Bank Level and Country Level Determinants of Bank Capital Structure and Funding Sources

Hafiz Hoque[a] and Eilnaz Kashefi Pour[b]

Abstract

We examine the determinants of capital structure and funding sources of 347 large global banks between 1998 and 2016 from 57 countries around the world. We find that the capital structure of banks does not evolve only as a result of capital regulations, it is also affected by market forces. We find that bank capital structure corresponds to corporate finance theory and buffer view, and in particular, that market-to-book ratio, size and risk are positively related and that profitability is negatively related to bank leverage. Banks in countries with higher tax advantages, creditor rights, deposit insurance and bankruptcy codes have more leverage and those bound by common law have less leverage. Size and country level factors are important determinants of sources of financing.

Keywords: Global banks, capital structure, crisis, deposit/non deposit financing, speed of adjustment.

JEL: G21, G32.

[a]The York Management School, University of York, Freboys lane,YO10 5GD,York, United Kingdom, hafiz.hoque@york.ac.uk (H. Hoque), Tel.: +44 (0)1904325047.
[b]Department of Accounting and Finance, Birmingham Business School, University of Birmingham University House, Edgbaston Park Road, Birmingham, B15 2TT, e.kashefipour@bham.ac.uk.

1. Introduction

Almost all of the studies on capital structure exclude the banking industry (e.,g., Bessler et al., 2013; Fan et al. 2012) because capital adequacy regulation dictates their capital structure. Another important reason to exclude banks is that their balance sheets are very different from the other firms because of their typically very high leveraging and deposit taking.[1] Whilst this may justify excluding banks from a study of non-bank industrial firms, it is reasonable to ask whether the theories relating to capital structure that hold for industrial firms also hold for banks. This paper thus asks: what are the determinants of bank capital structure? We examine the bank level, regulatory and country level determinants of bank capital structure. Since banks are deposit taking institutions, we also examine the determinants of deposit and non-deposit financing. We use large banks, which are a particular focus of the current regulatory environment because of their importance domestically and internationally as systemically important financial institutions.

For banks higher leverage ratios arise as they deal with money and leverage are much more important. A bank lends out money which is essentially borrowed from the customers. In some sense, these deposits are loans granted to the bank that could be withdrawn by the depositors at any time. In sum, banking is all about leverage. Put simply, banks are highly leveraged institutions that are in the business of facilitating leverage for others (Basel Committee on Banking Supervision, 2014). The leverage ratio is used to capture how much debt the bank has relative to its capital, such as tier 1 capital, including common stock, retained earnings and other selected assets. Although it is considered safer for a bank to have higher leverage (DeAngelo and Stulz,

2013), but we expect that there are variations in capital structure across banks and that is determined by their asset structure, tax rates, regulations which we analyse in this paper.

The amount of bank capital is determined by bank capital requirements (Mishkin, 2000, p.227). This means that bank leverage should be determined by regulations and that there should be less variation in leverage across banks.[2] Putting it differently, standard corporate finance theories should have little power in explaining the cross-sectional variation in leverage for banks. Figure 1 plots Tire 1 capital as a percentage of risk weighted assets. Interestingly, the Tier 1 capital ratio shows considerable variation. This implies that bank leverage needs more investigation, as it seems that capital structure decisions are not only a result of capital regulation.

[Insert Figure 1 here]

Barth et al. (2005), Berger et al. (2008) and Brewer et al. (2008) find that historically banks hold higher levels of capital than the regulatory minimum. This finding implies that banks hold capital buffers in excess of the regulatory minimum, asserting the role of market forces in determining the cushions banks tend to maintain over the minimum capital requirements. Figure 1 also shows that banks hold a higher level of Tier 1 capital as than that prescribed by the Basel regulations.

There is a large body of literature which investigates the determinants of capital structure within individual countries.[3] Some papers examine capital structure choices across countries to link the cross-sectional variation in the institutional environment.[4] Recently, Gropp and Heider

[2] For example, Basel I regulatory regime proposes a uniform capital ratio (Gropp and Heider, 2010).
[3] Frank and Goyal (2015), Campbell and Hamao (1995), and Gatward and Sharpe (1996) examine the US, Japan and Australia, respectively.
[4] Cross-country studies include Bessler et al. (2013), Fan et al. (2012), De Jong, Kabir and Nguyen (2008), Giannetti (2003), Booth, Aivazian, Demirguc-Kunt, and Maksimovic (2001), Claessens, Djankov, and Nenova (2001), and Demirguc-Kunt and Maksimovic (1996, 1998, 1999).

(2010) have examined the determinants of bank capital structure using a sample of US and EU-15 banks and they confirm that the market/corporate finance view of capital structure applies to banks. Our study is related to Gropp and Heider (2010), but our approach is different in three respects; first, we investigate the impact of tax, second, in addition to bank level variables, we also examine institutional and country level variables, and third, we test whether financial crisis shows any significant effect on the leverage of banks.

In particular, the paper contributes to the literature in several ways. First, we examine whether bank capital structure evolves as a result of capital regulations or corporate finance and buffer views explain the capital structure of banks. We use an international sample of large banks from 57 countries to examine whether the bank-level characteristics like profitability, market-to-book, size explains some of variations of the capital structure of banks. Our findings imply that capital structure of banks is not solely determined by the capital regulations, rather, corporate finance theory / buffer view explain a significant portion of capital structure of banks across the globe.

Second, what is the role of country level governance and institutional factors in determining the capital structure of banks? There are a few studies which have looked at the importance of country level governance and institutional factors in the capital structure of non-financial firms across the globe (e.g., Bessler et al., 2013; Fan et al. 2012). We extend their evidence in the case of banks. Our findings are consistent with Bessler et al. (2013) and Fan et al. (2012) using a non-financial sample from a number of countries, in that country level governance variables are a very important determinant of capital structure. Consistent with the previous literature (Bessler et al., 2013; Fan et al., 2012; Djankov, Hart, McLiesh, and Shleifer, 2008; Claessens, Djankov and Mody, 2001; and La Porta, Lopez-de-Silanes, Shleifer and Vishny, 1997,

1998), we find that, in contrast to countries with a common law origin, those with bankruptcy and deposit insurance have higher book leverage. These findings relate to the importance of the legal system, the implementation of investor rights, and the resolution of financial distress.

We also examine the country level governance and institutional determinants of non-deposit and deposit financing. We find that these variables are even more important compared to bank level variables for the sources of financing. The standard corporate finance determinants have little or no explanatory power in determining the sources of banks' capital structure when we control for country level characteristics, while the magnitude and significance of country level variables suggest that country effects are more important for the sources of financing of banks.[5]

Third, the tax treatment of interest and dividend payments is found to be an important factor which affects the leverage of firms after the seminal work of Modigliani and Miller (1963) and Miller (1977). However, no studies try to understand whether bank leverage responds to the Miller tax ratio in a similar way to non-financial firms. In this paper we hand collect the data on tax rates for different countries and relate it to the leverage of banks. We compute the Miller (1977) tax ratio and show that it is positively related to the leverage. This is in line with Fan et al. (2012), who show that for non-financial firms the coefficient of the Miller tax ratio is positive. A country's tax system is of primary importance in explaining the capital structure of banks. We use the Miller tax ratios to explain the capital structure of banks in a cross country setting. We also classify our countries into classical, partial, and full dividend imputation systems. Our results support that banks located in the classical tax system have higher leverage. Interestingly, we show that creditor

[5] To give an idea of the importance of country level governance and institutional variables, we compare our results with and without these variables. When we run our models without the variables we obtain an R^2 of 31.7% to 37.0%. When we include the country level governance and institutional variables, R^2 increases to 63.7%-69.0%. These results indicate the scale of the importance of these variables in explaining the sources of finance. The corruption index and bankruptcy code are negatively related to non-deposit financing, while deposit insurance and crisis are positively related. All these variables have an opposite relation (in sign) to the deposit financing.

rights and bankruptcy codes are positive in the classical tax system suggesting that, in strong protection countries, the benefit of tax is more pronounced for credit suppliers.

Fourth, banks are heavily regulated and capital regulation is at the heart of this. The recent financial crisis showed some fundamental flaws in capital regulation and that it cannot prevent banks from bankruptcy. Many of the banks that were rescued appeared to be holding regulatory capital, and in addition were also holding some buffer. We examine in this paper whether financial crisis shows any significant effect on the leverage of banks. We find that financial crisis is related to higher use of leverage by banks. This perhaps stresses the fact that equity capital was harder to raise during the financial crisis. Therefore, banks had to rely on the easier option to raise finance, leverage.

Fifth, previous studies have not included regulatory capital (Tier 1) in estimating the speed of adjustment for bank capital structure. We include this when estimating the speed of adjustment, finding that it decreases as a result of the holding of regulatory capital. In particular, the speed of adjustment decreases by 6.1%, from 53.7% to 46.7%. This suggests that holding regulatory capital decreases the speed of adjustment to a certain degree. Thus, it is very important to consider regulatory capital when estimating the speed of adjustment for the capital structure of banks.

The remainder of the paper is organized as follows. In section two we develop the hypotheses and section three describes the data and provides descriptive statistics. In section four we describe the methodology; section five discusses the empirical results; and section six concludes the paper.

2. Bank- and Country-level Determinants of Capital Structure

2.1 Predictions from Buffer and Corporate Finance View

Banks are required to hold capital buffers above the regulatory minimum to avoid the cost of issuing equity at short notice (e.g., Ayuso et al., 2004 and Peura and Keppo, 2006). Hence, it is expected that banks which face a higher cost of issuing equity at short notice are less levered because they keep buffers, which supports the buffer view (Gropp and Heider, 2010). Accordingly, in the buffer view, banks with higher market-to-book ratios, profits, and dividends are less likely to face a higher cost of issuing equity because of their better reputation, greater financial slack, and better market price (Gropp and Heider, 2010); hence, it is expected that these banks will have more leverage.

In the buffer view, the effect of size is not clear (see Gropp and Heider, 2010). Larger banks are expected to be less levered as they are more likely to issue equity at lower costs due to their reputation. Alternatively, larger banks may hold larger buffers because they are more complex and hence are subject to a higher asymmetric information problem. The relationship between risk and leverage is expected to be negative, as risky banks are more likely to have a higher cost of issuing equity and thus are expected to be less levered. Unlike Gropp and Heider (2010), who suggest that the buffer view has no clear prediction of the relationship between collateral and leverage, we argue that banks with higher collateral are likely to have more leverage, as they are expected to have greater financial slack and are less risky or obtain a better price, and thus face a lower cost of issuing equity at short notice.

Alternatively, corporate finance theories which are developed from Modigliani and Miller's (1985) propositions determine firms' capital structure. Previous empirical studies (e.g., Rajan and Zigales, 1995; Frank and Goyal, 2009; Fan et al. 2012), have converged the most reliable factors

that explain firms' leverage. They mainly show that leverage is positively associated with size and collateral while it is negatively related to risk, market-to-book ratios, dividends, and profits. The corporate finance literature argues that larger firms with more collateral face lower expected financial costs, and hence have higher leverage. Similarly, risky firms with higher costs of financial distress should use less debt. In addition, high-growth banks (measured by the market-to-book ratio) use less debt financing to mitigate the agency conflict in the form of underinvestment problems. Finally, previous corporate finance studies have relatively converged that profitable firms tend to be less levered as they have sufficient internal funds needing less external financing.[6] Gropp and Heider (2010) test the related factors for explaining banks' capital structure. Consistent with the empirical corporate finance literature, Gropp and Heider (2010) show that, for banks, leverage is negatively correlated with market-to-book ratios, dividends, profits, risk, and, is positively related to size and collateral.

If corporate finance or buffer view explains the variation in capital structure of banks, we expect them to be significant in the regressions and the predicted effects of the explanatory variables on banks' leverage for both the corporate finance and the buffer views are summarized in the following Table.[7] As the table shows the signs for M/B, ROAA, size, and dividends are different significantly between the buffer view and corporate finance view.

	Buffer View	Corporate Finance
M/B	+	-
ROAA	+	-
Log (size)	-/+	+
Dividends	+	-
Risk	-	-

[6] See Rajan and Zingales (1995) Frank and Goyal (2008 and 2009).
[7] See Gropp and Heider (2010).

Collateral	+	+

2.2 Country Level Governance and Institutions

We follow the empirical corporate finance literature to include country level variables, which are likely to influence bank leverage.

2.2.1 Legal Systems

La Porta et al. (1998) argue that a country's legal system can affect the agency conflict between corporate insiders and external investors. They suggest that the substance of the law and timely enforcement mitigate agency conflicts. They also show that developed countries and the common-law system offer better protection for outsiders. Following Fan et al. (2012) and Bessler et al. (2013), we therefore expect that banks located in developed or common law countries will use more equity and hence have lower leverage.

In addition, corruption is suggested to shape a country's legal system (e.g., Djankov et al., 2003). Fan et al. (2012) argue that the perceived corruption level in a country reflects the integrity and enforceability of the law. Following Fan et al. (2012), we focus on corruption as the abuse of public office for private gain, measured by the Corruption Perception Index (CPI), which measures the level of corruption perceived to exist among public officers and politicians. We reverse the index, so the CPI index determines a value from 0 to 10. The higher the index score, the higher the level of corruption. Fan et al. (2012) argue that debt is used more when the corruption is higher in public sector and hence we expect that banks in more corrupt countries have higher leverage.

We also investigate the enforcement of debt contracts. Djankov et al. (2008) show that the legal structure which identifies the resolution of default is different across countries. In countries with weak enforcement codes or no bankruptcy codes, creditors have problems in retrieving the

collateral of distressed firms or in seizing them (e.g., Claessens et al., 2001; Claessens and Klapper, 2005). In line with the corporate finance literature, the existence of a transparent bankruptcy code for deferred debt payments and firm reorganization encourages firms to issue more debt, especially long-term debt. Therefore, we expect that banks will have lower leverage in countries with a lack of explicit bankruptcy codes. We follow Djankov et al. (2008) and use a dummy variable equal to 1 for countries in which insolvent firms are most likely to undergo reorganization proceedings, and 0 otherwise. Similarly, we expect that better protection of creditors will have a positive impact on bank leverage, as creditors are more willing to provide debts. Following Djankov et al. (2007), we use the creditor right index. The higher the index score, the higher the level of creditor protection.

2.2.2 Tax Systems

Tax is one of the factors which have been recognized to be important in firms' capital structure since the irrelevance propositions of Modigliani and Miller (1958). Accordingly, we expect that tax possibly determines banks' capital structure if they optimize their capital structure like non-financial firms. We employ the Miller tax ratio (1977), using the tax gain from leverage, to control for a country's tax system. Following Fan et al. (2012), we calculate the Miller tax ratio for each country and year, taking into account corporate income tax and personal income tax on interest and equity. The tax gain from leverage is calculated as 1 - [(after tax value of dividends)/ (after tax value of interest)], using statutory tax rates. The tax gain from leverage can be positive or negative. Countries located in a dividend tax relief system, where divided payments are taxed at a reduced rate at the personal level, have negative values for tax gain. The tax gain from leverage is zero under a full dividend imputation tax system, in which shareholders pay taxes on the personal level of distributed income, but receive full tax credit for the corporate taxes paid on this distributed

income. In the classical tax system, in which shareholders pay personal taxes on distributed income in addition to the corporate taxes paid on this income, the tax gain from leverage is positive. We expect that banks located in countries with such a tax system, where the tax gain from leverage is positive, use more debt.

