

# Banking liberalization and firms' debt structure: International evidence

*Víctor M. González\**  
*Francisco González*

## *Abstract*

This paper analyzes the effect of banking liberalization on firms' debt structure and how this effect varies across firm size and countries depending on bank supervision, investor protection, financial structure, and development of financial system. Results for 11,845 firms in 39 countries over the 1995-2004 period indicate that banking liberalization increases firm leverage and reduces its maturity. Debt availability increases in countries with stronger official and private supervision, better protection of property rights and lower protection of creditor rights, and more bank-oriented and less-developed financial systems. The reduction of debt maturity is greater in countries with stronger official supervision and property rights protection. Banking liberalization, moreover, affects small and large firms differently. Small firms in financially developed countries and large firms in less developed countries benefit least from banking liberalization.

JEL classification: G18, G32.

Keywords: debt structure, banking liberalization, supervision, investor protection, financial structure, financial development.

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\* Department of Business Administration. University of Oviedo. Spain.

**Corresponding author:** Víctor M. González, Department of Business Administration. University of Oviedo. Spain. [vmendez@uniovi.es](mailto:vmendez@uniovi.es), Tel.: + 34 985102826; Fax: + 34 985103708

**Acknowledgements:** Financial support from the Ministry of Science and Innovation of Spain - ERDF, Project MICINN-09-ECO2009-11758 is gratefully acknowledged.

## 1. Introduction

Financial liberalization has attracted the attention of the financial literature over the last two decades. The advocates of financial liberalization emphasize the positive effects it has on economic growth by increasing credit availability and improving investment allocation (Laeven, 2003; Galindo *et al.*, 2007). Empirical evidence, however, is inconclusive and not only combines different aspects of financial liberalization but also samples from a single country or from specific groups of countries. Basically, there have been three aspects of financial liberalization that have attracted interest: the effects of capital account openness (see Eichengreen, 2001 for a survey), equity market liberalization (see, for example, Bekaert *et al.*, 2001, 2005, 2006), and banking market liberalization.

This paper focuses on a particular facet of financial liberalization and analyzes how banking liberalization modifies the credit channel by influencing the availability and maturity of firms' debt. We argue that the effects of banking liberalization may be different for long-term and short-term debt. The finance literature suggests that the influence of banking liberalization on firms' access to credit depends on the intensity of the informational asymmetries. In perfect credit markets, higher competition increases the amount of credit and reduces its cost (Klein, 1971). However, models that incorporate asymmetric information between lenders and borrowers show that increases in credit market competition reduce lending (Petersen and Rajan, 1994, 1995). As information asymmetries are more relevant in long-term than in short-term debt, we analyze if banking liberalization affects short and long-term debt differently. As information asymmetries are usually negatively related to firm size, we also analyze differences between small and large firms. Moreover, bank supervision, investor protection, and financial structure and development in a country may affect the intensity of informational asymmetries and, therefore, shape the effect of banking liberalization on debt structure.

Previous studies on banking market liberalization have analyzed related aspects. Laeven (2003) uses panel data on a large number of firms in 13 developing countries to find that banking liberalization relaxes financing constraints for small firms, but increases them for large ones. Barth *et al.* (2004) show in a cross-sectional study of 107 developed and developing countries that regulatory restrictions on non-traditional bank activities and barriers to foreign-bank entry have a negative influence on the development and stability of banking systems. In a closely related paper, Agca *et al.* (2008) assess the impact of both financial globalization and credit market deregulation

on corporate leverage. They examine data from a large panel of publicly-traded non-financial firms in 38 countries over the period 1994-2002 and find that credit market globalization results in higher leverage, particularly in emerging markets. In contrast, deregulation in domestic credit markets brings about a decline in leverage in emerging market firms and, to a smaller degree, an increase in leverage in advanced country firms. None of the above-mentioned papers analyze the consequences of banking liberalization on debt structure.

We use an international panel database of 11,845 firms in 39 developing and developed countries over the 1995-2004 period. The availability of an international database allows us to analyze how the effect of banking liberalization on debt structure varies across countries. Our paper makes several contributions. First, we analyze the effect of the openness of a country's banking system not only on the amount of firm leverage but also on debt maturity. As problems of moral hazard and adverse selection are specially relevant in long-term debt, we were able to observe a different impact of banking liberalization between short and long-term debt.

Second, we analyze the interaction of the liberalization of the bank market with official and private supervision, investor protection, financial structure, and financial development in a country. International institutions, such as the Bank for International Settlements, the International Monetary Fund, and the World Bank, are encouraging countries to strengthen both official and private bank supervision. These recommendations are frequently discussed in the context of increasing bank stability, but, as far as we know, there are no studies analyzing the effects of the interaction between liberalization of the banking system and supervisory policy on the credit supply.

The literature on firms' capital structure has used international databases to analyze the influence of institutions. Empirical studies show that better protection of creditors makes loans more available to firms by reducing adverse selection and moral hazard problems of debt (Levine, 1999; Giannetti, 2003; Fan *et al.*, 2006; and González and González, 2008; Bae and Goyal, 2009). Moreover, Demirgüç-Kunt and Maksimovic (1999) and Giannetti (2003) show that institutions that favor creditor rights and ensure stricter enforcement are associated not only with higher leverage but also with higher availability of long-term debt. Stronger protection of property rights, however, favors increased use of equity over debt (González and González, 2008). This is because weak protection of property rights diminishes the ability of private contracts to solve problems of adverse selection and moral hazard. As equity issue is subject to the

above problems more than debt, better protection of rights encourages the issue of equity and is, therefore, negatively related to firm leverage. None of the above studies, however, analyze how institutions or financial structure and development modify the effects of banking liberalization on firms' debt structure.

Third, we analyze if banking liberalization affects small and large firms differently depending on their countries' financial development. If informational asymmetries are important for explaining the effects of banking liberalization on firms' debt structure, we might expect different results for small and large firms. Empirical evidence reports mixed results depending on countries' development. Laeven (2003) finds, in firms from 13 developing countries, that financial liberalization relaxes external financing constraints for small firms but increases them for large firms. Petersen and Rajan (1994, 1995) and Zarutskie (2006) suggest the opposite for US firms. They find that more competition among creditors damages availability of debt for small and young firms. We use our international database of developed and developing countries to analyze if countries' financial development shapes the differential effect of banking liberalization between small and large firms.

