used.

## 6. Conclusion

**A**n abundant amount of studies examine how government ownership can add or destroy banks' value, where the added value is defined as the ownership reducing the banks' default risks. We build six hypotheses on where (such as a country's income level) and when (during crisis or not) our benchmark holds. We find that government ownership does not always reduce risk and often even increase it. The effectiveness of a government's bailout policy to protect banks from default depends on this government's income level and the nature of the crisis.

Our six hypotheses fall into two groups. The first group considers the countries' income level and the 2008 crisis. Two hypotheses support the benchmark result: banks from high-income countries during the 2008 financial crisis and banks from non-high-income countries during the non-crisis periods have reduced default risk from government ownership. The remaining two conditions do not support the benchmark result: banks are from high-income countries during the non-crisis periods and banks are from non-high-income countries during the 2008 crisis have increased default risk due to government ownership.

The second group considers the last two hypotheses. One is a government may not inject sufficient funds during a country-specific banking crisis. We argue that a government's bailout during a country-specific banking crisis is a complex issue. For example, the causes and cures for one country are quite different from those in other countries. Government ownership does not reduce default risk. Hence, hypothesis 5 is accepted.

The other is that the government ownership can reduce default risk but the government's worsened fiscal condition reduces the positive effect of its ownership on default risk. The reduced default risk due to government ownership is most likely to occur for banks from countries with a sound fiscal condition.

## Table 13 Using matching samples

**Panel A Without considering income level and financial crisis**

| | Using operating risk as dependent variables | | Using default risk as dependent variables | |
|---|---|---|---|---|
| | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) |
| GOV | 0.407* | 0.673*** | 0.230 | 0.260 |
| | (1.93) | (4.16) | (1.03) | (1.27) |
| Financial variables | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes |
| R-square | 0.558 | 0.574 | 0.696 | 0.774 |
| Observations | 439 | 318 | 445 | 410 |

**Panel B Considering income level and crisis**

| | Panel B.1 2008 financial crisis | | | | Panel B.2 Banking crisis | | | |
|---|---|---|---|---|---|---|---|---|
| | Using operating risk as dependent variables | | Using default risk as dependent variables | | Using operating risk as dependent variables | | Using default risk as dependent variables | |
| | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) |
| GOV | -0.122 | 0.120 | -0.246 | -0.134 | 0.013 | 0.379 | -0.067 | -0.265* |
| | (-0.43) | (0.36) | (-0.71) | (-0.53) | (0.04) | (1.54) | (-0.27) | (-1.71) |
| GOV*$D_{HIC}$ | 1.367*** | 1.628*** | 1.824*** | 3.109** | 1.157** | 1.456*** | 1.464** | 3.243** |
| | (3.05) | (2.79) | (2.60) | (2.16) | (2.57) | (2.75) | (2.24) | (2.28) |
| GOV*CRISIS DUMMY | 0.794** | 0.703* | 0.842* | 0.702* | 0.469 | 0.243 | 1.313 | 1.111 |
| | (2.17) | (1.73) | (1.76) | (1.67) | (1.00) | (0.90) | (1.08) | (1.54) |
| GOV*$D_{HIC}$*CRISIS DUMMY | -0.395 | -0.543 | -2.470*** | -4.446*** | -0.317 | -0.440 | -1.201 | -1.122 |
| | (-0.75) | (-0.87) | (-3.07) | (-3.35) | (-0.56) | (-0.91) | (-1.15) | (-1.57) |
| Financial variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-square | 0.569 | 0.574 | 0.705 | 0.794 | 0.529 | 0.534 | 0.657 | 0.759 |
| Observations | 439 | 318 | 445 | 226 | 366 | 276 | 366 | 198 |

**Panel C Considering a country's government debt**

| | Panel C.1 2008 financial crisis | | | | Panel C.2 Banking crisis | | | |
|---|---|---|---|---|---|---|---|---|
| | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) | (1) GOV(20%) | (2) GOV(50%) | (3) GOV(20%) | (4) GOV(50%) |
| GOV | -0.156 | 0.517 | -0.680 | -1.807* | -0.337 | 0.957*** | -1.473** | -2.989*** |
| | (-0.35) | (1.54) | (-1.02) | (-1.73) | (-0.61) | (3.18) | (-2.04) | (-2.64) |
| GOV*DEBT | 0.006 | 0.001 | 0.018 | 0.035* | 0.011* | -0.004 | 0.032** | 0.048*** |
| | (0.97) | (0.12) | (1.28) | (1.73) | (1.81) | (-0.57) | (2.32) | (2.60) |
| GOV*DEBT*CRISIS DUMMY | 0.007 | 0.008 | -0.013 | -0.017*** | 0.004 | 0.009* | -0.008 | -0.015 |
| | (1.23) | (1.55) | (-1.56) | (-2.95) | (0.89 | (1.69) | (-1.03) | (-1.37) |
| Financial variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Macro variables | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Year dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Country dummies | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-square | 0.641 | 0.639 | 0.756 | 0.853 | 0.624 | 0.625 | 0.763 | 0.839 |
| Observations | 302 | 223 | 305 | 162 | 251 | 196 | 257 | 143 |

Each column presents the coefficient estimates from an ordinary least squares (OLS). The sample period is from 2002 until 2012. The dependent variables include operating risk (individual ratings proxied by Moody's bank financial strength ratings, BFSRs) and default risk (issuer ratings proxied by Moody's bank deposit ratings, BDRs). See Table 2 for details. The independent variables are as follows. GOV(20%) and GOV(50%) equal 1 when the bank is owned by government for more than 20% and 50% respectively, and 0 otherwise. We specify $D_{HIC}$ as unity when the country is classified as high-income countries, and zero otherwise. CRISIS DUMMY includes $D_{2008}$ and $D_{BCRISIS}$. $D_{2008}$ is equal to unity for the crisis period (2008~2010) and zero for non-crisis period (2002~2007 and 2011~2012). $D_{BCRISIS}$ equals unity when a country experiences its own banking crisis and zero otherwise. We use debt-to-GDP ratio (DEBT) as the proxy for the fiscal condition. Intercepts, financial variables, macro-economic variables, year dummies, and country dummies are not reported. *t*-statistics are in parenthesis and are based on the standard errors adjusted for clustering on each country. *, **, and *** denote significance at the 10%, 5%, and 1% levels respectively.

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**Appendix A Matching of bank deposit rating and bank financial strength rating**

| Bank deposit rating | Bank financial strength rating | Numerical |
|---|---|---|
| Aaa | A | 13 |
| Aa1 | A- | 12 |
| Aa2 | B+ | 11 |
| Aa3 | B | 10 |
| A1 | B- | 9 |
| A2 | C+ | 8 |
| A3 | C | 7 |
| Baa1 | C- | 6 |
| Baa2 | C- | 6 |
| Baa3 | D+ | 5 |
| Ba1 | D+ | 5 |
| Ba2 | D | 4 |
| Ba3 | D- | 3 |
| B1 | E+ | 2 |
| B2 | E+ | 2 |
| B3 | E+ | 2 |
| Caa1 | E | 1 |
| Caa2 | E | 1 |
| Caa3 | E | 1 |