2.2.3 Country Factors

We also control for bond and equity market development. De Jong et al. (2008) argue that in the developed bond market firms have more leverage, as they have more options for borrowing, and lenders are more willing to provide debt, while in the developed stock market, firms have lower leverage, as they face lower costs of issuing equity. Therefore, we expect that banks will have higher leverage if they are located in countries with bond market development (measured by public bonds over GDP). In contrast, with the development of the stock market (measured by the logarithm of a country's number of listed companies), banks face lower costs of issuing equity; we therefore expect that banks will be induced to reduce their leverage.

Moreover, deposit insurance is in use in many countries to protect depositors, which reduces the risk of bank runs. We expect that banks located in countries with deposit insurance will have higher leverage, as they are less risky. For this purpose, we follow Demirguc-Kunt et al. (2005) and use a dummy variable equal to one if bank deposits are at least partially explicitly insured by the government, and 0 otherwise. To proxy for the supply of funds to banks, we use the logarithm of domestic savings for each country We expect that banks located in countries with large domestic savings need less external financing, and hence have lower leverage.

Finally, we control for other macroeconomic conditions including crisis, inflation, and GDP growth (e.g., Fan et al., 2012; De Jong et al., 2008; Demirguc-Kunt and Maksimovic, 1999). We

control for crisis by a dummy equal to 1 if the time is between 2007 and 2010; zero otherwise. Inflation is measured as an annual percentage change in the average consumer price index. GDP growth is the annual percentage change of gross domestic products.

3. Data and Descriptive Statistics

We collected data for the largest 350 banks from *Bankscope*. As we required stock price and dividend data from DataStream, we could not identify three banks in other databases. Our final sample therefore included 347 global banks, for which we had accounting, share price and other data. All the systematically important banks (29) are included in the sample.[8]

The primary source of our bank-level data is *Bankscope*, which we used to obtain data on banks' consolidated balance sheets and income statements. The country level data was collected from five sources: *Economic and Social Data Service*, *International Financial Statistics*, *World Development Indicators*, *World Bank* and *Financial Development and Structure Dataset*. The information about taxes was obtained from the *OECD tax database*, *Price Waterhouse Coopers*, *Doing Business*, and *Ernst Young*. We follow Demirguc-Kunt et al. (2005), Djankov et al. (2008), and Djankov et al. (2007) to collect data on deposit insurance, bankruptcy code, and creditor rights, respectively.[9] Table 1 shows the number of banks and bank-year observations across countries in our sample.

[Insert Table 1 here]

[8]The list of Globally Systemically Important Financial Institutions (G-SIFIs) includes 17 European, 8 US, 3 Japanese, and 1 Chinese bank. The Bank of America, Bank of China, Bank of New York Mellon, Banque Populaire CE, Barclays, BNP Paribas, Citigroup, Commerzbank, Credit Suisse, Deutsche Bank, Dexia, Goldman Sachs, Crédit Agricole, HSBC, ING Bank, JP Morgan Chase, Lloyds Banking Group, Mitsubishi UFJ FG, Mizuho FG, Morgan Stanley, Nordea, Royal Bank of Scotland, Santander, Société Générale, State Street, Sumitomo Mitsui, UBS, Unicredit Group, and Wells Fargo are those listed.

[9] See Appendix 1 for details on data sources and definitions.

Table 2 provides descriptive statistics. We compare our descriptive statistics to those of Gropp and Heider (2010) for a sample of large banks, and Fan et al. (2012) for a sample of listed non-financial companies across 39 countries. For our bank sample, the market-to-book ratio is close to one, which is similar to Gropp and Heider (2010). The results show that banks hold less tangible assets than non-financial companies, as banks' tangibility of assets are 1% versus 33% of book assets for non-financial firms (Fan et al., 2012).

The results for other variables are relatively consistent with Gropp and Heider (2010) for a typical sample of banks across 16 countries. Mean (median) total assets are $17.50 ($17.21) billion. Collateral, measured by liquid securities over total assets, is about 30% of assets. Table 1 also shows that nearly 93% of banks pay dividends. The mean (median) profitability of banks is 0.00 (0.01). Banks' mean (median) book leverage is 0.77 (0.82) and mean (median) market leverage is about 0.84 (0.91). However, non-financial companies have lower debt ratios, as mean (median) book leverage for non-financial companies in Fan et al. (2012) is 0.29 (0.22). Rajan and Zingales (1995) and Frank and Goyal (2009) also find relatively similar mean (median) leverage.

Figures 2 and 3 present the book and market median leverage by country for the period from 1998 to 2012, respectively. As can be seen in both figures, the highest five book leverage ratios are observed in Belgium, Germany, the Netherlands, Ireland and the United Kingdom, while Norway, France, Austria and Portugal have the highest market leverage ratios. Portugal is also among the countries with the highest leverage for non-financial companies, as reported by Fan et al. (2012). Indonesia has the second highest median leverage for non-financial companies in Fan et al. (2012), while its median leverage for banks is displayed in the last 7 countries with the lowest median leverage.

Table 2 also presents descriptive statistics of all the variables. Deposit insurance, bankruptcy code, creditor rights, corruption index, and developed and common law are constant across time, while all remaining variables show time-series variation. All variables are defined in Appendix 1, along with their sources.

[Insert Table 2 and Figures 2 and 3 here]

We compute pairwise correlation coefficients for the dependent and independent variables in Table 3. The overall results suggest that market-to-book ratio and size are positively related to both book and market leverage, while profitability, measured by ROAA, is negatively related to leverage. For country level variables, the results show that banks in more developed economies, with explicit bankruptcy codes and stronger creditor rights, have higher leverage. Common law systems and low levels of corruption are associated with lower leverage. GPD growth rates and inflation are negatively related to leverage. Moreover, banks in countries with larger domestic savings and developed bond and stock markets tend to have higher leverage.

[Insert Table 3 here]

4. Methodology

We use the following equation to test the corporate finance vs buffer view of capital structure:

$$Leverage_{i,j,t} = \begin{cases} \alpha + \beta\ M/B_{i,j,t-1} + \ \gamma\ ROAA_{i,j,t-1} + \delta\ \log(Size)_{i,j,t-1} \\ \theta\ \text{Collateral}_{\text{i,j,t}-1} + \vartheta Dividends_{i,j.t-1} + \\ C_j + C_t + \varepsilon_{i,j,t} \end{cases} \quad \ldots\ldots\ldots (1)$$

The dependent variable is market leverage. We use book leverage as an alternative measure of debt. The explanatory variables are the market-to-book ratio (*M/B*), return on average assets (ROAA), the log of total assets (*Size*), collateral (*Collateral*) and a dummy for dividend paying banks (*Div*), for bank *i* in country *j* in year *t* (see Appendix 1 for a definition of the variables). All

these variables are lagged by one year, except the dividend dummy. Time (c_t) and country (c_j) fixed effects are included in the regression to account for unobserved heterogeneity at the country level and across time, which might be correlated with the independent variables. Following Petersen (2009), we employ cluster adjusted standard errors at the bank level to account for heteroscedasticity and serial correlation of errors.

We define book leverage as one minus the ratio of book value of the equity-to-book value of assets. We define market leverage as one minus the ratio of the market value of equity to the market value of the bank. Both of the dependent variables include both debt and non-debt liabilities, such as deposits. We use leverage instead of debt, following Gropp and Heider (2010). The logic for using leverage rather than debt is that leverage is better defined than debt (see Welch, 2011). Leverage magnifies the sensitivity of equity to the underlying performance of the firm, especially for a bank. Debt and non-debt liabilities (both parts of leverage) are not explicitly differentiated in the corporate finance literature. However, there are a few exceptions, which include the theoretical contribution by Diamond (1993), and the empirical work by Barclay and Smith (1995) and Rauh and Sufi (2010). As argued in Gropp and Heider (2010), since by construction leverage includes everything except equity, it can be readily linked to the regulatory view of banks' capital structure. Nonetheless, as deposit accepting institutions, there are differences in banks' capital structure and non-banks' capital structure. We therefore examine two major components of the sources of financing: deposit and non-deposit liabilities.

To decompose banks' leverage we use the following equation:

$$Financing\ source_{i,j,t} = \begin{cases} \alpha + \beta\ M/B_{i,j,t-1} + \gamma\ ROAA_{i,j,t-1} + \delta\ \log(Size)_{i,j,t-1} \\ \theta\ \text{Collateral}_{i,j,t-1} + \vartheta Dividends_{i,j.t} \\ +C_j + C_t + \varepsilon_{i,j,t} \end{cases} \quad \ldots\ldots (2)$$

The dependent variable is either deposits (as a ratio of the market or book value of assets) or one minus deposits (as a ratio of the market or book value of assets). The explanatory variables are the market-to-book ratio (*M/B*), return on average assets (*ROAA*), the log of total assets (*Size*), collateral (*Collateral*) and a dummy for dividend paying banks (*Div*), for bank *i* in country *j* in year t (see Appendix 1 for a definition of the variables). All these variables are lagged by one year, except the dividend dummy. Time (c_t) and country (c_j) are fixed effects and are included in the regression to account for unobserved heterogeneity at the country level and across time that might be correlated with the independent variables. Following Petersen (2009), we employ cluster adjusted standard errors at the bank level to account for heteroscedasticity and serial correlation of errors.

5. Regression Results

5.1 Baseline Results: Buffer View vs Corporate Finance View

We follow Gropp and Heider (2010) and test the determinants of banks' leverage for our sample. It is worth mentioning that if capital requirements are a first-order determinant of banks' capital structure, the standard corporate finance determinants should have little or no explanatory power in determining banks' capital structure. We report the results of estimating Equation (1) in Table 4.

Table 4 shows the results for a sample of firms that are comparable in size with the banks in Gropp and Heider's (2010) sample. We report the results for both book and market leverage ratios to check whether the results are the same or different, as in Gropp and Heider (2010). We also report the coefficient elasticities and standard errors, which are adjusted for clustering at the bank level to account for heteroscedasticity and serial correlation of errors (Petersen, 2009).

All coefficients are statistically significant, except collateral, which is insignificant for the book leverage ratio, and dividends, which are not significant for market leverage. Unlike Gropp and Heider (2010), we find that the market-to-book ratio is positively and significantly associated with both market and book leverage ratios. However, our results are in line with a large cross-country study of non-financial firms by Bartram (2016), who shows that the market-to-book ratio is positively related to leverage.[10] Our results are in line with the buffer view that banks facing a higher cost of issuing equity should be less levered, as these banks need to hold capital buffers above the regulatory minimum to avoid the cost of issuing equity at short notice (Ayuso et al., 2004; Perura and Keppo, 2006). The cost of issuing equity is subject to asymmetric information. Banks with higher market-to-book ratios are either better known to outsiders and the market, have more financial slack, or can obtain a better price. Therefore, banks with higher market-to-book ratios can be expected to have lower costs of issuing equity, resulting in them having higher leverage ratios (Gropp and Heider, 2010).

Although our results are not in line with the most previous studies for non-financial firms (e.g., Rajan and Zingales, 1995; Frank and Goyal, 2008, 2009; Fan et al., 2012) using agency conflict in the form of the underinvestment problem (Myers, 1977), in that leverage is negatively related to the market-to-book ratio, we argue that banks with more growth opportunities use more debt to finance their growth options. Therefore, we propose that bank with high market-to book ratios may either, in line with the buffer view, hold discretionary capital to reduce the cost of issuing equity at short notice, or, within the corporate finance view, leverage use more debt.

The remaining variables have the same sign as shown in Gropp and Heider (2010), using the largest bank sample, and, as in the regressions of Rajan and Zingales (1995), Frank and Goyal

[10] While our sample consists of 57 countries over the years 1998-2012, Bartram's (2016) final sample consists of companies from 50 countries during the period 2002–2009.

(2009) and Fan et al. (2012), for firms' leverage. Consistently, we find that leverage ratios are positively related to size, measured by the logarithm of total assets, while they are negatively associated with profitability, measured by ROAA, supporting the corporate finance. Our results are consistent with Frank and Goyal (2015), Bartram (2016) and Eun and Wang (*2016*), who find a negative relationship between leverage and profitability. Our results, therefore, suggest that a pure regulatory view does not apply to banks' capital structure; rather, that corporate finance theory holds.

We also find that the elasticity of banks' leverage to all explanatory variables is relatively larger than the corresponding elasticity reported in Gropp and Heider (2010). For example, the elasticity of market (book) leverage to profitability, measured by ROAA, is -0.053 for our sample, compared to that of -0.018 in Gropp and Heider (2010). The overall results suggest that banks' capital structure is not only affected by the regulatory view, but also by the standard corporate finance view. Consistent with the corporate finance view, leverage decreases with profitability, suggesting that banks with greater internal funds are less likely to tap into the external capital market, and hence have lower leverage. The coefficients of size suggests that larger banks are more diversified, face lower costs of financial distress, and hence have higher leverage. Our results are relatively consistent with those of Brewer III et al. (2008), who find that size is negatively related to banks' equity ratios. However, they do not find strong evidence to support the impact of profitability on these ratios. Dividends are in line with the buffer view, but only for the book leverage ratio, which is more important for banks, since capital regulation is imposed on book, but not on market values (Gropp and Heider, 2010).

We also check the robustness of our results by including country and/or time fixed effects as well as risk.[11] The results are reported in Appendix 2 for space considerations.

[Insert Table 4 here]

5.2 Country Effects

As we propose that legal systems and country factors do affect banks' capital structure, we estimate the influence of country level explanatory variables in Table 5. Table 5 presents the results of both market (Models 1 and 2) and book (Models 3 and 4) leverage. The models fit the data very well, as the R^2 for banks is higher than non-financial firms in Fan et al. (2012), who investigate both the firm and country level variables on leverage. For market leverage, the R^2 is about 0.58, compared to 0.07 in Fan et al. (2012, Table 6), and, for book leverage, the R^2 is about 0.87, compared to 0.18 in Fan et al. (2012, Table 4).

The top half of Table 6 shows the coefficients of our bank-specific variables. The overall results suggest that the coefficients for the bank specific variables have the same sign in the regressions where country level variables are included, and are also generally consistent with

[11] We include either or both country and time fixed effects in regressions in Appendix 2. Models (1) and (5) do not control for time and country fixed effects for market and book leverage ratios, respectively. Models (2) and (6) control only for country fixed effects, while estimations (3) and (7) control only for time fixed effects using book and market leverage ratios as our dependent variables. Models (4) and (8) include both time and country fixed effects. The R^2 drops from 0.66 (Model 4) to 0.39 (Model 1) in market leverage. As crisis affects different countries in a different way, this effect is evident in R^2 when the country and time fixed effect is not included. However, R^2 remains relatively stable at 0.88 (Model 8) to 0.84 in book leverage when time and country fixed effects are excluded from Model 5. These results suggest that country or time fixed effects do not drive the fit of our regressions in book leverage regressions significantly, as R^2 is relatively similar across regressions for book leverage. Following Lemmon et al. (2008) and Booth et al. (2001), we include risk. For book leverage, the coefficients on risk are not statistically and economically significant across the different Models (5-8). For market leverage, risk is statistically significant in Models 1 to 3, but is no longer significant when both time and country fixed effects are included (Models 2 and 4). The insignificant coefficient of risk on book leverage and its positive impact on market leverage is not in line with standard corporate finance arguments, nor with empirical studies on firms' leverage (e.g., Lemmon et al., 2008; Welch, 2004). Gropp and Heider (2010) also find that risk significantly reduces banks' leverage, which is not consistent with our results shown in Table 5. The remaining coefficients are relatively similar, in particular Model (4), which includes both time and country fixed effects, to those reported in Table 4, where risk is omitted. Therefore, the results suggest that risk does not drive out the other variables.

individual leverage regressions without the country level variables, as shown in Tables 4 and Appendix 2. In Table 5, we also control for the effect of regulation by including regulatory Tier 1 capital (*Tier one*) as an additional independent variable. The estimated coefficients on Tier 1 capital are significantly and negatively related to leverage at both market and book values. The results suggest that capital requirements are of first order importance in determining the capital structure of banks.