Finally, we account for dynamic processes in firm leverage using the generalized-method-of-moments (GMM) estimators developed by Arellano and Bond (1991) for dynamic panel data. GMM models are designed to handle autoregressive properties in the dependent variable (firm leverage) and control for the endogeneity of the explanatory variables and unobserved firm-specific characteristics. We also include country and industry dummies to prevent the coefficients of supervisory and institutional variables from being biased by incorporating confusing effects of other omitted country variables.

Our results for 11,845 firms in 39 countries indicate that banking liberalization increases firm leverage and reduces its maturity. However, these effects vary among firms and countries. The increase in debt availability is higher in countries with stronger official and private supervision, better protection of property rights and lower protection of creditor rights, and in more bank-oriented and less developed financial systems. The reduction of debt maturity is higher in countries with stronger official supervision and property rights protection. Moreover, we find that the effect of banking liberalization varies with firm size depending on countries' financial development. Larger firms in poorly-developed financial systems and smaller firms in well-developed financial systems benefit the least from banking liberalization.

The rest of the paper is organized as follows. Section 2 discusses the influence of banking liberalization on debt structure and the hypotheses tested in the paper. Section 3 describes the database, methodology, and main variables used in the paper. Section 4 discusses the empirical results. Finally, Section 5 concludes.

## **2. Theoretical background and hypotheses**

In this section we discuss the potential effects of banking liberalization on the availability and maturity of firms' debt. A potential effect of banking liberalization may stem from changes in bank market competition. Claessens and Laeven (2004) have shown that more strictly regulated bank markets are less competitive. Theoretically, the influence of higher bank competition on firms' credit access depends on the intensity of informational asymmetries. In a market without information asymmetries, an increase in competition would result in a lower price for credit and more credit availability (Klein, 1971). In markets with asymmetric information, however, an increase in banking competition may diminish banks' incentives to invest in the acquisition of soft information by establishing close relationships with borrowers. Petersen and Rajan (1995), for instance, show that credit market competition imposes constraints on the ability of the firm and the creditor to intertemporally share surplus. Banks in less competitive markets may, however, lend with the expectation that they will recover the initial subsidy via higher interest rates in the future.

As informational asymmetries are higher in long-term than in short-term debt, lending relationships would be more valuable for long-term debt in less competitive markets. We therefore expect banking liberalization and increases in banking competition to have a different impact on short-term debt than on long-term debt. The lower informational asymmetries of short-term debt suggest that banking liberalization would bring down prices and make larger amounts of short-term debt available to firms. Moreover, greater competition that reduces bank charter value increases bank risk-taking incentives (Keeley, 1990) so is likely to encourage banks to finance new investments that they would not consider if they were behaving more cautiously. Both effects lead us to forecast greater availability of short-term debt for firms.

The greater informational asymmetries of long-term debt, however, have a less clear expansionary effect on debt maturity. Banking liberalization may limit the interest rates that banks can charge in the future and prevent higher interest rates from subsidizing

lower interest rates in the present. It basically reduces the ability to contract long-term debt. As the predicted positive impact on short-term debt is greater than for long-term debt, we can expect a reduction in firms' debt maturity. The impact of banking liberalization on debt availability will depend on whether or not the positive effect on short-term debt offsets the potential negative effect on long-term debt.

Following the above arguments, our first hypothesis is:

*H1: Banking liberalization has a more positive (less negative) effect on firms' short-term debt than on long-term debt.*

The effect of banking liberalization on firms' debt structure may also vary across countries depending on bank supervision. If bank supervision affects the enforcement of bank regulation, we would expect greater effects from changes in bank regulation as private and official bank supervision becomes stronger. If a country's bank supervision is weak, we would expect regulation to be less binding for banks and to reduce the potential impact of changes in banking regulations on firms' debt structure. Although official supervision is specifically designed to enforce bank regulation, since Basel II banking authorities have been aiming to reinforce both types of supervision to control bank risk-taking. For this reason, we might find differential effects between the two types of supervision. Our second hypothesis is:

*H2: The influence of banking liberalization on debt structure is positively related to bank supervision in a country.*

The law and finance literature has highlighted the importance of creditor rights for making debt more available to firms and increasing its maturity (Levine, 1999; Giannetti, 2003; González and González, 2008) while better protection of property rights favors equity issues (González and González, 2008). It is less clear, however, how investor protection complements or substitutes the effect of banking liberalization on firms' debt structure. On the one hand, if better protection of creditor rights makes debt more available, we might expect banking liberalization to have lower marginal benefits on debt availability and maturity. In this case, the protection of creditor rights and bank liberalization would be substitutes. On the other hand, banking liberalization cannot by itself facilitate bank loans to firms if regulation does not adequately protect creditor rights. In this case, better protection of creditor rights would complement banking liberalization to facilitate firms' access to bank debt.

Similarly, if better protection of property rights favors the use of equity versus debt, in such an environment we might expect banking liberalization to have lower marginal effects on debt. The protection of property rights and the banking liberalization would then be substitutes. Better protection of property rights, however, might complement banking liberalization and increase the marginal effects on debt structure of relaxing bank regulation. Bae and Goyal (2010) have shown that corporate governance affects firms' profits when countries liberalize their equity markets. Their results reveal that better-governed Korean firms experience higher abnormal returns, have more foreign ownership, and exhibit higher rates of physical capital accumulation following equity liberalization. As both types of relation are theoretically possible, we make no a priori forecast as to whether banking liberalization complements or substitutes the protection of creditor and property rights, and treat it as an empirical issue.

We also analyze the influence of financial structure and development in a country. We expect that the greater the importance of banks in the country's financial system, the higher the marginal impact associated with changes in bank regulation. We therefore forecast that the effects of banking liberalization will be higher in bank-based than in market-based financial systems. Additionally, financial development increases the financial instruments available to firms and will reduce the marginal benefits associated with banking liberalization to increase debt availability for firms. Schmukler and Vesperoni (2006) provide evidence indicating that firms from emerging economies with more developed domestic financial systems are less affected by equity market liberalization. This means that relatively developed domestic financial sectors are able to provide similar financial instruments to the ones obtained abroad. In a similar way, banking liberalization might have a lower influence on both availability and maturity of bank debt in financially developed economies. Moreover, more financially developed countries are usually more market-oriented, so liberalization will have lower positive effects than in more bank-oriented and less financially-developed countries. Following these arguments, our third hypothesis is:

*H3: The effects of banking liberalization on debt structure are higher in bank-oriented and less-developed financial systems.*

Finally, the greater impact of banking liberalization on debt structure may not be independent of firm size. Small firms are characterized by larger informational asymmetries and greater dependence on bank financing for their investments. Large firms, on the contrary, have better access to domestic and international markets and are usually less dependent on domestic bank markets. When the effect of banking

liberalization depends on the intensity of informational asymmetries between the borrower and lender, we can expect a different effect for large and small firms. If relationship banking is important and informational asymmetries reduce the benefits of banking liberalization for credit supply, we should expect the availability and maturity of debt for small firms to fall more, or increase less, than it does for larger firms when banking liberalization changes.

Moreover, if the intensity of informational asymmetries varies between developed and underdeveloped financial systems, we would observe that the effect of banking liberalization on debt structure depending on firm size may also vary between developed and underdeveloped financial systems. Laeven (2003) finds, in a sample of firms from 13 developing countries, that financial liberalization relaxes external financing constraints for small firms, but increases them for large ones. Petersen and Rajan (1994, 1995) and Zarutskie (2006) suggest the opposite influence, using data from US firms. They find that more competition among creditors damages availability of debt for small and young firms. This suggests that more competition discourages creditors from lending to firms whose qualities are not well known. In our international database we empirically analyze if the influence of banking liberalization on debt structure depending on firm size also depends on the country's financial development.

### **3. Database, methodology, and variables**

#### *3.1. Database*

Our source for firm data is the *Worldscope* database which contains financial statement data and stock prices from many countries in comparable form. We initially selected the 49 countries considered by La Porta *et al.* (1998) over the 1995-2004 period, but eliminated 10 of them because of scarce data: Colombia, Ecuador, Egypt, Jordan, Kenya, Nigeria, Sri Lanka, Uruguay, Venezuela, and Zimbabwe. The final number of countries considered is therefore 39, including both developed and developing countries.

We excluded firms whose capital decisions may reflect special factors: the financial industry (SIC codes 6000 – 6999) and regulated enterprises (SIC codes 4000 – 4999). Since we apply the GMM first-difference estimator with at least one lag of the dependent variable, firms with fewer than three consecutive years of data had to be



excluded. Extreme values of dependent variable were also excluded. Finally, 11,585 firms were included in the sample with 56,151 firm-year observations.

### 3.2. Methodology

We adopted the traditional dynamic model of capital structure used in previous studies.<sup>1</sup> The model tests whether there is a leverage target and, if so, how quickly a firm moves toward the target. The form of the target adjustment model states that changes in the debt ratio ( $D_{it} - D_{it-1}$ ) partially absorb the difference between the target leverage ( $D_{it}^*$ ) and lagged leverage ( $D_{it-1}$ ):

$$(D_{it} - D_{it-1}) = \alpha(D_{it}^* - D_{it-1}) \quad [1]$$

where the transaction costs that prevent complete adjustment to the target leverage are measured by the coefficient  $\alpha$ , which varies between 0 and 1 and is inversely related to adjustment costs.

As the target debt is unobservable, we model it as a linear function of the traditional determinants of capital structure as indicated by Rajan and Zingales (1995), i.e., profitability (PROF), growth opportunities (GROWTH), tangible assets (PPE), and size (SIZE). Substituting these variables for  $D^*$  in model [1], we get:

$$D_{it} = \alpha a_0 + (1 - \alpha)D_{it-1} + \alpha a_1 PROF_{it} + \alpha a_2 GROWTH_{it} + \alpha a_3 PPE_{it} + \alpha a_4 SIZE_{it} \quad [2]$$

As we used an international database, we incorporate country variables and the influence of banking liberalization. As estimations are carried out with panel data, our basic model is:

$$D_{it} = \alpha a_0 + (1 - \alpha)D_{it-1} + \alpha a_1 PROF_{it} + \alpha a_2 GROWTH_{it} + \alpha a_3 PPE_{it} + \alpha a_4 SIZE_{it} + b_5 CONC_{kt} + b_6 RIGHTS_{kt} \times ENFORCE_{kt} + b_7 CREDITORS_{kt} \times ENFORCE_{kt} + b_8 BFREEDOM_{kt} + \sum_{k=1}^m C_k \quad [3]$$

$$+ \sum_{t=1995}^{2004} Y_t + \sum_{j=1}^n I_j + \gamma_i + \mu_{it}$$

The main variable in our study is BFREEDOM. It is a proxy of banking freedom for country  $k$  in year  $t$ . As control variables at country level we include three country characteristics previously incorporated in studies on firms' capital structure with

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<sup>1</sup> Other authors using this framework with one country data include Miguel and Pindado (2001), Ozkan (2001), Gaud *et al.* (2005), Flannery and Rangan (2006). González and González (2008) applied the GMM estimator in an international sample of industrial firms.

international data: bank market concentration (CONC), protection of property rights (RIGHTS), and protection of creditor rights (CREDITORS). As effective protection of rights requires both an explicit legal protection and enforcement of the law, we interact RIGHTS and CREDITORS with a variable capturing law enforcement in countries (ENFORCE).

Bank market concentration has usually been used as a proxy of bank market competition. As effects of banking liberalization can potentially be associated to changes in bank competition, we check if the influence of banking liberalization remains after controlling for bank concentration. We do not forecast a clear sign for  $b_5$  as banking literature suggest a negative effect on firm leverage in perfect capital markets but a positive one in markets with asymmetric information (Petersen and Rajan, 1994, 1995).

The protection of property rights is crucial to solve problems of adverse selection and moral hazard in financial contracts (La Porta *et al.*, 1997, 1998). As equity issue is subject to more of these problems than debt, empirical evidence confirms that stronger protection of property rights favors increased use of equity over debt (González and González, 2008). We therefore expect a negative sign for the coefficient of RIGHTSxENFORCE ( $b_6$ ).