The lower half of Table 5 shows the coefficients for country level variables. In contrast to Fan et al. (2012), we do not find evidence that economic development and the corruption index affect banks' leverage significantly. However, similar to Fan et al. (2012), we find that leverage is unrelated to inflation. Consistent with our hypotheses, we find that banks' leverage at both market and book values is higher in countries with an explicit bankruptcy code (Models 1 and 2) and lower in common law systems (Models 1, 3, and 4). We also find that banks have higher leverage during the crisis, as the dummy variable for the financial crisis (*crisis*) is positive and relatively consistent across models.

Since, in line with Gropp and Heider (2010), our results support the argument that banks may choose their capital structure like non-financial firms and hence standard determinants of firms' leverage can also drive banks' capital structure; we investigate the impact of tax on banks' leverage. Within corporate finance theory, leverage increases with the tax benefits of debt. Therefore, the high leverage of banks may suggest higher tax benefits of debt. Our results show that banks' leverage is higher in countries where the tax gain of leverage, measured by the Miller tax ratio, is positive. This evidence is in line with Fan et al. (2012), who find a significant and positive relationship between firms' leverage and tax ratios. The tax findings are in favour of the corporate finance argument, suggesting that we are able to support the standard corporate finance

view. We further analyse tax in section 5.4. In general, we find that results are relatively significant for market leverage. For example, consistent with our hypotheses, leverage is positively related to bond market development, measured by public bonds over GDP, and negatively related to stock market development, measured by the logarithm of the number of listed companies.

The overall results suggest that country level effects are important for banks, which is in line with the argument of Fan et al. (2012), who show that country level variables are important in explaining the capital structure of non-financial firms.

[Insert Table 5 here]

The analysis of country level institutional structures raises some endogeneity issues[12], since we expect banks and markets to develop ways that satisfy the financing needs of firms, as well as the preferences of investors. The inclusion of stock/bond market size may be questionable; these variables could be influenced by the capital structure choices of firms (banks). For example, in countries with a higher number of firms that require considerable amounts of equity capital, the stock market is likely to be larger. The same argument can be made with respect to measures of the tax system. For example, a country's overarching policy objectives may simultaneously drive tax rates and other fiscal and monetary policies that impact on bank financing decisions. Our bank level variable only models (Tables 4 and Appendix 2) show that the results are not driven by endogeneity, as the sign and significance of the bank level variables do not disappear after we include the country level and institutional variables (Table 5). To reconfirm, we include other country level variables without the size of the stock market, gross domestic savings and public

[12] We are not aware of any recent studies that have raised endogeneity concerns for analysing capital structure in similar settings to ours. For instance, Bessler et. al., (2013) and Fan et. al., (2012) use similar institutional variables for non-financial firms.

bond over GDP (Models 1 and 3, Table 5). We also run our regressions with other country level variables, but excluding the Miller tax ratio, and the results are similar.[13]

5.3 Legal Systems and Leverage

We now turn our attention to the differences in influence of country level variables between developed and developing economies. The legal structure is normally weak in developing countries. With weak legal structures in these economies, the role played by creditor rights and bankruptcy code is unclear. In particular, we examine if there is any difference in the country level and institutional variables between developing and developed countries. If there is, then where does it come from? With respect to variables such as creditor rights and bankruptcy codes having a first order effect through the banks' lending activity, we examine the impact of these two variables in details.

The results for the different impacts of creditor rights and bankruptcy codes on the capital structure of banks are reported in Table 6. When we partition the sample according to whether the countries are developed or developing, the results show that creditor rights are not significant in the developed countries sample. However, creditor rights are significant in the developing sample, showing that as creditor rights increase, leverage increases. In the presence of bankruptcy codes, leverage is higher in both the developed and developing samples. To further explore how bankruptcy codes and creditor rights influence each other in capital structure decisions, we estimate the equations in the high versus low creditor rights samples and in countries with explicit bankruptcy code versus those without. We find interesting results. Creditor rights and bankruptcy codes are positively related to leverage. On the other hand, countries with lower creditor rights and

[13] These results are not reported for the sake of brevity and are available upon request.

no bankruptcy codes are not significant, meaning that in countries with lower creditor rights, bankruptcy codes do not matter. When we partition the samples based on explicit bankruptcy codes we find similar results. We find that in countries with explicit bankruptcy codes, creditor rights are significant. These results taken together suggest that the overall investor protection environment represented by creditor rights and bankruptcy codes works in a complementary way, rather than as one based on substitutes. In all these regressions, M/B is positive and ROAA is negative, showing consistency with our baseline results.

[Insert Table 6 here]

5.4 Tax Systems and Leverage

In previous regressions, we use the Miller tax ratio (1977), using the tax gain from leverage to control for a country's tax system. We calculated the ratio for each country and year, taking account of corporate and personal income tax on interest and equity. However, we did not differentiate explicitly between different tax systems: the classical, the partial and the full dividend imputation. To examine the impact of taxes further, we use three samples: the classical, partial and full dividend imputation system. We expect that banks located in countries with the classical tax system, where the tax gain from leverage is positive, would use more debt compared to countries with other tax systems.

The results are reported in Table 7. For the classical tax system countries, the results show (Equation 1) that the gains from leverage positively influence the leverage of banks. While the effect is positive for the partial tax system countries, the coefficient is smaller compared to the classical tax system (0.036, t=3.21 for the classical, compared to 0.024, t=2.70 for the partial system). The results show that the full imputation system does not significantly relate to the

leverage choice for banks and that in the classical tax system, where the tax gain from leverage is positive, banks have more leverage compared to other tax systems.

In the classical tax countries, creditor rights and bankruptcy codes are positive and significant. This means that suppliers of credit weigh the benefit of tax more positively in the presence of the higher investor protection environments, e.g., creditor rights and bankruptcy codes. On the other hand, in full imputation system countries, neither of the creditor rights and investor protection variables are significant, showing that the suppliers of credit do not obtain much tax gain and hence the creditor rights protection environment is irrelevant. Again, M/B is positively and ROAA is negatively related to leverage, consistent with our previous findings.

[Insert Table 7 here]

5.5 Decomposing Leverage

Unlike firms' capital structure, banks' capital structure includes deposits which are the source of capital not available for firms. Therefore, this section decomposes bank liabilities into deposit and non-deposit liabilities. We report the results of estimating Equation (2) for deposit and non-deposit liabilities in Table 8.

The results in Table 8, Panel A, suggest that there are some significant differences between deposit and non-deposit liabilities at both market and book values. The market-to-book ratio is positive and significant for both the book and market values of non-deposit liabilities, but its sign is opposite for deposit liabilities at the market value and insignificant at book value. The signs of the coefficients in the leverage regression using non-deposit liabilities are the same as in previous leverage regressions in Table 4 , except profitability and risk. The negative coefficient of risk for non-deposit liabilities at both book and market values is in line with the studies on firms' leverage

(e.g., Titman and Wessels, 1998; Frank and Goyal, 2008, 2009). The positive relationship between non-deposit liabilities and profitability is in line with corporate finance theory, suggesting that profitable banks are less risky and hence have better access to debt market. This result is also consistent with Gropp and Heider (2010), who find that profitable banks use more non-deposit liabilities as they are less prone to default. Collateral becomes insignificant for either deposit or non-deposit liabilities. For deposit liabilities, size is positive and insignificant at the market value, while it is negative and significant at the book value. Risk has the opposite sign between deposit and non-deposit liabilities.

Although the R^2 is relatively similar across deposit and non-deposit liabilities using book and market values, the overall results suggest that the standard corporate finance argument works relatively better for non-deposit than deposit liabilities. The results for non-deposit liabilities are consistent with those of Fan et al. (2012), De Jong et al. (2008), and Demirguc-Kunt and Maksimovis (1999) for firms' leverage. Unlike non-deposit liabilities, dividends are positive and significant, supporting the notion that banks that pay dividends are expected to face lower costs of issuing equity at short notice because they are better known to the market (Gropp and Heider, 2010). In summary, our results suggest that standard corporate finance theory works better when banks use more non-deposit liabilities in their capital structure.

The estimates of the country level variables on deposit and non-deposit liabilities are reported in Panel B. The results show that, except for size, the estimated coefficients for banks' characteristics are no longer significant when the dependent variable is decomposed into deposit and non-deposit liabilities. The relatively insignificant estimated coefficients for bank level variables, at both market and book values, suggest that the country level variables are first-order determinants of banks' funding sources, as the standard corporate finance determinants have little

or no explanatory power in determining sources of banks' capital structure when we control for country-level characteristics. The magnitude and significance of country level variables suggest that country effects are more important for funding sources for banks.

Taking the results of Table 5 into account, our findings suggest that the standard corporate finance style regression works better for leverage itself than for the components of leverage. This is also more pronounced for the book leverage ratio, as the R^2 decreased from 0.86, in Table 5, to around 68-69% in regressions with deposit and non-deposit liabilities, as shown in Table 8. The signs of the estimated coefficients for the country-level variables are relatively the same as before for total leverage (market and book values) when the dependent variables is non-deposit liabilities. For non-deposit liabilities, the signs of the coefficients of bankruptcy code, common law, deposit insurance, and public bonds to GDP are opposite, while for deposit liabilities, the coefficients have the same signs as for total leverage. Interestingly, in line with the corporate finance view, our results provide strong evidence that tax is positively related to deposit liabilities, while its impact is weak for non-deposit liabilities.

The overall results suggest that the legal environment has an important impact on banks' leverage and its components. Our findings show that banks in common law countries with greater domestic savings and an explicit deposit insurance have lower leverage; in particular, they have lower deposit liabilities but greater non-deposit ones. At the same time, banks in countries with explicit bankruptcy codes, a higher corruption index, higher growth rates, and developed bond and stock markets, tend to use lower non-deposit liabilities. These results are qualitatively similar at both market and book values.

[Insert Table 8 here]

5.6 Tier I capital and leverage

We investigate whether the same variables that explain leverage of banks explain the tier I capital. In particular, we identify the effects of Tier 1 capital ratios in Table 9. Column two in Table 9 shows the results for Tier 1 capital as the dependent variable. The results are considerably consistent with those reported for leverage in Table 4 and Appendix 2.

In line with Gropp and Heider (2010), we estimate the following regression to examine banks whose capital is close to the regulatory minimum, *Close*:

$$Leverage_{i,j,t} = \alpha + \beta X_{i,j,t-1} + \gamma X_{i,j,t-1} * Close_{i,j,t-1} + C_j + C_{t_t} + \varepsilon_{i,j,t} \ldots\ldots\ldots\ldots (3)$$

where the dependent variable is book leverage. We use two definitions of *Close;* a dummy that is equal to one if a bank's Tier 1 capital ratio is less than the capital requirement in accordance with Basel II (0.08) in column four, and less than the sample median (0.094) in column six in the previous year. We use the sample median as an alternative threshold because of the lower number of observations for banks with Tier 1 capital of less than 8%. The results of the two ratios are qualitatively similar. All the coefficients on interaction variables ($X_{i,j,t-1} * Close_{i,j,t-1}$) are insignificant, except risk and dividends. Risk is positive and significant only for banks below 0.094 Tier 1 capital, while the relationship between risk and leverage is significantly weak for banks close to the regulatory minimum (8%). Dividends are positive and significant for both levels of capital requirements. Consistent with Gropp and Heider (2010) who argue that banks are less levered if they face a higher cost of issuing equity, our results confirm that dividend paying banks have higher leverage as they are expected to have a lower cost of issuing equity at short notice. Our results suggest that regulation is matter for banks which hold their capital close to their capital requirements.

[Insert Table 9 here]

5.7 Speed of Adjustments and Regulations

Following Flannery and Rangan (2006), who show that, according to the partial adjustment model of firms' leverage, firms do have target capital structures and adjust toward them, we attempt to ascertain whether their model also extends to banks' capital structure. The results based on both book and market values of leverage are reported in Table 10, where standard errors are clustered at the bank level to account for heteroscedasticity and serial correlation of errors. We use the fixed effects model, as pooled OLS underestimates the speed of adjustment (Flannery and Rangan, 2006).

The results show that for market leverage in Model (1) the speed of adjustment is $\lambda=1-0.707=0.293$, as compared to that of book leverage in Model (4), $\lambda=1-0.629=0.371$, and is thus economically significant. Adding firm level characteristics in Models 2 and 5, the speed of adjustment increases to 0.506 and 0.537 for market and book leverage respectively, which are greater than the 0.380 for non-financial firms in Flannery and Rangan (2006). Our speed of adjustment coefficients are even higher than Gropp and Heider (2010), which they estimated as 0.45. The economically significant speed of adjustment provides evidence against the regulatory view of banks, which asserts that banks should converge to a common target.

Next, we estimate the speed of adjustment by considering regulatory Tier 1 capital (*Tierone*) as an additional explanatory variable in Models 3 and 6 for market and book leverage, respectively. The results show that adding regulatory capital does not affect the speed of adjustment significantly for the market value of leverage in Model 3. The speed of adjustment increases only by 2.8 percentage points (from 0.506 to 0.534). However, the results are different

when we use the book value of leverage in Model 6, suggesting that the speed of adjustment decreases from 0.537 to 0.467 (6.1 percentage points). The results suggest that the effect of regulation is relatively more visible for book leverage. Since the effect of regulation is more visible in the case of book leverage (Gropp and Heider, 2010), the speed of adjustment decreases as a result of holding of Tier 1 capital. This suggests that holding regulatory capital decreases the speed of adjustment to a certain degree. Thus, it is very important to consider regulatory capital when estimating the speed of adjustment for the capital structure of banks. The coefficients of the explanatory variables keep the same sign as in Tables 5 and Appendix 2, except for risk (*Risk*), which is significantly negative when using market leverage.

[Insert Table 10 here]

5.8 Robustness Checks

In this section, we perform a series of sensitivity analysis tests to check the robustness of our results. Notably, we use an alternative sample period as well as alternative sample compositions.

5.8.1 Financial Crisis

The recent financial crisis was an exogenous shock to most countries and the supply of bank credit was interrupted. As a robustness check, we examine the impact of financial crisis on different factors affecting leverage. We report the sensitivity of our analyses with regard to the financial crisis of 2007 in Table 11. Akhigbe et al. (2012) argue that the recent crisis caused weak returns and a higher bank risk in general. In particular, they find that although banks' stock price declined significantly during the financial crisis, those with more capital experienced more severe declines. Therefore, our different results compared to those of Gropp and Heider (2010) might

suggest that they are driven by the impact of financial crisis. To address this issue, we rerun our regressions with and without the crisis period and the results are reported in Table 11.

Panel A shows the results for market and book leverage. Our results are qualitatively similar for bank characteristics, except that when we exclude the financial crisis period, market leverage is independent of size and collateral. Bank leverage is positively related to market-to-book ratios (*M/B*), size, and collateral, and, negatively related to profitability. The similarity in sign and significance of the estimated coefficients for bank leverage to corporate finance view suggests that the buffer view does not completely apply to banks' capital structure. After controlling for country factors, the results did not change significantly, except that when the dependent variable is market leverage, there are some differences related to creditor rights and deposit insurance, which are not surprising as an impact of financial crisis. Creditor rights are negatively related to leverage during the crisis, while positively associated with leverage in the non-crisis period. The results are relatively similar for deposit insurance, which is negative and significant in the crisis, but insignificant in the non-crisis period. A few countries, such as Canada, were not adversely affected by the financial crisis at all. On the other hand, some countries were also affected by financial crises before 2007; for example some East Asian countries were severely impacted by the Asian Flu outbreak after 1997. Against this background, we include appropriate dummy variables according to the dates of financial crises, as well as the countries involved. However, the results remain qualitatively the same. We do not report these results in order to save space.