The literature on firms' capital structure has found a positive relation between the protection of creditor rights and firms' leverage, which is greater with long-term debt (Demirgüç-Kunt and Maksimovic, 1999; Giannetti, 2003; Qian and Strahan, 2007; González and González, 2008). We therefore include the interaction between CREDITORS and ENFORCE as a control variable and expect a positive sign for this coefficient ( $b_7$ ).

We also include a set of country dummies ( $\sum_{k=1}^m C_k$ ) to control for other legal and

institutional aspects beyond those explicitly included in the regressions.  $\sum_{t=1995}^{2004} Y_t$  is a set

of dummy time variables for each year, capturing any unobserved firm-invariant time effect not included in the regression. We also include industry dummy variables

according to the SIC code ( $\sum_{j=1}^n I_j$ ) to capture any industry effect not included in the

explanatory variables.  $\gamma_i$  is the firm effect, which is assumed to be constant for firm  $i$  over  $t$ ; and  $\mu_{it}$  is the error term.

We extend the basic model to analyze how the influence of banking liberalization varies across countries depending on bank supervision, investor protection, financial structure, and financial development. We include an interaction term between each country variable and banking freedom (COUNTRYVARxBFREEDOM). The inclusion of dummy country variables avoids the need for these supervisory and institutional country variables to enter the regression on their own and allows us to focus on the terms of their interaction with banking freedom.

$$\begin{aligned}
D_{it} = & \alpha a_0 + (1 - \alpha)D_{it-1} + \alpha a_1 PROF_{it} + \alpha a_2 GROWTH_{it} + \alpha a_3 PPE_{it} + \alpha a_4 SIZE_{it} + \\
& + b_5 CONC_{kt} + b_6 RIGHTS_{kt} \times ENFORCE_{kt} + b_7 CREDITORS_{kt} \times ENFORCE_{kt} + \\
& + b_8 BANKFREEDOM_{kt} + b_9 COUNTRYVAR_{kt} \times BFREEDOM_{kt} + \\
& + \sum_{k=1}^m C_k + \sum_{t=1995}^{2004} Y_t + \sum_{j=1}^n I_j + \gamma_i + \mu_{it}
\end{aligned}$$

[4]

As country variables interacting with banking freedom we include official supervision (OFFICIAL), private supervision (MONITOR), protection of property (RIGHTS) and creditor (CREDITORS) rights, market orientation of the financial system (STRUCT), and the country's financial development (FINAN).

We apply generalized-method-of-moments (GMM) estimators developed for dynamic models of panel data by Arellano and Bond (1991). This methodology is specifically designed to address three particular econometric issues: (i) the presence of unobserved firm-specific effects, eliminated by taking first differences of the variables; (ii) the autoregressive process in the data regarding leverage ratio behavior (i.e., the need to use a lagged-dependent-variables model to capture the dynamic nature of the capital structure decisions); and (iii) the likely endogeneity of the explanatory variables. We control for the potential endogeneity of PROF, GROWTH, PPE, and SIZE in the GMM estimations by using two- to four-period lags of the same variables as instruments. The country and the dummy variables are initially considered exogenous.

We use one-step estimation and specify the robust estimator of the variance-covariance matrix of the parameters. We also examine the hypothesis that there is no second-order serial correlation in the first-difference residuals ( $m_2$ ). In our models this hypothesis of the absence of second-order serial correlation is not rejected. First-order

serial correlation ( $m_t$ ) in the differentiated residuals is attributable to the first difference of models. We report results using one or two lags of the dependent variable depending on their statistical significance.

### 3.3. Variables

Appendix A describes how we define the variables used in the empirical analysis and their sources. Most of the variables are self-explanatory and have been used in other cross-country studies of firms' debt structure. We therefore only describe in greater detail the proxies of our main variables: debt structure and banking liberalization.

#### 3.3.1. Debt structure

We use three proxies to measure firms' debt structure: 1) Total debt is measured by the ratio between long-term and short-term debt and the market value of assets, 2) Long-term debt is measured by the ratio between long-term debt and the market value of assets and, 3) Short-term debt is measured by the ratio between short-term debt and the market value of assets. Market value of assets is defined as total assets minus book value of equity plus market value of equity.<sup>2</sup> The first variable measures the availability of debt whereas the other two variables are proxies of debt maturity.

Panel A in Table 1 shows for the total sample a mean leverage ratio of 25.53%, a mean long-term debt ratio of 13.55%, and a mean short-term debt ratio of 11.98% with an average profitability of 9.33% and a mean for growth opportunities of 2.67. The companies in the sample have on average a 32.14% ratio of property, plant, and equipment to total assets.

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<sup>2</sup> Welch (2004) argues that we should use market leverage ratios since our theories of target ratios are implicitly about market leverage ratios. Many other researchers analyze market value debt ratios, such as Fama and French (2002), Barclay *et al.* (2003), Leary and Roberts (2005), and Flannery and Rangan (2006).

**Table 1. Descriptive Statistics**

Panel A reports the descriptive statistics of firm-level variables. LDEBT is the ratio between the book value of debt (long-term and short-term debt) and the market value of total assets; LONG-TERM DEBT is the ratio between the book value of long-term debt and the market value of total assets; SHORT-TERM DEBT is the ratio between the book value of short-term debt and the market value of total assets; PROFIT is estimated as EBIT plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets; GROWTH is growth opportunities and is measured by Tobin's Q; PPE is the ratio between tangible assets (property, plant and equipment) and total assets; SIZE is the firm's sales (in millions of euros). Panel B reports the descriptive statistics of country-level variables. BREEDOM measures the openness of the banking and financial system; RIGHTS measures the protection of property rights; CREDITORS measures creditor rights; ENFORCE measures the country legal enforcement; CONC is the fraction of assets held by the three largest commercial banks in each country; OFFICIAL measures the extent to which official supervisors authorities have the authority to take specific actions to prevent and correct problems; MONITOR measures the degree of private oversight; STRUCT is a proxy of the market-orientation of the country's financial system; FINAN measures the country's financial development.