In Panel B, we use the market values of deposit and non-deposit leverage, and in Panel C, we use their book values. In both panels, the results are qualitatively similar, suggesting that whenever an estimated coefficient is significant, it has the opposite sign for deposit and non-deposit liabilities. In Panel B, the overall results for crisis and non-crisis periods are similar, except the

market-to-book ratio (*M/B*), return on average assets (*ROAA*), and Tier 1 capital (*Tierone*). The market-to-book ratio is no longer a significant explanatory variable for either component of leverage when we exclude the financial crisis period. In contrast, Tier 1 capital is insignificant for both deposit and non-deposit liabilities during the crisis period. The coefficient of return on average assets is only significant for the market values of non-deposit liabilities.

In Panel C, when the dependent variable is non-deposit liabilities, the signs of the estimated coefficients are the same as before for total leverage (Panel A), apart from collateral and Tier 1 capital, which are no longer significant. Moreover, the results for the crisis and non-crisis periods are relatively similar, except the market-to-book ratio and Tier 1 capital. The coefficients on Tier 1 capital are insignificant for both components of leverage in the crisis period. The market-to-book ratio is positive and significant when the dependent variable is non-deposit liabilities in the crisis period, but negative and insignificant in the non-crisis period. These results are reversed when the dependent variable is deposits.

[Insert Table 11 here]

5.8.2 Alternative Sample Compositions

We assess if our results are sensitive to sample selections. In Table 12, panel A, we report the results for bank leverage based on market values in Europe and developed countries in Models (1) and (2) respectively. These results are qualitatively similar to our baseline results. As our results persists in both the EU and developed economy subsamples, it may be a product of a changing regulatory environment, changing structures in banks or the financial crisis. In Model (3), we re-estimate our regression for the period 1998-2004 to investigate the determinants of banks' market leverage under the Basel I regulatory regime in Model (3). In summary, our results are qualitatively

similar, suggesting that they are not driven by the European and developed countries sample, nor the Basel I regulatory regime, the changing structure of banks or the financial crisis. Our results are also robust with the book values of leverage in Models (4)-(6).

In Panel B, we replicate our regressions for source of financing, deposit- and non-deposit liabilities, based on market values for the European sample (Model 1), developed countries (Model 2), and sample period 1998-2004 (Model 3). The coefficients have the same sign as in our results documented in Table 6, suggesting that standard corporate finance theory works better when banks use more non-deposit liabilities in their capital structure. We repeat all the robustness checks based on book values in Models (4)-(6) and our results are qualitatively similar.

[Insert Table 12 here]

6. Conclusions

In this paper we investigate the determinants of banks' capital structure. Our sample includes 347 large banks across 57 countries from 1998 to 2012. We provide evidence that banks' capital structure is determined by the country in which they are located. In particular, in line with Bessler et al. (2013) and Fan et al. (2012), who find that the institutional environment plays an important role in non-financial firms' leverage, we show that banks in countries with bankruptcy codes and deposit insurance have higher leverage. Moreover, banks' leverage is lower in common law and corrupt countries. These findings are consistent with the previous literature on the significance of the legal system, the protection of investor rights, and resolution of financial distress (Fan et al., 2012; Djankov et al., 2008; Claessens et al., 2001; La Porta et al., 1997, 1998). Consistent with the corporate finance argument and the findings of Fan et al. (2012) for non-financial firms, we

find that banks use more debt in the classical tax system where the tax gain from leverage is positive. These results are relatively consistent at both book and market values.

Interestingly, our results suggest that the overall investor protection environment represented by creditor rights and bankruptcy codes is complementary, rather than one based on substitution. In the classical tax countries, suppliers of credit weigh the benefit of tax more positively in the presence of higher creditor rights and bankruptcy codes. On the other hand, in full imputation system countries, the suppliers of credit do not obtain much tax gain and hence the creditor rights protection environment is irrelevant. These results are consistent with the empirical literature on firms' leverage (e.g., De Jong et al., 2008; Demirguc-Kunt and Maksimovis, 1999). We do not find significant evidence to support the impact of creditors' rights and bond market development. Our results suggest that market leverage is negatively related to the development of stock markets, which is in line with the argument that costs of equity are lower in countries with developed stock markets, resulting in lower leverage (De Jong et al., 2008).

Examining the composition of banks' leverage without including the country level data, the results are qualitatively similar to those of leverage, apart from the market-to-book ratio, which is weakly related to deposit liabilities. However, when we control for country level characteristics, the estimated coefficients do not remain significant, except the coefficient of the market-to-book ratio for non-deposit liabilities at the market value and the coefficient on size, which is positive and significant for non-deposit liabilities, but negative for deposits at both market and book values. Therefore, the failure of banks' characteristics to determine the shift away from deposits towards non-deposit liabilities supports the role of regulation in banks' sources of finance.

As a robustness check, we rerun our regressions for crisis and non-crisis periods. While not all of our results hold across all sub periods, some of the results are significantly strong. For example,

we find that market leverage is independent of size and collateral when we exclude the financial crisis period, while other estimated coefficients, including market-to-book ratios, return on average assets, and Tier 1 capital, are very strong and robust across the sub periods. The overall results for bank characteristics are relatively consistent for the book value of leverage. Moreover, the results do not change significantly for country effects across different periods, except that when the dependent variable is market leverage, there are some differences in creditor rights and deposit insurance. Creditor rights are negatively related to leverage during the crisis, while positively associated with leverage in the non-crisis period. The results are relatively similar for deposit insurance, which is negative and significant in the crisis, but insignificant in the non-crisis period. Tax is strongly and positively related to leverage in market and book leverage. Furthermore, corruption, stock market development, and domestic savings are strong for market leverage in all sub periods.

Our paper broadly supports the corporate finance view on banks' capital structure. Our analysis may suffer from a number of limitations. We assume that banks are subject to the taxes of their country of registration, while many banks are international and have overseas income. Eun and Wang (2016) show that international sourcing has a negative effect on financial leverage, an issue that we do not address in this paper. Diamond and Rajan (2000) argue that banks' capital structure is mainly driven by the asset side of their balance sheet, which is also not examined in this paper. Moreover, we do not investigate managerial preference. For example, overconfident CEOs may feel their company's share price to be undervalued. They persistently perceive equity financing to be more mispriced than debt financing and hence are less likely to use equity (see Heaton, 2002). Malmendier et al. (2011) argue that the net effect of managerial overconfidence on leverage

depends on a manager's perceived financing costs and investment returns. Overall, the extent to which these factors will strengthen or alter our results should be a subject for further research.

References

Adam, T., Goyal, V.K., (2008), The investment opportunity set and its proxy variables. *Journal of Financial Research* 31, 41-63.

Allen, F., Carletti, E., and Marquez, R., (2011), Credit market competition and capital regulation, *Review of Financial Studies*, 24, 983-1018.

Akhigbe, A., Madura, J., and Marciniak, M., (2012), Bank capital and exposure to the financial crisis. *Journal of Economics and Business*, 64, 377-392.

Ayuso, J., Perez, D. and Saurina, J., (2004). Are capital buffers pro-cyclical? Evidence from Spanish panel data, *Journal of Financial Intermediation* 13, 249-264.

Barclay, M. and Smith, C., (1995), The priority structure of corporate liabilities, *Journal of Finance* 50, 899-917.

Barth, J., Caprio, G. and Levine, R., (2005), Rethinking Bank Regulation: Till Angels Govern, Cambridge and New York: Cambridge University Press.

Bartram, S. M., (2016), Corporate Post-Retirement Benefit Plans and Leverage, *Review of Finance* 20*,* Review of Finance , 575-629.

Berger, A., Herring, R., and Szegö, G., (1995) The role of capital in financial institutions, *Journal of Banking and Finance* 19, 393-430.

Bessler, W., Drobetz, W., Haller, R., and Meier, I., (2013), The international zero-leverage phenomenon, *Journal of Corporate Finance* 23 196–221.

Booth, L, Aivazian, V., Demirguc-Kunt, A., and Maksimovic, V., (2001), Capital structures in developing countries, *Journal of Finance* 56, 87-130.

Brewer III, E., Kaufman, G.G., and Wall, L.D., (2008), Bank capital ratios across countries: Why do they vary? *Journal of Financial Services Research* 34, 177–201

Campbell, J., and Hamao Y., (1995), Changing patterns of corporate financing and the main bank system in Japan, In The Japanese Main Bank System, M. Aoki and H. Patrick, eds. Oxford: Oxford University Press.

Claessens, S., Djankov, S., and Mody A., (2001), Resolution of financial distress: An international perspective on the design of bankruptcy laws. Washington, DC: World Bank Institute Development Studies.

Claessens, S., and Klapper, L.F., (2005), Bankruptcy around the world: Explanations of its relative use, *American Law and Economics Review* 7, 253–283.

De Jong, A., Kabir, R., and Nguyen T.T., (2008), Capital Structure around the World: the Roles of Firm- and Country-Specific Determinants, *Journal of Banking and Finance* 32 1954–1969.

Demirgüç-Kunt, A., and Maksimovic, V., (1996), Stock Market Development and Financing Choices of Firms, *Word Bank Economic Review* 10, 341–369.

Demirgüç-Kunt, A.,Karacaovali, B., and Laeven, L, (2005), Deposit insurance around the world: A comprehensive database. Working Paper, World Bank.

Demirguc-Kunt, A. and Maksimovic, V., (1998), Law, finance and firm growth, *Journal of Finance* 53, 2107-2137.

Demirgüc-Kunt, A. and Maksimovic, V., (1999), Institutions, financial markets, and debt maturity, *Journal of Financial Economics* 54, 295-336.

Diamond, D. and Rajan, R., (2000), A theory of bank capital, *Journal of Finance* 55, 2431-2465.

Diamond, D., (1993), Seniority and maturity of debt contracts, *Journal of Financial Economics* 53, 341-368.

Djankov, S., La Porta, R., Lopez-de Silanes, F., and Shleifer, A., (2008), The law and economics of self-dealing, *Journal of Financial Economics* 88, 430–465.

Djankov, S., La Porta, R., Lopez-de-Silanes, F., and Shleifer, A., (2003), Courts, *Quarterly Journal of Economics* 118, 453–517.

Djankov, S., McLiesh, C., and Shleifer, A., (2007), Private credit in 129 countries. *Journal of Financial Economics* 84, 299–329.

Eun, Cheol S. and Lingling Wang, (2016), International Sourcing and Capital Structure, *Review of Finance* 20,535-574.

Fama, E.F., and MacBeth, J.D., (1973), Risk, return, and equilibrium: Empirical tests, *Journal of Political Economy* 81, 607–636.

Fan, P.J., Titman, S., and Twite, G., (2012), An international comparison of capital structure and debt maturity choices, *Journal of Financial and Quantitative Analysis 47, 23-56.*

Flannery, M., (1994), Debt maturity and the deadweight cost of leverage: Optimally financing banking firms, *American Economic Review* 84, 320-33.

Frank, M.Z. and Goyal, V.K., (2015), The Profits–Leverage Puzzle Revisited, *Review of Finance* (2015) 19: pp. 1415–1453.

Frank, M.Z. and Goyal, V.K., (2009), Capital structure decisions: Which factors are reliably important? *Financial Management*, 38, 1-37.

Frank, M.Z. and Goyal, V.K., (2008) Trade-off and pecking order theories of debt, in: E. Eckbo (ed.). Handbook of Corporate Finance: Empirical Corporate Finance, Vol.2, Elsevier, Amsterdam, pp. 135-202.

Gatward, P., and Sharpe, I.G., (1996), Capital structure dynamics with interrelated adjustment: Australian evidence, *Australian Journal of Management* 21, 89–112.

Gropp, R., and Heider F., (2010), The determinants of Bank capital structure, *Review of Finance* 14, 587-622.

Heaton, J.B., (2002), Managerial optimism and corporate finance, *Financial Management* 31, 33-45.

Jensen, M.C. and W.H. Meckling, (1976), Theory of the firm: Managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 305-360.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny R., (1997), Legal determinants of external finance, *Journal of Finance* 52, 1131-1150.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., and Vishny R., (1998), Law and finance, *Journal of Political Economy* 106, 1113-1155.

Lemmon, M., Roberts, M., and Zender, J., (2008), Back to the beginning: Persistence and the cross-section of corporate capital structure, *Journal of Finance* 63, 1575-1608.

Malmendier, U., Tate, G., and Yan, J., (2011), Overconfidence and early-life experiences: the effect of managerial traits on corporate financial policies, *Journal of Finance* 66, 1687-1733.

Miller, M. H., (2007), Debt and taxes, *Journal of Finance* 32, 261–275.

Modigliani, F. and Miller, M., (1958), The cost of capital, corporation finance and the theory of investment, *American Economic Review* 48, 261-297.

Myers, S. and Rajan, R., (1998), The paradox of liquidity, *Quarterly Journal of Economics* 113, 733-771.

Myers, S.C. and Majluf, N., (1984), Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics* 13, 187-221.

Myers S.C., (1977), Determinants of corporate borrowing, *Journal of Financial Economics* 5, 147-175.

Myers, S.C, (1984), The capital structure puzzle, *Journal of Finance* 39, 575-92.

Petersen, M., (2009), Estimating standard errors in finance panel data sets: comparing approaches, *Review of Financial Studies* 22, 435-480.

Peura, S. and Keppo, J., (2006), Optimal bank capital with costly recapitalization, *Journal of Business* 79, 2162-2201.

Rajan, R. and Zingales, L., (1995), What do we know about capital structure? Some evidence from international data, *Journal of Finance* 50, 1421-1460.

Shyam-Sunder, L. and Myers, S., (1999), Testing static trade off against pecking order models of capital structure, *Journal of Financial Economics*, 51, 219-244.

Rauh, J. and Sufi, A., (2010), Capital structure and debt structure, *Review of Financial Studies* 23, 4242-4280.

Titman, S. and Wessels, R., (1988), The determinants of capital structure choice, *Journal of Finance* 43, 1-19.

Treisman, D., (2000), The causes of corruption: A cross-national study, *Journal of Public Economics* 76, 399-457.

Welch, I., (2011), Common flaws in empirical capital structure research, *International Review of Finance* 11, 1-17.

Table 1: The Sample Banks and Bank-Years across Countries

Country	Bank	Bank-years	Country	Bank	Bank-years
Australia	6	90	Kazakhstan	1	15
Austria	4	60	Korea republic of	3	45
Bahrain	2	30	Kuwait	2	30
Belgium	1	15	Malaysia	3	45
Bosnia and Herzegovina	2	30	Morocco	3	45
Brazil	4	60	Netherlands	2	30
Canada	9	135	Norway	2	30
Chile	5	75	Oman	1	15
China	16	240	Peru	1	15
Colombia	3	45	Philippines	1	15
Croatia	2	30	Poland	9	135
Cyprus	1	15	Portugal	4	60
Czech republic	1	15	Qatar	2	30
Denmark	3	45	Romania	1	15
Estonia	1	15	Russian federation	5	75
Finland	2	30	Saudi Arabia	6	90
France	16	240	Singapore	2	30
Germany	6	90	South Africa	2	30
Greece	6	90	Spain	12	180
Hong Kong	4	60	Sweden	4	60
Hungary	1	15	Switzerland	4	60
Iceland	1	15	Taiwan	3	45
India	28	420	Thailand	6	90
Indonesia	6	90	Turkey	8	120
Ireland	3	45	United Arab emirates	6	90
Israel	5	75	United kingdom	10	150
Italy	17	255	United states of America	17	255
Japan	69	1035	Vietnam	2	30
Jordan	1	15	**Total**	**347**	**5,205**

This table provides the number of banks and bank-year observations for each country. The sample consists of 347 banks across 57 countries from 1998 to 2012, resulting in 5,205 bank-year observations.