Panel A: Descriptive statistics of firm level-variables									
	TOTAL DEBT (%)	SHORT-TERM DEBT (%)	LONG-TERM DEBT (%)	PROFIT (%)	GROWTH	PPE (%)	SIZE		
Mean	25.53	13.55	11.98	9.33	2.67	32.14	1427.34		
Median	21.01	8.52	5.41	10.93	1.47	28.94	190.43		
Standard dev	21.99	15.16	15.07	29.85	29.69	34.72	6780.36		
First quartile	5.49	0.30	0.67	5.60	0.85	15.38	54.76		
Third quartile	41.85	21.89	18.39	16.62	2.58	45.03	694.58		
Panel B: Descriptive statistics of country level-variables									
	BFREEDOM	RIGHTS	CREDITORS	ENFORCE	CONC (%)	OFFICIAL	MONITOR	STRUCT	FINAN
Argentina	60	2.6	1	5.79	40.94	12	8	-0.63	-2.89
Australia	90	1	3	9.3	63.47	12	10	-0.21	-0.17
Austria	76	1	3	9.47	70.84	14	6	-2.39	-1.44
Belgium	70	1	2	9.49	88.42	10	8	-1.00	-1.01
Brazil	50	3	1	6.52	43.68	15	8	-0.23	-1.68
Canada	70	1	1	9.58	55.50	9	9	0.08	-0.01
Chile	56	1	2	5.66	55.21	11	8	-0.65	-1.19
Denmark	76.67	1	3	9.8	78.31	9	7	-0.48	-0.69
Finland	56.67	1	1	9.8	98.38	9	9	0.33	-0.25
France	50	2	0	8.97	55.92	8	6	-0.46	-0.27
Germany	56	1	3	9.37	65.48	11	5	-0.97	-0.16
Greece	38	2.3	1	6.82	72.02	10	6	-0.28	-1.10
Hong Kong	88	1	4	8.77	69.91	10	8	0.33	1.21
India	30	3	2	6.12	36.61	9	6	0.16	-1.58
Indonesia	38	3.4	2.3	2.9	60.11	14	8	-0.50	-1.93
Ireland	78	1	1	8.4	65.07	11	6	-0.87	-0.56
Israel	50	2	3.1	7.72	75.25	8	9	-0.94	-0.84
Italy	66	2	2	7.95	40.50	6	6	-0.69	-0.76
Japan	50	1.3	2	9.37	37.80	13	8	-0.78	0.04
Malaysia	42	2.4	3	7.71	46.32	11	9	0.07	0.43
Mexico	44	2.9	0	5.99	67.65	10	6	-0.29	-2.50
Netherlands	90	1	3	9.87	72.77	8	6	-0.13	0.67
New Zealand	90	1	4	9.8	78.17	7	8	-1.39	-0.70
Norway	50	1.33	2	9.76	89.91	8	10	-0.68	-0.54
Pakistan	52	3.3	1	3.67	60.09	6	12	-0.22	-1.94
Peru	70	3.2	0	4.83	73.25	14	8	-0.90	-2.87
Philippines	50	2.6	1	4.08	51.05	12	8	-0.44	-1.59
Portugal	50	2	1	7.81	85.55	13	8	-1.42	-0.63
Singapore	70	1	3	8.99	92.11	3	9	0.05	0.46
South Africa	54	3	3	6.44	74.13	4	8	0.21	0.18
South Korea	58	1.2	3	6.71	44.60	10	6	-0.19	0.27
Spain	66	2	2	7.87	56.48	10	8	-0.20	0.07
Sweden	72	1.6	1.1	9.92	97.82	6	6	0.64	0.24
Switzerland	87.78	1.11	1	9.99	71.18	13	8	0.17	1.17
Taiwan	54	1.3	2	7.4	30.71	13	9	-	-
Thailand	50	1.7	2.4	5.93	53.06	11	6	-0.89	-0.22
Turkey	62	2.3	2	5.46	65.86	11	6	0.73	-1.80
UK	90	1	4	9.4	49.34	12	8	-0.06	0.59
US	78	1	1	9.52	29.86	14	8	1.27	1.13
Mean	62.28	1.76	1.97	7.77	63.16	10.18	7.65	-0.37	-0.60
Median	58	1.33	2	7.95	65.07	10	8	-0.29	-0.55
Standard dev	16.37	0.82	1.10	1.98	18.16	2.85	1.48	0.66	1.07
First quartile	50	1	1	6.28	50.19	8.5	6	-0.75	-1.38
Third quartile	74	2.35	3	9.48	73.69	12	8	0.07	0.15

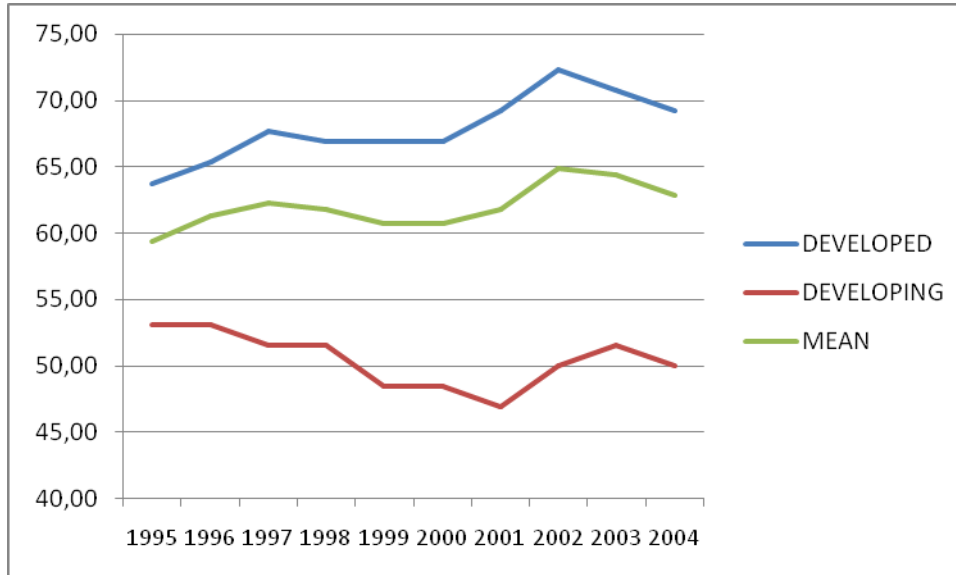
### 3.3.2. *Banking liberalization*

We measure banking liberalization using the index of Financial Freedom published annually for each country by the Heritage Foundation. It is a composite index for the extent of government regulation of financial services; the extent of state intervention in banks and other financial services; the difficulty of opening and operating financial services firms (for both domestic and foreign individuals); and government influence on the allocation of credit. It varies on a scale of 0 to 100. Higher values indicate a less restrictive banking system. A detailed explanation of the specific banking and finance grading scale is given in Appendix B.

Panel B in Table 1 shows that the mean value of BANKING FREEDOM is 62.28. The countries with a more open banking system are Australia, Netherlands, New Zealand, and UK (their mean value is 90) while those with less banking freedom are Greece and Indonesia (their mean value is 38). Figure 1 shows the evolution of banking liberalization over the 1995-2004 period depending on countries' development. It reveals that banking freedom has increased slightly in the countries in our sample, although evolution of the index is different between developed and developing countries. Developed countries have greater levels of financial freedom than developing countries (a mean value of 68.20 in developed countries versus 50.46 in developing ones), and the difference has increased over the 1995-2004 period.

**Figure 1**  
**Evolution of banking liberalization**

The figure shows the evolution of Financial Freedom during the period 1995-2004. Financial Freedom is one of the 10 aspects measured in the Index of Economic Freedom elaborado por Heritage Foundation. It is scored by determining the extent of government regulation of financial services; the extent of state intervention in banks and other financial services; the difficulty of opening and operating financial services firms; and government influence on the allocation of credit. It is scored on a scale of 0 to 100, where higher values indicate lower restrictions on banking. DEVELOPED countries are countries classified as high income and upper middle income and DEVELOPING countries are countries classified as low income and lower middle income according to GNI per capita, calculated using the World Bank's Atlas method.



## 4. Results

### 4.1. Banking liberalization and firm leverage

Table 2 shows the results of the partial-adjustment model [3] for the whole sample of firms using as dependent variables total, short-term, and long-term debt. The coefficients of time, country, and industry dummies are not reported to save space. The positive coefficient of BFREEDOM in column (1) indicates that the openness of the country's banking system has a positive influence on total debt. This result holds in column (2) when we explicitly control for bank concentration, the protection of creditor and property rights, and law enforcement in countries.

**Table 2**  
**Banking liberalization and firm leverage**

Regressions are estimated using the Arellano and Bond (1991) one-step GMM difference estimator for panel data with lagged dependent variables. Three dependent variables are used: total, short-term, and long-term debt. The dependent variables are measured as the ratio between the book value of debt and the market value of total assets. As explanatory variables, we include one lag or two lags of the dependent variable (DEBT<sub>t-1</sub> and DEBT<sub>t-2</sub>); PROFIT is estimated as EBIT plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets; GROWTH is growth opportunities and is measured by Tobin's Q. PPE is the ratio between tangible assets (property, plant and equipment) and total assets; SIZE is the natural logarithm of sales; CONC is the fraction of assets held by the three largest commercial banks in each country; RIGHTS measures the protection of property rights; CREDITORS measures the protection of creditor rights; ENFORCE measures the country legal enforcement; BFREEDOM measures the openness of the banking and financial system. T-statistics are in parentheses. \*\*\*, \*\* and \* represent the significance at the 1%, 5%, and 10% levels, respectively.

	Total debt		Short-term debt		Long-term debt	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	-0.0077 (-1.10)	0.0365** (2.41)	-0.0140*** (-2.36)	0.0003 (0.02)	0.0327*** (5.80)	0.0378** (2.56)
DEBT <sub>t-1</sub>	0.8016*** (51.58)	0.8040*** (51.91)	0.5683*** (24.15)	0.5647*** (23.94)	0.7000*** (37.62)	0.6993*** (37.62)
DEBT <sub>t-2</sub>			0.0546*** (4.76)	0.0548*** (4.77)	0.0190* (1.76)	0.0203* (1.88)
PROFIT	-0.1178*** (-3.67)	-0.1113*** (-3.53)	-0.0545*** (-2.20)	-0.0538** (-2.17)	-0.0884*** (-3.10)	-0.0804*** (-2.84)
GROWTH	-0.0006 (-1.41)	-0.0005 (-1.40)	-0.0001 (-0.41)	-0.0001 (-0.61)	-0.0007 (-1.25)	-0.0007 (-1.24)
PPE	0.0998 (1.56)	0.1045 (1.58)	0.0413 (1.02)	0.0395 (0.99)	0.0908 (1.31)	0.0980 (1.34)
SIZE	0.0457*** (3.77)	0.0431*** (3.69)	0.0465*** (3.02)	0.0456*** (3.00)	0.0259** (2.42)	0.0271** (2.47)
CONC		0.0139 (0.82)		-0.0681*** (-3.27)		0.0334* (1.78)
RIGHTS x ENFORCE		-0.0023*** (-7.66)		-0.0005 (-1.62)		-0.0022*** (-7.97)
CREDITORS x ENFORCE		0.0019*** (11.43)		0.0007*** (3.38)		0.0010*** (5.01)
BFREEDOM	0.0003*** (3.38)	0.0004*** (3.95)	0.0002*** (2.73)	0.0003*** (3.69)	-0.0002*** (-2.39)	0.0000 (0.10)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
m <sub>1</sub>	-34.62***	-35.35***	-28.39***	-28.08***	-23.76***	-24.45***
m <sub>2</sub>	-1.41	-1.38	0.71	0.70	0.32	0.36
# observations	56,151	55,987	44,406	44,319	44,406	44,319
# firms	11,845	11,845	10,645	10,645	10,645	10,645

Banking liberalization also affects firms' debt maturity. Columns (3) and (4) report positive coefficients for BFREEDOM when the dependent variable is the short-term debt ratio, whereas the coefficients BFREEDOM are negative or non-significant when we use the long-term debt ratio as the dependent variable in columns (5) and (6). The change in results depending on debt maturity indicates that, although banking liberalization increases the total amount of debt available to firms, it basically increases short-term debt, and has no effect on long-term debt. This result is consistent with our hypothesis 1, indicating that banking liberalization might reduce the benefits for banks



of close lending relationships that allow reduction of the higher adverse selection and moral hazard problems associated with long-term debt. The consequence is a negative effect on availability of long-term debt for firms. However, banking liberalization increases the availability of short-term debt, for which informational asymmetries between borrowers and lenders are less relevant and close lending relationships are less beneficial. The net effect is an increase in debt availability for firms (a higher total debt ratio) and a reduction in debt maturity.