Table 2: Descriptive Statistics

Variables	Mean	SD	Median	Min	Max
Book leverage	0.928	0.035	0.938	0.803	0.982
Market leverage	0.878	0.116	0.919	0.454	0.996
Bookdep/TA	0.774	0.165	0.825	0.229	0.953
Market dep/TA	0.837	0.175	0.911	0.253	0.990
Book nondep/TA	0.154	0.165	0.083	0.010	0.697
Mktnondep/TA	0.163	0.175	0.089	0.010	0.747
Log Size ($ Bil)	17.505	1.576	17.213	10.656	21.843
Divdum	0.928	0.258	1.000	0.000	1.000
M/B	0.926	0.052	0.935	0.497	2.268
STDEV	0.569	0.402	0.475	0.094	1.913
ROAA	0.007	0.006	0.011	-0.042	0.036
Collateral	0.291	0.138	0.277	0.005	0.866
Tierone	0.101	0.035	0.094	0.043	0.233
Crisis	0.400	0.490	0.000	0.000	1.000
GDP growth	0.029	0.035	0.025	-0.057	0.120
Log GDS $ Bil	2.343	0.656	2.442	-1.067	3.585
log no of listed companies	2.945	0.637	3.009	0.845	3.927
deposit insurance	0.860	0.347	1.000	0.000	1.000
Bankruptcy code	0.660	0.474	1.000	0.000	1.000
Public Bond/GDP	0.616	0.509	0.429	0.016	2.189
Miller tax ratio	0.209	0.154	0.250	-0.330	0.550
Classical tax =1	0.566	0.496	1.000	0.000	1.000
Creditor rights	1.856	0.900	2.000	0.000	4.000
Corruption Index	0.677	0.468	1	0	1
Developed	5.913	2.054	6.2	1.7	10

This table provides the mean, standard deviation (SD), median, minimum, and maximum of each variable. The variables are defined in Appendix 1.

Table 3: Correlation Matrix

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Book leverage	1.00																							
2	Market leverage	**0.51**	1.00																						
3	Bookdep/TA	**0.11**	**0.04**	1.00																					
4	Market dep/TA	**0.10**	**0.07**	**-0.98**	1.00																				
5	Book nondep/TA	**-0.07**	**-0.04**	**0.98**	**-0.99**	1.00																			
6	Mktnondep/TA	**0.12**	**0.04**	**-0.92**	**0.95**	**-0.94**	1.00																		
7	M/B	**0.91**	**0.45**	**0.13**	**0.06**	**0.04**	**0.09**	1.00																	
8	ROAA	**-0.56**	**-0.52**	**-0.11**	-0.01	-0.01	**-0.05**	**-0.52**	1.00																
9	Log Size ($ Bil)	**0.29**	**0.26**	**-0.43**	**0.50**	**-0.48**	**0.46**	**0.25**	**-0.17**	1.00															
10	Collateral	**0.18**	**0.04**	**-0.08**	**-0.13**	**0.11**	**-0.13**	**-0.19**	0.03	**-0.26**	1.00														
11	STDEV	**0.04**	**-0.11**	**0.17**	**-0.16**	**0.16**	**-0.13**	**-0.06**	**-0.08**	**-0.09**	0.00	1.00													
12	Divdum	-0.03	-0.02	**-0.10**	**0.09**	**-0.10**	**0.09**	-0.01	**0.17**	-0.01	-0.01	-0.03	1.00												
13	Tierone	**-0.69**	**-0.45**	**-0.15**	-0.01	-0.02	-0.00	**-0.59**	**-0.50**	**-0.06**	**-0.26**	**-0.04**	**-0.05**	1.00											
14	Developed	**-0.21**	**-0.29**	**-0.06**	-0.02	-0.03	**-0.05**	**-0.19**	**-0.24**	-0.01	**-0.04**	**-0.04**	**-0.15**	**-0.31**	1.00										
15	Inflation	**-0.21**	**-0.24**	**-0.07**	-0.03	**-0.06**	**-0.04**	**-0.20**	**-0.12**	**-0.15**	**-0.13**	-0.02	**-0.16**	**-0.20**	**-0.23**	1.00									
16	Corruption Index	**-0.24**	**-0.37**	**-0.16**	**-0.20**	**-0.18**	**-0.19**	**-0.20**	**-0.24**	**-0.38**	**-0.14**	-0.01	**-0.16**	**-0.19**	**-0.33**	**-0.42**	1.00								
17	Creditor rights	**0.21**	0.03	**0.07**	-0.02	-0.03	-0.01	**0.22**	**-0.07**	**-0.04**	-0.03	-0.02	**-0.04**	**-0.07**	**-0.14**	-0.02	-0.03	1.00							
18	Bankruptcy code	**0.44**	**0.40**	**0.18**	**-0.09**	**-0.11**	**-0.11**	**-0.41**	**-0.32**	**-0.20**	-0.03	**-0.09**	**-0.16**	**-0.39**	-0.00	**-0.25**	**-0.36**	**-0.15**	1.00						
19	Miller tax ratio	**-0.30**	**-0.16**	**-0.16**	**0.10**	**-0.11**	**-0.07**	**-0.28**	**-0.26**	-0.06	-0.09	-0.08	-0.19	-0.30	-0.16	-0.33	-0.16	-0.01	-0.34	1.00					
20	common law	**-0.09**	**-0.14**	**-0.15**	**-0.13**	**-0.13**	**-0.06**	**-0.09**	**-0.18**	**-0.09**	**-0.11**	**-0.07**	**-0.05**	**-0.05**	**-0.10**	-0.02	**-0.03**	**-0.25**	**-0.16**	-0.01	1.00				
21	deposit insurance	**0.23**	**0.24**	**-0.14**	**0.19**	**-0.18**	**-0.13**	**-0.20**	**-0.28**	**-0.04**	**-0.08**	**-0.03**	-0.02	**-0.20**	**-0.24**	**-0.07**	**-0.11**	**-0.24**	**-0.07**	**-0.06**	**-0.18**	1.00			
22	Public Bond/GDP	**0.21**	**0.39**	**0.38**	**-0.35**	**0.36**	**-0.34**	**-0.18**	**-0.31**	**-0.06**	**-0.04**	**-0.12**	**-0.15**	**-0.10**	**-0.40**	**-0.29**	**-0.37**	-0.01	**-0.18**	**-0.36**	**-0.34**	**-0.24**	1.00		
23	Log GDS $ Bil	**-0.30**	**-0.40**	**-0.10**	**-0.04**	**-0.05**	**-0.09**	**-0.26**	**-0.28**	**-0.32**	**-0.06**	**-0.09**	**-0.15**	**-0.30**	**-0.29**	**-0.23**	**-0.23**	**-0.11**	**-0.37**	**-0.48**	**-0.06**	**-0.13**	**-0.53**	1.00	
24	GDP growth	**-0.16**	**-0.25**	**-0.07**	**-0.10**	**-0.10**	**-0.11**	**-0.14**	**-0.40**	**-0.21**	**-0.11**	-0.03	**-0.04**	**-0.11**	**-0.20**	**-0.12**	**-0.42**	-0.00	**-0.03**	**-0.11**	**-0.21**	**-0.31**	**-0.43**	**-0.14**	1.00

Table 3 provides a correlation matrix for our sample. Variables are defined in Appendix 1. Bold numbers are significant at 5% or better level.

Table 4: Buffer View vs Corporate Finance View

	Market Leverage	Book Leverage	Gropp and Heider (2010) Table 5, Column 2
M/B	0.731***	0.883***	-0.560***
SE	0.146	0.020	0.034
Elasticity	0.777	0.882	-0.683
ROAA	-4.794***	-0.105***	-0.298***
SE	0.641	0.045	0.097
Elasticity	-0.053	-0.001	-0.018
log(size)	0.017***	0.002***	0.006***
SE	0.003	0.0001	0.001
Elasticity	0.339	0.029	0.007
Collateral	0.109***	0.002	0.020*
SE	0.032	0.003	0.012
Elasticity	0.038	0.001	0.006
Dividends	0.005	0.003*	-0.019***
SE	0.011	0.002	0.004
Elasticity	0.005	0.003	-0.020
Constant	-0.026	0.080***	1.360***
SE	0.153	0.019	0.039
N	5,205	5,205	2,415
Adj R^2	0.39	0.85	0.79

The table shows the results of estimating the following regression for 347 banks across 57 countries from 1998 to 2012:

$$Leverage_{i,j,t} = \alpha + \beta M/B_{i,j,t-1} + \gamma ROAA_{i,j,t-1} + \delta \log(Size)_{i,j,t-1} + \theta \text{Collateral}_{i,j,t-1} + \vartheta Dividends_{i,j.t} + C_j + C_t + \varepsilon_{i,j,t}$$

The dependent variable is market leverage in column tw and book leverage in column three. The explanatory variables are the market-to-book ratio (*M/B*), return on average assets (*ROAA*), the log of total assets (*Size*), collateral (*Collateral*) and a dummy for dividend paying banks (*Div*) for bank i in country j in year t (see Appendix1 for the definition of variables). All these variables are lagged by one year except dividend dummy. Time (c_t) and country (c_j) fixed effects and are included in the regression to account for unobserved heterogeneity at the country level and across time that might be correlated with the independent variables. Following Petersen (2009), we employ cluster adjusted standard errors at the bank level to account for heteroscedasticity and serial correlation of errors.***, ** and * denote statistical significance at the 1%, the 5% and the 10% level, respectively.

Table 5: Determinants of Leverage-Country Effects

	Market Leverage				Book Leverage			
	(1)		(2)		(3)		(4)	
Dependent variable	Coef.	*t*	Coef.	*t*	Coef.	*t*	Coef.	*t*
Banks' variables								
M/B	0.433***	3.20	0.478***	3.31	0.710***	23.65	0.725***	22.59
ROAA	-3.443***	-6.53	-3.156***	-5.41	-0.082	-1.10	-0.225***	-3.42
Log(size)	0.007***	3.51	0.006***	2.60	0.001***	5.18	0.002***	4.11
Collateral	0.015	0.55	0.027	1.05	0.027***	6.29	0.019***	4.99
Risk	0.014***	2.61	0.006	1.12	0.000	-0.20	-0.001	-0.94
Tierone	-0.460***	-3.85	-0.444***	-3.74	-0.247***	-8.52	-0.205***	-7.81
Countries' variables								
Developed	0.002	0.26	-0.010	-0.91	-0.001	-0.57	-0.001	-0.80
Inflation	0.058	0.34	0.261	1.43	-0.005	-0.29	0.012	0.53
Corruption index	-0.126**	-2.05	-0.117	-1.58	-0.006	-0.68	-0.013	-1.27
Creditor rights	0.000	-0.02	0.002	0.34	0.002***	3.18	0.002**	2.50
Bankruptcy code	0.023**	2.55	0.015	1.54	0.003**	2.42	0.002	1.23
Miller tax	0.060**	2.51	0.040**	2.02	0.012***	3.25	0.010***	2.18
Common law	-0.025***	-2.69	-0.015	-1.30	-0.005***	-4.00	-0.006***	-3.87
Deposit insurance	-0.019	-1.59	-0.032**	-2.10	0.002**	2.13	0.003*	1.68
GDP growth	-0.154***	-2.68	-0.273***	-5.12	0.026***	2.59	0.034***	3.39
Crisis	0.042***	6.33	0.036***	5.45	0.001	0.70	0.002**	2.26
Log listed companies			-0.033***	-3.36			0.002	1.36
Log (GDS bil)			0.037***	3.62			-0.003**	-2.17
Public bond/GDP			0.018**	2.31			0.001	0.60
Cons	0.447***	3.46	0.437***	3.09	0.259***	8.47	0.243***	7.28
N		5,205		5,205		5,205		5,205
Adj R^2		0.58		0.57		0.87		0.86

The table shows the results of estimating the following regression for 347 banks across 57 countries from 1998 to 2012:

$$Leverage_{i,j,t} = \alpha + \beta M/B_{i,j,t-1} + \gamma ROAA_{i,j,t-1} + \delta \log(Size)_{i,j,t-1} + \theta \text{Collateral}_{\text{i,j,t}-1} + \vartheta Risk_{i,j.t-1} + \mu\, Tierone_{i,j,t-1} + \Omega Countrylevelvariables_{j,t} + \varepsilon_{i,j,t}$$

The dependent variable is market leverage in columns two and four, and book leverage in columns six and eight. The explanatory variables include both bank- and country-level variables which are defined in Appendix 1. Standard errors are clustered at the country level to account for heteroscedasticity and serial correlation of errors (Petersen, 2009).***,** and * denote statistical significance at the 1%, the 5% and the 10% level, respectively.

Table 6: Legal Systems and Leverage

	Developed	Developing	Creditor rights>median	Creditor rights<median	Bankruptcy code=1	Bankruptcy code=0
	(1)	(2)	(3)	(4)	(5)	(6)
M/B	0.674***	0.583***	0.619***	0.719***	0.708***	0.582***
	(4.20)	(3.28)	(4.34)	(4.43)	(5.51)	(4.27)
ROAA	-0.455***	-0.518***	-0.388***	-0.408***	-0.319***	-0.553***
	(-9.97)	(-6.80)	(-8.44)	(-4.96)	(-6.38)	(-8.16)
Log(size)	0.002***	0.002**	0.002***	0.001	0.001***	0.001*
	(7.06)	(3.07)	(7.25)	(1.09)	(6.14)	(2.06)
Collateral	0.021***	0.028***	0.027***	0.027***	0.022***	0.039***
	(7.06)	(4.59)	(9.65)	(4.09)	(7.72)	(6.51)
Dividends	0.004**	0.001	0.001	0.002	0.004**	-0.001
	(3.11)	(-0.19)	(0.80)	(1.05)	(3.08)	(-0.37)
Risk	-0.001	0.001	-0.001	-0.001	0.001	-0.001
	(-0.75)	(-0.21)	(-0.82)	(-0.33)	-0.19	(-0.59)
Tier one	-0.208***	-0.255***	-0.225***	-0.194***	-0.210***	-0.249***
	(-16.59)	(-11.12)	(-19.39)	(-6.96)	(-16.01)	(-11.87)
Inflation	0.042*	-0.004	0.026*	0.021	0.009	0.002
	(2.38)	(-0.20)	(1.99)	(0.54)	(0.47)	(0.09)
Corruption index	-0.077***	0.004	-0.014**	-0.041*	-0.017*	-0.012
	(-7.28)	(0.40)	(-2.70)	(-2.35)	(-2.41)	(-1.28)
Creditor rights	0.001	0.002*	--	--	0.002***	0.001
	(1.40)	(2.37)	--	--	(4.58)	(0.46)
Bankruptcy code	0.003***	0.006**	0.005***	0.002	--	--
	(3.55)	(2.97)	(6.01)	(0.93)	--	--
Miller tax	0.028***	0.012	0.004	0.033***	0.020***	0.001
	(6.86)	(1.17)	(0.90)	(3.42)	(3.60)	(1.67)
Common law	-0.012***	-0.002	-0.003**	-0.006**	-0.007***	0.001
	(-11.15)	(-1.21)	(-3.24)	(-2.64)	(-9.10)	-0.24
Deposit insurance	-0.005**	0.001	0.001	0.001	0.001	0.003
	(-3.19)	(-0.03)	(0.98)	(-0.01)	(0.94)	(0.92)
crisis	0.001	-0.005**	0.001*	-0.002	0.003***	-0.008***
	(0.86)	(-3.05)	(2.35)	(-0.94)	(4.86)	(-4.90)
constant	0.304***	0.376***	0.340***	0.274***	0.265***	0.388***
	(20.56)	(15.04)	(24.70)	(8.78)	(19.44)	(14.94)
Adj R^2	0.894	0.864	0.901	0.854	0.87	0.876
N	2229	1465	3315	1381	3251	1445

The table shows the results of estimating the following regression for 347 banks across 57 countries from 1998 to 2012:

$$Leverage_{i,j,t} = \alpha + \beta M/B_{i,j,t-1} + \gamma ROAA_{i,j,t-1} + \delta \log(Size)_{i,j,t-1} + \theta \text{Collateral}_{i,j,t-1} + \vartheta Risk_{i,j.t-1} + \mu\, Tierone_{i,j,t-1} + \Omega Countrylevelvariables_{j,t} + \varepsilon_{i,j,t}$$

The dependent variable is book leverage in developed, developing, countries with creditor rights greater than median (2), countries with creditor rights less than median, countries with explicit bankruptcy costs, countries without explicit bankruptcy codes in columns 1-6, respectively. The explanatory variables include both bank- and country-level variables which are defined in Appendix 1. Standard errors are clustered at the country level to account for

heteroscedasticity and serial correlation of errors (Petersen, 2009).$***$,$**$ and $*$ denote statistical significance at the 1%, the 5% and the 10% level, respectively.

Table 7: Tax system and Leverage

	Classical	Partial	Full Imputation
	(1)	(2)	(3)
M/B	0.685***	0.548***	0.667***
	(4.01)	(8.31)	(7.92)
ROAA	-0.455***	-0.442***	-0.645***
	(-9.37)	(-4.30)	(-6.41)
Log(size)	0.001***	0.001	0.002***
	(4.83)	(-0.22)	(3.50)
Collateral	0.028***	0.029**	0.011*
	(8.47)	(3.15)	(2.19)
Dividends	0.003*	0.017***	-0.002
	(1.96)	(4.47)	(-0.94)
Risk	-0.002**	0.001	0.001
	(-2.78)	(0.38)	(0.45)
Tier one	-0.206***	-0.296***	-0.168***
	(-14.66)	(-10.80)	(-6.16)
Developed	-0.003*	-0.001	0.001
	(-2.09)	(-0.33)	-0.54
Inflation	0.014	0.019	0.098**
	(0.74)	(0.75)	(3.11)
Corruption index	-0.024**	0.01	-0.047
	(-2.83)	(0.57)	(-1.74)
Creditor rights	0.003***	0.003*	-0.001
	(4.45)	(2.11)	(-1.30)
Bankruptcy code	0.004*	0.004	0.001
	(2.06)	(1.54)	(-0.18)
Miller tax	0.036**	0.027**	0.007
	(3.21)	(2.70)	(0.83)
Common law	-0.007***	-0.003	0.002
	(-7.09)	(-0.82)	(0.84)
Deposit insurance	0.001	0.002	0.002
	(0.04)	(0.62)	(0.59)
crisis	0.002*	-0.006**	-0.004**
	(2.06)	(-2.81)	(-3.02)
constant	0.286***	0.429***	0.311***
	(17.49)	(13.14)	(8.37)
Adj R^2	0.874	0.884	0.935
N	2124	1297	1254

The table shows the results of estimating the following regression for 347 banks across 57 countries from 1998 to 2012:

$$Leverage_{i,j,t} = \alpha + \beta M/B_{i,j,t-1} + \gamma ROAA_{i,j,t-1} + \delta \log(Size)_{i,j,t-1} + \theta \text{Collateral}_{\text{i,j,t-1}} + \vartheta Risk_{i,j.t-1} + \mu\, Tierone_{i,j,t-1} + \Omega Countrylevelvariables_{j,t} + \varepsilon_{i,j,t}$$

The dependent variable book leverage in classical, partial and full imputation system countries in Models 1-3, respectively. In the classical tax system, where shareholders pay personal taxes on distributed earnings in addition to the corporate taxes paid on those earrings, the tax gain from leverage is positive. Countries located in a dividend tax relief, where divided payments are taxed at a reduced rate at the personal level, have negative values for the tax gain. The tax gain from leverage is zero under a full dividend imputation tax system, where shareholders pay personal taxes on distributed income but receive full tax credit for the corporate taxes paid on these incomes. The explanatory variables include both bank- and country-level variables which are defined in Appendix 1. Standard errors are clustered at the country level to account for heteroscedasticity and serial correlation of errors (Petersen, 2009).$***$,$**$ and $*$ denote statistical significance at the 1%, the 5% and the 10% level, respectively.

Table 8: Financing Sources

Dependent variable	Market value				Book value			
	Non-deposit		Deposit		Non-deposit		Deposit	
	Coef.	*t*	Coef.	*t*	Coef.	*t*	Coef.	*t*
Panel A:Financing Sources								
M/B	0.542**	2.32	-0.447*	-1.83	0.524**	2.36	0.337	1.46
ROAA	2.043***	3.16	-3.016***	-3.71	2.741***	3.72	-2.951***	-3.88
Log (size)	0.053***	9.78	-0.065	-11.4	0.062***	11.64	-0.061***	-11.3
Collateral	0.031	0.37	0.004	0.04	0.006	0.07	-0.002	-0.02
Dividends	-0.081***	-3.66	0.092***	4.22	-0.082***	-4.08	0.088***	4.15
Risk	-0.036***	-2.79	0.042***	3.11	-0.040***	-3.16	0.039***	3.07
Cons	-1.275***	-5.20	2.364***	9.13	-1.401***	-5.90	1.510***	6.15
N		5205		5205		5205		5205
Adj R^2		0.317		0.353		0.370		0.354
Panel B: Financing Sources with Country-Level Variables								
Banks' variables								
M/B	0.548**	2.16	-0.355	-1.25	0.410	1.50	0.308	1.16
ROAA	-0.854	-1.61	0.355	0.54	-0.485	-0.81	0.257	0.42
Log(size)	0.032***	5.99	-0.039***	-7.46	0.039***	7.71	-0.037***	-7.43
Collateral	0.073	1.18	-0.024	-0.37	0.039	0.65	-0.022	-0.36
Risk	-0.005	-0.48	0.006	0.56	-0.006	-0.58	0.005	0.52
Tierone	-0.116	-0.55	0.127	0.54	-0.212	-0.98	0.010	0.05
Countries' variables								
Developed	-0.004	-0.14	-0.009	-0.32	0.004	0.17	-0.005	-0.20
Inflation	0.144	0.57	-0.354	-1.47	0.317	1.41	-0.308	-1.36
Corruption index	-0.570***	-4.14	0.702***	4.97	-0.665***	-5.01	0.654***	4.88
Creditor rights	0.018	1.49	-0.013	-1.10	0.013	1.18	-0.012	-1.07
Bankruptcy code	-0.080***	-2.73	0.092***	3.25	-0.085***	-3.16	0.087***	3.28
Miller tax	0.001	0.27	0.081**	2.12	-0.071**	-2.21	0.078**	2.19
Common law	0.033*	1.64	-0.047**	-2.03	0.041*	1.89	-0.048**	-2.19
Deposit insurance	0.123***	5.31	-0.133***	-4.70	0.129***	4.88	-0.127***	-4.87
GDP growth	-0.246**	-2.36	0.249***	2.36	-0.211**	-2.16	0.250**	2.46
Crisis	0.024***	2.72	-0.025***	-2.63	0.023**	2.56	-0.021**	-2.39
Loglisted companies	-0.097***	-2.98	0.090***	2.66	-0.082**	-2.55	0.084***	2.65
log (GDS bil)	0.079***	3.15	-0.076***	-2.87	0.068***	2.74	-0.072***	-2.89
Public bond/GDP	-0.128***	-6.96	0.145***	7.14	-0.137***	-7.15	0.139***	7.27
Cons	-0.747***	-2.78	1.636***	5.52	-0.695***	-2.46	0.945***	3.41

N	5205	5205	5205	5205
Adj R^2	0.637	0.681	0.689	0.690

The table presents the results for financing sources. Panel A shows the results of estimating the following regression for 347 banks across 57 countries from 1998 to 2012:

$$Financingsource_{i,j,t} = \alpha + \beta M/B_{i,j,t-1} + \gamma ROAA_{i,j,t-1} + \delta \log(Size)_{i,j,t-1} + \theta \text{Collateral}_{\text{i,j,t}-1} + \vartheta Dividends_{i,jt} + \varepsilon_{i,j,t}$$

The dependent variable is either deposit- or non-deposit liabilities based on market and book values. The explanatory variables include both bank- and country-level variables which are defined in Appendix 1. Panel B shows the results of estimating the following regression for 347 banks across 57 countries from 1998 to 2012:

$$Financingsource_{i,j,t} = \alpha + \beta M/B_{i,j,t-1} + \gamma ROAA_{i,j,t-1} + \delta \log(Size)_{i,j,t-1} + \theta \text{Collateral}_{\text{i,j,t}-1} + \vartheta Risk_{i,j.t-1} + \mu\, Tierone_{i,j,t-1} + \Omega Countrylevelvariables_{j,t} + \varepsilon_{i,j,t}$$

The dependent variable is either deposit- and non-deposit liabilities. The explanatory variables include both bank- and country-level variables. All variables are defined in Appendix 1

Table 9: Tier I capital and Leverage

	Book leverage					
	Tier 1 capital		Close is <0.08		Close is < median (0.094)	
	coef	*t*	coef	*t*	coef	*t*
M/B	-0.591***	-10.36	0.766***	12.89	0.741***	13.34
*M/B*Close*			0.002	0.10	0.023	0.97
ROAA	0.298*	1.83	0.092	0.23	-0.345	-0.92
*ROAA*Close*			-0.279	-0.69	0.100	0.27
Size	0.000	0.12	0.002*	1.79	0.003**	2.32
*Size*Close*			0.000	-0.02	-0.002	-1.26
Collateral	0.090***	7.48	0.018	1.54	0.005	0.46
*Collateral*Close*			-0.007	-0.55	0.007	0.061
Dividends	-0.007	-1.61	-0.011***	-3.90	-0.006	-1.66
Dividends*Close*			0.006***	2.52	0.004**	2.08
Risk	0.001	0.43	-0.003	-1.09	-0.008*	-1.76
Risk*Close			0.004	1.36	0.008*	1.88
Cons	0.624***	11.58	0.197***	4.05	0.206***	4.79
Adj R^2		0.465		0.736		0.719
N		5205		5205		5205

The table shows the results of estimating 347 banks across 57 countries from 1998 to 2012. The results of column two where the dependent variable is the regulatory Tier 1 capital ratio is for the following regression:

$$Tier\ One_{i,j,t} = \alpha + \beta M/B_{i,j,t-1} + \gamma ROAA_{i,j,t-1} + \delta \log(Size)_{i,j,t-1} + \theta \text{Collateral}_{i,j,t-1} + \vartheta Dividends_{i,j.t-1} + C_t + \varepsilon_{i,j,t}$$

The explanatory variables include bank level variables,$X_{i,j,t-1}$, which are defined in Appendix 1. Columns four and six report the results for the following estimation:

$$Leverage_{i,j,t} = \alpha + \beta X_{i,j,t-1} + \gamma X_{i,j,t-1} * Close_{i,j,t-1} + C_j + C_{t_t} + \varepsilon_{i,j,t}$$

The dependent variable is book leverage. The explanatory variables of both estimations include bank level variables, $X_{i,j,t-1}$, which are defined in Appendix 1. The interaction dummy *Close* is equal to 1 if a bank's Tier 1 capital ratio is below 8% (column four) and below 9.4% (column six) in the previous year. Standard errors are clustered at the country level to account for heteroscedasticity and serial correlation of errors (Petersen, 2009).***, ** and * denote statistical significance at the 1%, the 5% and the 10% level, respectively.

Table 10: Speed of Adjustment

	Market Leverage			Book Leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
Market Leverage $_{t-1}$	0.707***	0.494***	0.466***			
	(48.15)	(26.78)	(23.44)			
Book Leverage $_{t-1}$				0.629***	0.463***	0.524***
				(41.77)	(9.44)	(11.52)
M/B		0.182***	0.336***		0.117**	0.087**
		(2.66)	(4.24)		(2.55)	(2.04)
ROAA		-0.186	-0.306**		0.06*	0.036
		(-1.37)	(-1.94)		(1.87)	(1.17)
Log(size)		0.040***	0.050***		0.003***	0.002***
		(13.90)	(15.09)		(5.29)	(3.21)
Collateral		0.031	0.070		0.010***	0.036***
		(0.23)	(0.81)		(2.64)	(9.57)
Risk		-0.006*	-0.006*		-0.001	0.000
		(-1.89)	(-1.91)		(-1.50)	(-0.20)
Tierone			-0.360***			-0.306***
			(-6.53)			(-26.93)
constant	0.264***	-0.086	-0.065	0.343***	0.443***	0.576***
	(20.57)	(-1.00)	(-0.66)	(24.54)	(21.43)	(28.82)
Adj R^2	0.496	0.466	0.471	0.781	0.808	0.836
N	5205	5205	5205	5205	5205	5205
Fraction of Variance due to Bank FE	0.324	0.752	0.799	0.481	0.701	0.706

The table shows the results of estimating the following regression for 347 banks across 57 countries from 1998 to 2012:

$$Leverage_{i,j,t} = \alpha + (\lambda\beta)X_{i,j,t-1} + (1-\lambda)Leverage_{i,j,t-1} + C_j + \varepsilon_{i,j,t}$$

The dependent variable is market leverage in Models 1-3 and book leverage in Models 4-6. $X_{i,j,t-1}$ which contains the same explanatory variables: market-to-book ratio (*M/B*), return on average assets (ROAA), the natural logarithm of total assets (*Size*), collateral (*Collateral*) (all lagged by one year), risk and Tier 1 capital (see Appendix 1 for the definition of variables). λ represents the speed of adjustment (see Flannery and Rangan, 2006, for a derivation of the model). The regression includes bank fixed effects (c_j) to account for unobserved heterogeneity at the bank level that may be correlated with the explanatory variables. Standard errors are clustered at the bank level to account for heteroscedasticity and serial correlation of errors (Petersen, 2009). ***, ** and *denote statistical significance at the 1%, the 5% and the 10% level, respectively.