The impact of banking liberalization on debt structure is economically important. For instance, using the coefficients in column (2) of Table 2, a standard deviation increase in banking liberalization (16.37) would cause an increase in the total debt available which represents 2.56 per cent of its mean value. This effect represents an increase of 3.62 per cent in the mean value of short-term debt when we use the coefficients in column (4).

The coefficients of the control variables are consistent with those found in previous studies. The positive and statistically significant coefficients of  $DEBT_{t-1}$  in all estimations suggest that firms have a target leverage to which they partially adjust in each period. Coefficients of  $DEBT_{t-1}$  for total debt take values of around 0.80, which implies  $\alpha$  values of approximately 0.20. This value is smaller than those reported by Flannery and Rangan (2006), where the mean US firm converges toward its long-run target at a rate of 30% per year. We even obtain significant coefficients for the two lags of the short-term debt and long-term debt in columns (3)-(6).

The relation between profitability and firm leverage is negative for all estimations. This is consistent with the pecking order theory because higher profitability increases the possibility of retaining earnings and reduces, all else being equal, the need for debt. Size has a positive impact on firms' debt, which is consistent with size being an inverse proxy for the probability of bankruptcy. This result is similar to results shown in Rajan and Zingales (1995), Fama and French (2002), Frank and Goyal (2003), Flannery and Rangan (2006), and Gaud *et al.* (2005).

Coefficients for growth opportunities and asset tangibility are consistent with the traditional arguments of the trade-off theory, although they are not statistically significant at standard levels. The negative coefficients for growth opportunities reflect higher agency costs between shareholders and debtholders and higher costs of financial distress. The positive coefficients of PPE in all the estimations seem to be consistent with the greater value of these assets as collateral.

Bank concentration has a clear influence on debt maturity. Consistent with González and González (2008) we find a positive influence of bank concentration on long-term debt. However, bank concentration has a negative influence on short-term debt. As a result of the contrary effect on firm leverage depending on its maturity, we do not observe a significant influence on total debt ratio.

The variables proxying the protection of creditor and property rights have, respectively, positive and negative coefficients. The positive coefficients for CREDITORSxENFORCE confirm that legal protection of creditor rights can reduce the agency cost of debt, as documented by Demirguc-Kunt and Maksimovic (1999), Giannetti (2003), and González and González (2008). The negative coefficients for RIGHTSxENFORCE are consistent with better protection of property rights lowering agency costs associated with equity issues and then promoting lower firm leverage. Protection of both creditor and property rights has a greater economic effect on long-term than on short-term debt.

#### *4.2. Banking liberalization, supervision, and firm leverage*

We now analyze whether the effects of banking liberalization on debt structure vary across countries depending on bank supervision. In estimations in Table 3 we incorporate interaction terms between banking freedom and our measures of official and private supervision.

The interaction between banking freedom and official supervision (BFREEDOMxOFFICIAL) has positive coefficients when we use both total and short-term debt as dependent variables in columns (1), (3), (4), and (6). This indicates that banking liberalization has a positive influence on debt availability, increasing the amount of short-term debt, when the authority is able to take actions to prevent and correct problems. In fact, the negative and significant coefficients of BFREEDOM in columns (1), (3), and (4) reveal that banking liberalization reduces total and even short-term debt in countries with the lowest official supervisory powers. This result is consistent with our hypothesis 2, suggesting that the stronger the bank supervision the greater the positive effect of banking liberalization on the availability of short-term debt. We do not, however, obtain significant coefficients for banking freedom and its interactions with official supervision when we use long-term debt as the dependent variable in columns (7) and (9). This confirms that banking liberalization focuses its positive effects on short-term debt and that the non-positive effect on long-term debt does not depend on official supervision.

**Table 3**  
**Banking liberalization, supervision, and firm leverage**

Regressions are estimated using the Arellano and Bond (1991) one-step GMM difference estimator for panel data with lagged dependent variables. Three dependent variables are used: total, short-term, and long-term debt. The dependent variables are measured as the ratio between the book value of debt and the market value of total assets. As explanatory variables, we include one lag or two lags of the dependent variable ( $DEBT_{t-1}$  and  $DEBT_{t-2}$ ); PROFIT is estimated as EBIT plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets; GROWTH is growth opportunities and is measured by Tobin's Q. PPE is the ratio between tangible assets (property, plant and equipment) and total assets; SIZE is the natural logarithm of sales; CONC is the fraction of assets held by the three largest commercial banks in each country; RIGHTS measures the protection of property rights; CREDITORS measures the protection of creditor rights; ENFORCE measures the country legal enforcement; BFREEDOM measures the openness of the banking and financial system; OFFICIAL measures the extent to which official supervisors authorities have the authority to take specific actions to prevent and correct problems; MONITOR measures the degree of private oversight. T-statistics are in parentheses. \*\*\*, \*\* and \* represent the significance at the 1%, 5%, and 10% levels, respectively.