Table 11: The Financial Crisis and Leverage

	Crisis		Non-crisis		Crisis		Non-crisis	
	Coef	*t*	Coef	*t*	Coef	*t*	Coef	*t*
Panel A: Dependent variable-Market and book leverage								
	Market Leverage				Book Leverage			
M/B	0.456***	3.63	0.722***	2.91	0.724***	20.95	0.693***	15.52
ROAA	-3.970***	-4.66	-1.395***	-2.99	-0.232**	-2.48	-0.200***	-2.86
Log(size)	0.009***	5.09	-0.004	-0.96	0.002***	3.14	0.001***	3.26
Collateral	-0.025	-0.94	0.173***	3.71	0.025***	4.87	0.014***	2.78
Risk	0.003	0.69	0.007	0.97	-0.001	-0.65	0.000	-0.20
Tierone	-0.386***	-3.45	-0.632***	-3.24	-0.221***	-6.85	-0.191***	-6.24
Developed	0.004	0.33	-0.065***	-2.67	-0.001	-0.44	-0.006***	-3.06
Inflation	0.841***	4.95	-0.476*	-1.84	0.039	1.28	-0.045	-1.26
Corruption index	-0.143*	-1.90	-0.206*	-1.94	-0.018	-1.37	-0.012	-0.98
Creditor rights	-0.009**	-2.24	0.018**	2.16	0.001	1.32	0.002*	1.81
Bankruptcy code	0.011	1.19	0.015	0.91	0.003	1.35	-0.003	-1.65
Miller tax	0.104***	4.27	0.030***	2.53	0.034***	3.40	0.016***	3.23
Common law	0.002	0.16	-0.019	-0.95	-0.006***	-2.70	-0.005**	-2.34
Deposit insurance	-0.039**	-2.54	0.010	0.49	0.000	0.25	0.002	0.54
GDP growth	-0.246***	-4.25	-0.032	-0.18	0.034***	3.33	-0.028	-0.90
Log listed companies	-0.032***	-3.69	-0.035*	-1.79	0.001	0.51	0.007**	2.51
Log (GDS bil)	0.039***	3.69	0.042**	2.36	-0.001	-0.28	-0.006**	-2.30
Public bond/GDP	0.020***	3.01	0.032*	1.73	0.000	0.03	-0.001	-0.49
Cons	0.441***	3.34	0.324	1.32	0.246***	6.77	0.281***	6.20
Adj R^2		2082		2943		2082		2943
N		0.605		0.616		0.862		0.877
Panel B: Dependent variable-Deposit and non-deposit leverage (market values)								
	Non-deposit (market)				Deposit (market)			
M/B	0.744***	2.55	-0.085	-0.24	-0.586*	-1.74	0.180	0.45
ROAA	-1.805*	-1.83	0.229	0.61	0.613	0.48	-0.257	-0.55
Log(size)	0.033***	5.28	0.026***	4.13	-0.037***	-5.87	-0.037***	-5.81
Collateral	0.051	0.69	0.027	0.44	0.006	0.08	-0.017	-0.26
Risk	-0.006	-0.42	0.001	0.09	0.010	0.73	-0.009	-0.85
Tierone	-0.131	-0.53	-0.509**	-2.00	0.096	0.35	0.579**	2.03
Developed	0.014	0.53	-0.060	-1.25	-0.028	-1.07	0.064	1.38
Inflation	0.000	0.00	0.377	0.86	-0.081	-0.34	-0.761**	-1.96
Corruption index	-0.582***	-3.91	-0.731***	-4.83	0.703***	4.44	0.885***	5.79
Creditor rights	0.012	0.98	0.033*	1.74	-0.007	-0.50	-0.024	-1.38
Bankruptcy code	-0.070**	-2.56	-0.101**	-2.22	0.083***	2.97	0.112***	2.72

Miller tax	0.074*	1.84	0.124**	1.97	0.032	0.70	0.156**	2.32
Common law	0.031	1.11	-0.031	-1.38	-0.058*	-1.79	0.037	1.59
Deposit insurance	0.149***	5.67	0.080	1.63	-0.159***	-5.08	-0.071	-1.33
GDP growth	-0.282***	-2.78	-0.437	-1.18	0.292***	2.67	0.640*	1.69
Log listed companies	-0.099***	-3.31	-0.064	-1.26	0.092***	2.92	0.058	1.22
Log (GDS bil)	0.093***	3.51	0.060**	1.96	-0.100***	-3.43	-0.063**	-2.17
Public bond/GDP	-0.136***	-6.94	-0.158***	-6.42	0.156***	7.39	0.193***	7.39
Cons	-0.956***	-3.15	0.097	0.28	1.851***	5.32	0.898**	2.40
Adj R^2		0.645		0.659		0.670		0.736
N		2082		2943		2082		2943

Panel C: Dependent variable-Deposit and non-deposit leverage (book values)

	Non-deposit (book)				Deposit (book)			
M/B	0.632**	2.03	-0.121	-0.31	0.082	0.27	0.813**	2.12
ROAA	-0.770	-0.67	0.116	0.26	0.532	0.46	-0.316	-0.70
Log(size)	0.036***	6.14	0.037***	6.04	-0.034***	-5.86	-0.035***	-5.85
Collateral	0.007	0.10	0.029	0.46	0.015	0.21	-0.015	-0.24
Risk	-0.009	-0.70	0.007	0.73	0.009	0.67	-0.008	-0.76
Tierone	-0.174	-0.71	-0.654**	-2.38	-0.041	-0.17	0.463*	1.69
Developed	0.023	0.95	-0.062	-1.42	-0.023	-0.97	0.056	1.30
Inflation	0.048	0.22	0.695*	1.91	-0.011	-0.05	-0.740**	-2.00
Corruption index	-0.681***	-4.64	-0.815***	-5.60	0.665***	4.48	0.803***	5.42
Creditor rights	0.008	0.64	0.024	1.47	-0.007	-0.58	-0.023	-1.39
Bankruptcy code	-0.076***	-2.86	-0.105***	-2.70	0.079***	3.01	0.102***	2.64
Miller tax	-0.017	-0.40	-0.157**	-2.50	0.026	0.49	0.156**	2.14
Common law	0.047	1.58	-0.035	-1.58	-0.053*	-1.78	0.031	1.37
Deposit insurance	0.155***	5.27	0.074	1.47	-0.155***	-5.31	-0.072	-1.45
GDP growth	-0.257***	-2.58	-0.600*	-1.68	0.298***	2.88	0.573	1.60
Log listed companies	-0.084***	-2.82	-0.052	-1.14	0.085***	2.88	0.058	1.32
Log (GDS bil)	0.090***	3.33	0.054**	1.98	-0.092***	-3.38	-0.060**	-2.18
Public bond/GDP	-0.148***	-7.48	-0.178***	-7.18	0.149***	7.59	0.177***	7.16
Cons	-0.896***	-2.79	0.011	0.03	1.151***	3.63	0.270	0.75
Adj R^2		0.683		0.737		0.672		0.740
N		2082		2943		2082		2943

The table shows the results of estimating the following regression for 347 banks across 57 countries from 1998 to 2012:

$$Y_{i,j,t} == \alpha + \beta M/B_{i,j,t-1} + \gamma ROAA_{i,j,t-1} + \delta \log(Size)_{i,j,t-1} + \theta \text{Collateral}_{i,j,t-1} + \vartheta Risk_{i,j.t-1} + \mu\, Tierone_{i,j,t-1} + \Omega Countrylevelvariables_{j,t} + \varepsilon_{i,j,t}$$

In columns two and six, we report the results for the crisis period, while the results are reported without the crisis period in columns four and eight. In Panel A, the dependent variable is market leverage in columns two and four, and book leverage in columns six and eight. In Panel B, the dependent variable is market values of non-deposit liabilities

in columns two and four, and book values of deposit liabilities in columns six and eight. In Panel C, the dependent variable is book values of non-deposit liabilities in columns two and four, and book values of deposit liabilities in columns six and eight. The explanatory variables include both bank- and country-level variables. All variables are defined in Appendix 1. Standard errors are clustered at the country level to account for heteroscedasticity and serial correlation of errors (Petersen, 2009).***,** and * denote statistical significance at the 1%, the 5% and the 10% level, respectively.

Table 12: Determinants of Leverage and Funding Sources Using Different sub-Samples

	EU	Developed	Basel I (1998-2004)	EU	Developed	Basel I (1998-2004)
Panel A: Dependent variable-Market and book leverage						
	Market Leverage			Book Leverage		
	(1)	(2)	(3)	(4)	(5)	(6)
M/B	0.562***	0.780***	1.631***	0.652***	0.700***	0.659***
	(5.45)	(8.06)	(6.37)	(37.66)	(46.46)	(23.93)
ROAA	-3.301***	-4.001***	-2.230***	-0.580***	-0.601***	-0.396***
	(-3.03)	(-7.23)	(-5.26)	(-5.23)	(-6.43)	(-3.89)
Log(size)	0.002	0.001	-0.005	0.002***	0.002***	0.002***
	(1.00)	(0.67)	(-1.45)	(5.99)	(6.23)	(4.65)
Collateral	0.106***	0.058**	0.247***	0.025***	0.026***	0.013**
	(5.46)	(3.08)	(6.19)	(7.21)	(8.34)	(2.97)
Dividends	-0.030**	-0.024***	-0.094***	0.001	-0.001	0.001
	(-2.94)	(-2.62)	(-3.25)	(0.87)	(-0.81)	(0.10)
Risk	0.008	0.016**	0.003	-0.001	0.001	0.001
	(1.60)	(3.22)	(0.36)	(-0.82)	(-0.26)	(-0.28)
Tier one	-0.185*	-0.349***	-0.307	-0.237***	-0.250***	-0.198***
	(-2.14)	(-4.08)	(-1.81)	(-15.84)	(-18.41)	(-10.53)
Developed			0.008			-0.002
			-0.33			(-0.81)
Inflation	0.654***	-0.777***	-0.085	0.077**	-0.007	-0.089***
	(3.38)	(-6.45)	(-0.40)	(2.27)	(-0.37)	(-4.20)
Corruption index	0.245**	0.001	-0.254*	-0.043**	-0.054***	-0.018
	(2.77)	(0.02)	(-2.33)	(-2.79)	(-4.78)	(-1.50)
Creditor rights	0.003	0.006	0.029***	0.002***	0.001	0.002**
	(0.82)	(1.63)	(2.96)	(2.63)	(1.57)	(2.15)
Bankruptcy code	0.046***	0.023***	0.125***	0.002	0.004***	-0.003
	(5.38)	(3.74)	(8.48)	(1.46)	(4.44)	(-1.63)
Miller tax	0.174***	-0.019	0.157	0.014**	0.022***	0.046***
	(4.27)	(-0.66)	(1.38)	(2.11)	(5.02)	(3.81)
Common law	-0.101***	-0.028***	-0.067***	-0.018***	-0.013***	-0.004***
	(-10.71)	(-3.87)	(-4.36)	(-10.72)	(-10.96)	(-2.81)
Deposit insurance	-0.048***	0.001	-0.008	-0.005**	-0.002	-0.002
	(-3.31)	(0.09)	(-0.33)	(-2.00)	(-1.44)	(-0.69)
GDP growth	-0.348***	-0.379***	0.402*	-0.006	0.026*	-0.081***
	(-3.74)	(-4.39)	-1.91	(-0.35)	-1.85	(-3.39)
crisis	0.058***	0.064***		0.003**	0.003***	
	(12.53)	(13.74)		(3.24)	(3.91)	
Log listed companies	0.132***	0.021*	0.106**	0.021***	0.006***	0.014**
	(3.97)	(1.80)	(2.16)	(6.10)	(3.65)	(2.50)
Log (GDS bil)	0.113***	0.071***	0.098*	0.011***	0.002	0.016***
	(3.13)	(3.12)	(1.88)	(3.88)	(1.07)	(2.70)
Public bond/GDP	0.051***	0.007	0.049**	0.005***	0.001	0.001
	6.77	(0.97)	(2.47)	(3.92)	(1.22)	(0.17)
constant	0.297***	0.166	-0.688***	0.318***	0.280***	0.323***
	(2.65)	(1.62)	(-2.70)	(16.98)	(17.67)	(11.63)
Adj R^2	0.485	0.44	0.674	0.866	0.884	0.897

N	2465	3500	2429	2465	3500	2429

Panel B: Dependent variable-Deposit and non-deposit leverage

	Non-deposit	Non-deposit	Non-deposit	Deposit	Deposit	Deposit
	(1)	(2)	(3)	(4)	(5)	(6)
M/B	0.491***	0.344**	-0.424*	-0.485***	-0.339**	0.424*
	(3.44)	(2.26)	(-1.87)	(-3.46)	(-2.25)	(1.87)
ROAA	2.063***	1.369***	0.298	-2.090***	-1.400***	-0.298
	(4.88)	(3.25)	(0.76)	(-5.03)	(-3.35)	(-0.76)
Log(size)	0.031***	0.042***	0.030***	-0.031***	-0.042***	-0.030***
	(11.40)	(15.42)	(9.77)	(-11.60)	(-15.56)	(-9.77)
Collateral	0.097***	-0.003	0.096***	-0.104***	-0.002	-0.096**
	(3.41)	(-0.11)	(2.59)	(-3.71)	(-0.06)	(-2.59)
Risk	0.006	0.001	-0.003	-0.006	-0.001	0.003
	(0.84)	(0.09)	(-0.47)	(-0.87)	(-0.12)	(0.47)
Tier one	-0.091	-0.008	-0.372**	0.124	0.037	0.372**
	(-0.75)	(-0.06)	(-2.44)	(1.04)	(0.28)	(2.44)
Developed			-0.222***			0.222***
			(-5.31)			(5.31)
Inflation	1.414***	1.370***	2.225***	-1.404***	-1.362***	-2.225***
	(4.80)	(5.48)	(8.05)	(-4.85)	(-5.50)	(-8.05)
Corruption index	-0.235	-0.257**	-1.177***	0.247	0.257**	1.177***
	(-1.40)	(-2.19)	(-9.04)	(1.50)	(2.21)	(9.04)
Creditor rights	0.002	0.015***	0.070***	-0.002	-0.016***	-0.070***
	(0.26)	(2.77)	(6.92)	(-0.26)	(-2.85)	(-6.92)
Bankruptcy code	-0.021	-0.079***	-0.106***	0.021	0.079***	0.106***
	(-1.66)	(-7.00)	(-5.85)	(1.64)	(7.06)	(5.85)
Miller tax	0.450***	0.473***	-0.402***	-0.443***	-0.471***	0.402***
	(3.82)	(6.22)	(-2.90)	(-3.82)	(-6.26)	(2.90)
Common law	0.177***	0.008	0.083***	-0.175***	-0.008	-0.083***
	(7.71)	(0.53)	(3.92)	(-7.75)	(-0.48)	(-3.92)
Deposit insurance	0.117***	0.148***	0.256***	-0.117***	-0.148***	-0.256***
	(2.69)	(4.64)	(4.00)	(-2.72)	(-4.70)	(-4.00)
GDP growth	0.01	0.01	-0.375	-0.004	-0.006	0.375
	(0.10)	(0.08)	(-1.45)	(-0.04)	(-0.05)	(1.45)
crisis	0.033***	0.082***		-0.033***	-0.082***	
	(4.09)	(11.16)		(-4.13)	(-11.26)	
Log listed companies	-0.437***	-0.112***	-0.301***	0.436***	0.112***	0.301***
	(-13.29)	(-8.06)	(-6.81)	(13.48)	(8.12)	(6.81)
Log (GDS bil)	0.166***	0.045**	0.291***	-0.165***	-0.044**	-0.291***
	(5.55)	(2.32)	(7.05)	(-5.62)	(-2.30)	(-7.05)
Public bond/GDP	-0.01	-0.125***	-0.044**	0.011	0.124***	0.044**
	(-0.85)	(-15.75)	(-2.54)	(0.89)	(15.89)	(2.54)
constant	-0.113	-0.766***	0.354	1.104***	1.759***	0.646**
	(-0.68)	(-4.77)	(1.37)	(6.81)	(11.07)	(2.50)
Adj R^2	0.782	0.719	0.753	0.787	0.723	0.753
N	2465	3500	2429	2465	3500	2429

The table shows the results of estimating the following regression for 347 banks across 57 countries from 1998 to 2012:

$$Y_{i,j,t} == \alpha + \beta M/B_{i,j,t-1} + \gamma ROAA_{i,j,t-1} + \delta \log(Size)_{i,j,t-1} + \theta \text{Collateral}_{\text{i,j,t-1}} + \vartheta Risk_{i,j.t-1} + \mu\, Tierone_{i,j,t-1} + \Omega Countrylevelvariables_{j,t} + \varepsilon_{i,j,t}$$

In columns two and five, we report the results for the European banks. The results for banks in developed countries are reported in columns three and six. Columns four and seven report the results for Basel 1 (1998-2004). In Panel A, the dependent variable is market leverage in Models 1-3, and book leverage in Models 4-6. In Panel B, the dependent variable is market values of non-deposit liabilities in Models 1-3, and book values of deposit liabilities Models 4-6. The explanatory variables include both bank- and country-level variables which are defined in Appendix 1. Standard errors are clustered at the country level to account for heteroscedasticity and serial correlation of errors (Petersen, 2009).***,** and * denote statistical significance at the 1%, the 5% and the 10% level, respectively.

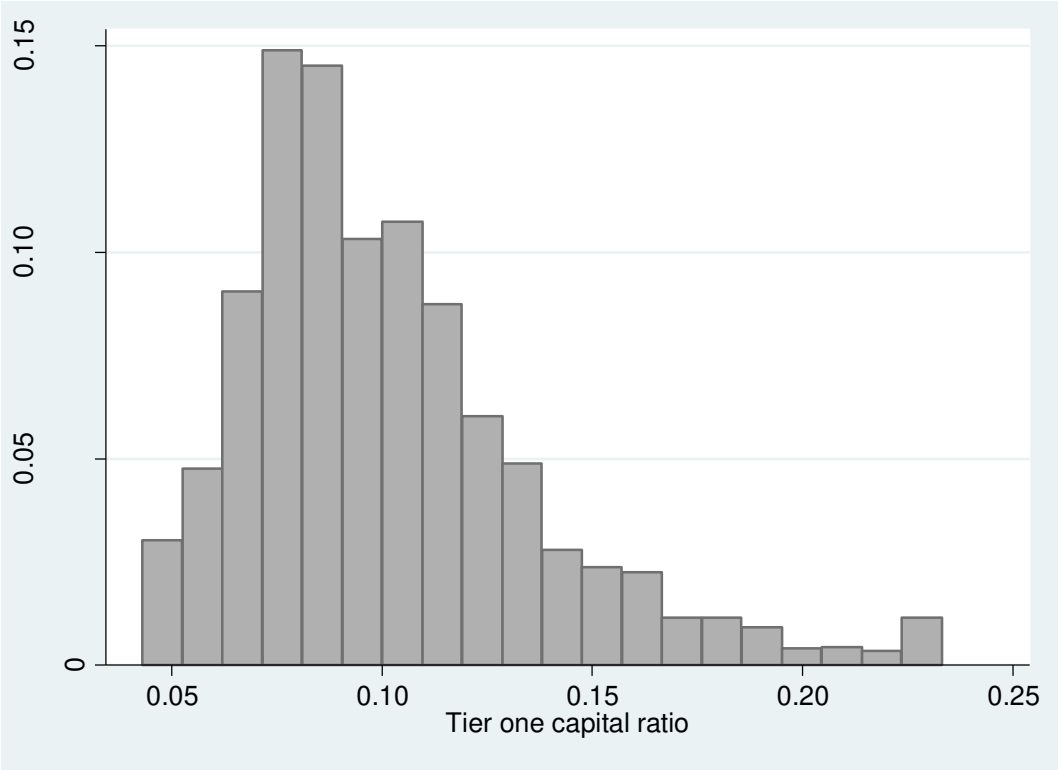

Figure 1. This figure plots the Tier one capital ratio as risk weighted assets across 57 countries over 1998-2012 period.

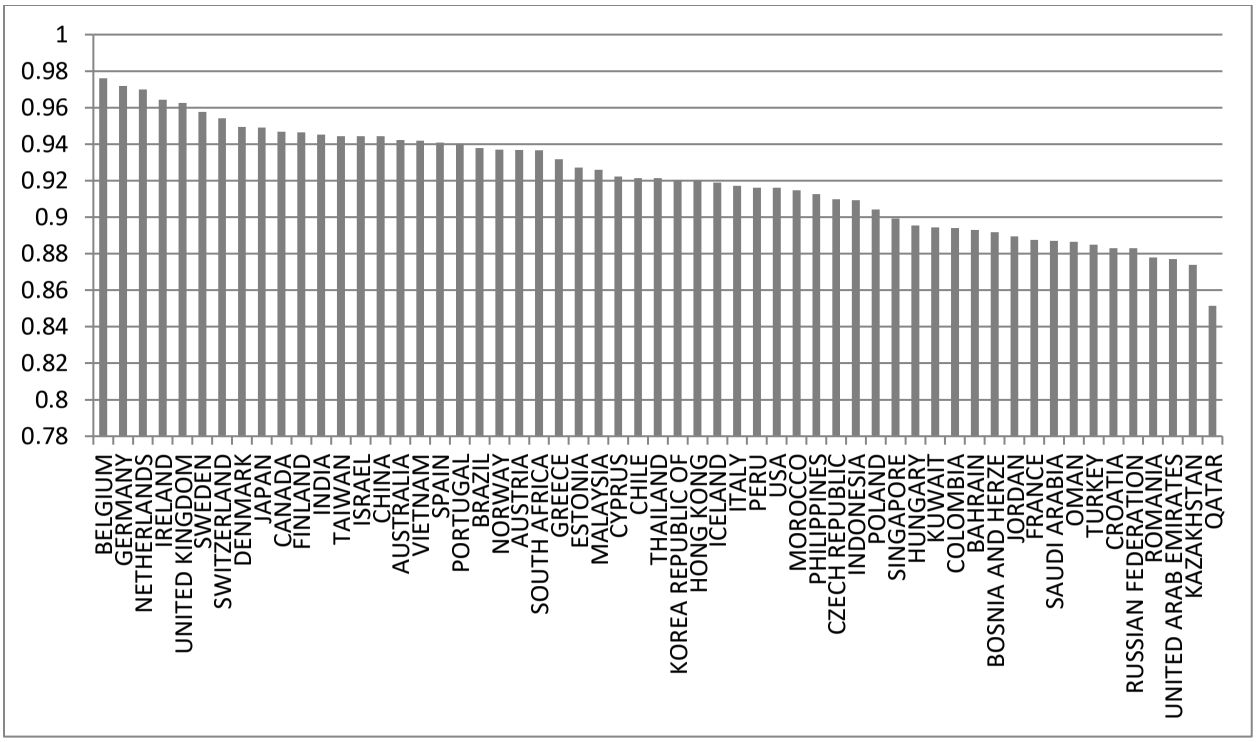

Figure 2: Median Book Leverage of Sample Banks (1998-2012)

This figure plots the median book leverage ratio across 57 countries. The book leverage ratio is measured as 1-(book value of equity/ book value of assets).

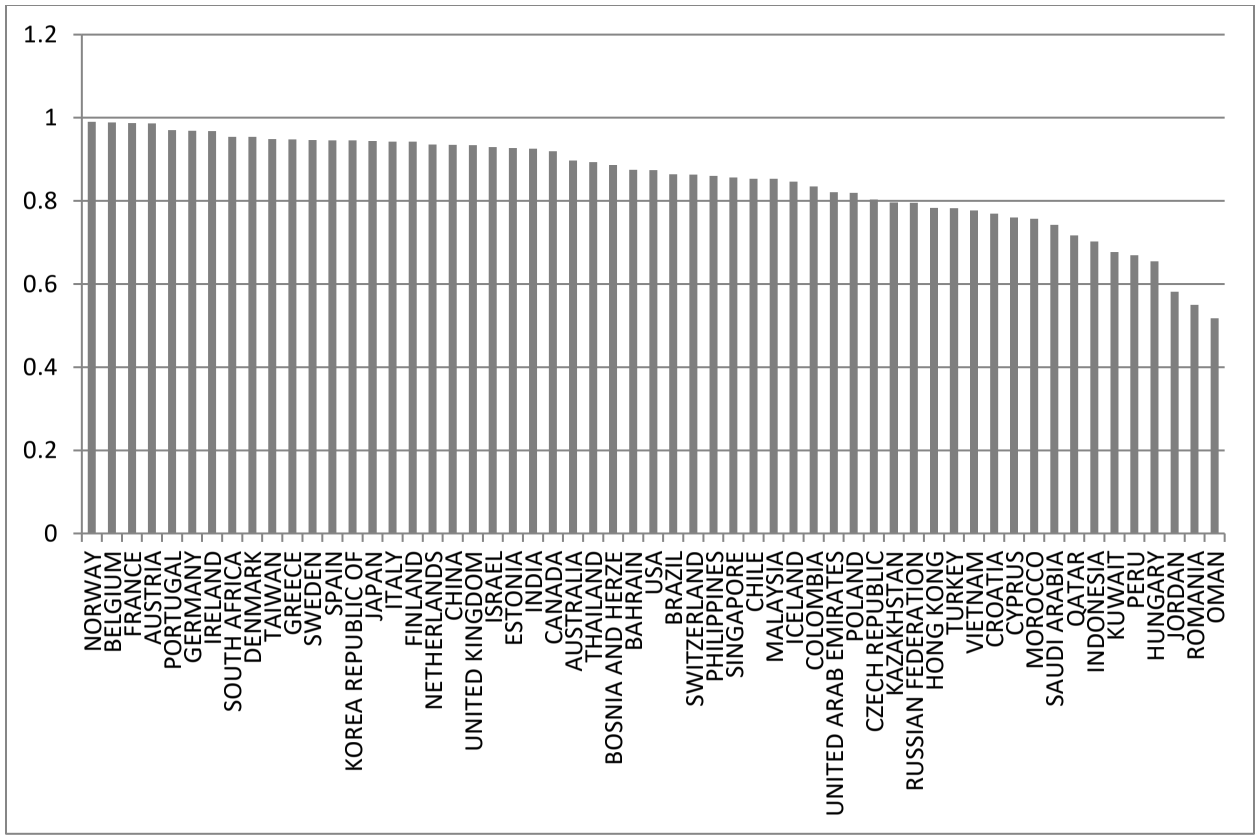

Figure 3: Median Market Leverage of Sample Banks (1998-2012)

This figure plots the median market leverage ratio across 57 countries. The market leverage ratio is measured as 1-(market value of equity (= number of shares*end of year stock price)/ market value of bank (= market value of equity+ book value of liabilities)).

Appendix 1: Definition of Variables

Variable	Description	Source
Book leverage	1- (book value of equity / book value of assets)	Bankscope
Market leverage	1- (Market value of equity (=number of shares * end of year stock price) / market value of bank (=market value of equity + book value of liabilities))	Bankscope
Log (size)	Book value of total assets	Bankscope
Collateral	(Total securities+treasury bills+other bills+bonds+CDs+cash and due from banks+land and buildings+other tangible assets)/book value of assets	Bankscope
ROAA	Net Income / book value of average assets	Bankscope
M/B	Market value of assets / book value of assets	Bankscope
	(total securities + treasury bills + other bills + bonds + CDs + cash and due from banks + land and buildings + other tangible assets) / book value of assets	Bankscope
Dividends	Dummy equal to one if the bank pays a dividend in a given year	Bankscope
Risk	Annualised standard deviation of daily national stock market index return*(market value of equity/market value of bank)	
Deposits (Book)	Total deposits / book value of assets	Bankscope
Deposits (Market)	Total deposits / market value of asset (see above)	Bankscope
Non-deposit liabilities (Book)	Book leverage – deposits (Book)	Bankscope
Non-deposit liabilities (Market)	Market leverage – deposits (Market)	Bankscope
GDP growth	Annual percentage change of gross domestic product	World Development Indicators, World Bank
Inflation	Annual percentage change in average consumer price index	Economic and Social Data Service, International Financial Statistics
Tier one	Regulatory Tier 1 calculated as Tier 1 capital divided by risk weighted assets	Bankscope
Deposit insurance	Dummy variable equal to 1 if bank deposits are insured by government.	Demirguc-Kunt et al. (2005)
Bankruptcy code	A proxy for the existence of an explicit bankruptcy code, measured as a dummy variable equal to 1 if an insolvent firm is most likely to undergo a reorganization proceeding	Djankov et al. (2008)
Public bond/GDP		World Development Indicators, World Bank, Financial Development and Structure Dataset
Miller tax	Estimate of the miller tax ratio equal to (1 - [(after tax value of dividends)/(after tax value of interest)]) calculated using statutory tax rates	OECD tax database, Price Waterhouse Coopers, Doing Business, Ernst Young
Classical tax	dummy equal to one if the bank is located in the classical tax system	OECD tax database, Price Waterhouse Coopers, Doing Business, Ernst Young

Crisis	Dummy equals 1 if t=2007-2010, zero otherwise	
Log listed companies	Logarithm of acountry's number of listed companies	
Log (GDS bil)	Logarithm of a country's domestic savings	
Creditor rights	Creditor rights index	Djankov et al. (2007)
Corruption index	An index ranges from 0 to 10, with larger value indicating more severe corruption	Corruption Perception Index, Transparency International
Developed	Dummy equal to one if a country is classified as developed according to the World Bank classification based on countries' gross national income level	World Development Indicators, World Bank
Common law	Dummy equal to one if a country adopts the common law system	Treisman (2002) and Djankov et al. (2007)

This table provides definitions and data sources of variables. We follow Gropp and Heider (2010) and Fan et al. (2012) in our definition of variables.

Appendix 2: Time and Country Fixed Effects

	Market Leverage				Book Leverage			
Dependent variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
M/B	0.613***	0.212	0.884***	0.607***	0.881***	0.774***	0.870***	0.771***
t	4.23	0.91	6.02	2.71	41.41	28.81	40.91	27.37
ROAA	-5.032***	-3.425***	-5.869***	-3.508***	-0.165**	0.126	-0.230***	0.039
t	-7.76	-5.12	-8.68	-5.14	-2.11	1.35	-2.86	0.40
log(size)	0.013***	0.011***	0.003	-0.002	0.001***	0.002***	0.002***	0.002***
t	4.54	3.25	1.10	-0.72	5.79	3.97	5.64	4.29
Collateral	0.087***	0.046	0.047*	0.063*	0.002	0.011**	0.001	0.009**
t	3.07	1.27	1.75	1.87	0.61	2.49	0.43	2.23
Dividends	0.007	-0.024**	-0.032***	-0.003	-0.003*	-0.002	0.002	-0.002
t	0.65	-2.31	-3.05	-0.35	-1.70	-0.82	1.31	-0.78
Risk	0.021***	0.001	0.028***	0.008	-0.001	-0.001	-0.000	-0.001
t	2.88	0.25	4.56	1.49	-0.90	-1.28	-0.26	-0.65
Constant	0.149	0.552**	-0.033	0.336	0.085***	0.188***	0.092***	0.188***
t	1.01	2.32	-0.23	1.52	4.23	7.33	4.68	7.11
N	5,205	5,205	5,205	5,205	5,205	5,205	5,205	5,205
Adj R^2	0.39	0.56	0.52	0.66	0.84	0.87	0.85	0.88
Time fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
Country Fixed effects	No	yes	No	Yes	No	yes	No	Yes

The table shows the results of estimating the following regression for 347 banks across 57 countries from 1998 to 2012:

$$Leverage_{i,j,t} = \alpha + \beta M/B_{i,j,t-1} + \gamma ROAA_{i,j,t-1} + \delta \log(Size)_{i,j,t-1} + \theta \text{Collateral}_{i,j,t-1} + \vartheta Dividends_{i,j,t} + Risk_{i,j,t-1} + C_j + C_t + \varepsilon_{i,j,t}$$

The dependent variable is market leverage in Models 1-4 and book leverage in Models 5-8. The explanatory variables are the market-to-book ratio (*M/B*), return on average assets (*ROAA*), the log of total assets (*Size*), collateral (*Collateral*) and a dummy for dividend paying banks (*Div*) for bank i in country j in year t (see Appendix1 for the definition of variables). All these variables are lagged by one year except dividend dummy. Time (c_t) and country (c_j) fixed effects and are included in the regression to account for unobserved heterogeneity at the country level and across time that might be correlated with the independent variables. Following Petersen (2009), we employ cluster adjusted standard errors at the bank level to account for heteroscedasticity and serial correlation of errors. ***, ** and *denote statistical significance at the 1%, the 5% and the 10% level, respectively.