	Total debt			Short-term debt			Long-term debt		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	0.0337** (2.27)	0.0901*** (4.57)	0.0803*** (3.90)	-0.0005 (-0.03)	0.0037 (0.19)	-0.0115 (-0.56)	0.0387*** (2.62)	0.0217 (1.18)	0.0211 (1.10)
DEBT <sub>t-1</sub>	0.8032*** (51.91)	0.8044*** (52.03)	0.8038*** (52.01)	0.5627*** (23.72)	0.5647*** (23.93)	0.5620*** (23.64)	0.6982*** (37.57)	0.6989*** (37.60)	0.6981*** (37.56)
DEBT <sub>t-2</sub>				0.0543*** (4.73)	0.0547*** (4.77)	0.0542*** (4.72)	0.0202* (1.87)	0.0203* (1.88)	0.0202* (1.87)
PROFIT	-0.1117*** (-3.52)	-0.1106*** (-3.51)	-0.1110*** (-3.51)	-0.0547** (-2.19)	-0.0539** (-2.17)	-0.0550** (-2.19)	-0.0826*** (-2.92)	-0.0811*** (-2.87)	-0.0828*** (-2.93)
GROWTH	-0.0005 (-1.40)	-0.0005 (-1.40)	-0.0005 (-1.40)	-0.0001 (-0.57)	-0.0001 (-0.60)	-0.0001 (-0.56)	-0.0007 (-1.24)	-0.0007 (-1.24)	-0.0007 (-1.24)
PPE	0.1046 (1.58)	0.1037 (1.58)	0.1038 (1.58)	0.0438 (1.06)	0.0395 (0.99)	0.0444 (1.06)	0.0938 (1.32)	0.0978 (1.34)	0.0945 (1.32)
SIZE	0.0436*** (3.67)	0.0435*** (3.70)	0.0437*** (3.67)	0.0479*** (3.01)	0.0456*** (3.00)	0.0481*** (3.01)	0.0248** (2.31)	0.0268** (2.45)	0.0250** (2.32)
CONC	0.0188 (1.11)	0.0090 (0.52)	0.0127 (0.74)	-0.0611*** (-2.92)	-0.0684*** (-3.27)	-0.0594*** (-2.62)	0.0329* (1.75)	0.0349* (1.86)	0.0356* (1.88)
RIGHTS x ENFORCE	-0.0022*** (-7.06)	-0.0023*** (-7.52)	-0.0022*** (-7.13)	-0.0003 (-1.20)	-0.0005 (-1.58)	-0.0004 (-1.23)	-0.0022*** (-7.92)	-0.0022*** (-8.06)	-0.0022*** (-7.98)
CREDITORS x ENFORCE	0.0018*** (10.69)	0.0019*** (11.28)	0.0018*** (10.74)	0.0006*** (2.94)	0.0007*** (3.38)	0.0006*** (2.90)	0.0010*** (5.00)	0.0010*** (5.02)	0.0010*** (4.93)
BFREEDOM	-0.0010** (-2.06)	-0.0024*** (-3.59)	-0.0028*** (-4.07)	-0.0011*** (-2.60)	0.0001 (0.09)	-0.0006 (-0.82)	-0.0001 (-0.17)	0.0009 (1.40)	0.0007 (1.09)
BFREEDOM x OFFICIAL	0.0001*** (2.95)		0.0001* (1.66)	0.0001*** (3.30)		0.0001*** (3.28)	0.0000 (0.19)		0.0000 (0.63)
BFREEDOM x MONITOR		0.0004*** (4.22)	0.0003*** (3.29)		0.0000 (0.28)	-0.0001 (-0.81)		-0.0001 (-1.39)	-0.0001 (-1.38)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
m <sub>1</sub>	-34.97***	-35.21***	-34.96***	-27.90***	-28.08***	-27.87***	-24.18***	-24.49***	-24.26***
m <sub>2</sub>	-1.37	-1.32	-1.32	0.70	0.70	0.71	0.37	0.36	0.37
# observations	55,987	55,987	55,987	44,319	44,319	44,319	44,319	44,319	44,319
# firms	11,845	11,845	11,845	10,645	10,645	10,645	10,645	10,645	10,645

The positive coefficients of BFREEDOMxMONITOR in columns (2) and (3) indicate that private supervision also interacts positively with banking freedom to favor access to debt for firms. We do not, however, obtain positive and significant coefficients for this interaction term when the dependent variables are short-term and long-term debt. The significant coefficient of BFREEDOMxOFFICIAL and the non-significant coefficient of BFREEDOMxMONITOR suggest a more positive influence for official supervision than for private supervision on firms' debt availability. The greater influence of official

supervision in banking liberalization is consistent with official supervision being the main mechanism to enforce bank regulation.

#### *4.3. Banking liberalization, institutions, and firm leverage*

We analyze in this section how the quality of institutions shapes the influence of banking liberalization on firms' debt structure. The results are shown in Table 4. In the estimations we incorporate sequentially the interactions between bank liberalization and our proxies of the protection of creditor and property rights.

The interaction of  $\text{BFREEDOM} \times \text{RIGHTS} \times \text{ENFORCE}$  has non-significant coefficients for total and long-term debt. However, it has a positive coefficient for short-term debt in column (2), suggesting that better legal enforcement and protection of property rights increases the benefits of banking liberalization for short-term debt availability. The negative coefficient of  $\text{BFREEDOM}$  in column (2) indicates that banking liberalization even has a negative influence on short-term debt in countries with the poorest-quality institutions. In terms of economic significance, a standard deviation increase in the protection of property rights (0.82) would cause banking liberalization to increase the short-term debt available, representing 6.76 per cent of its mean value.

The interaction of  $\text{BFREEDOM} \times \text{CREDITORS} \times \text{ENFORCE}$  has negative coefficients for the three dependent variables in columns (2), (4), and (6). Moreover,  $\text{CREDITORS}$  and  $\text{BFREEDOM}$  keep the positive coefficients in these estimations. This indicates that the protection of creditor rights and banking liberalization are substitutes for promoting bank lending. The positive coefficients of  $\text{CREDITORS}$  and  $\text{BFREEDOM}$  suggest that both variables favor firms' debt but, the lower the marginal benefit of increasing banking liberalization (protection of creditors), the higher the protection of creditors (banking liberalization). The positive coefficient of  $\text{BFREEDOM}$  in column (6) indicates that banking liberalization even has a positive influence on long-term debt in countries with the lowest protection of creditor rights. One potential explanation is that weak protection of creditors does not favor lending relationships, so greater banking liberalization does not have any lending relationships to destroy and promotes better access not only to short-term debt but also to long-term debt.

In economic terms, a standard deviation increase in the protection of creditor rights (1.10) would cause banking liberalization to reduce the total, short-term, and long-term debt available, representing 41.69%, 39.27%, and 46.36% of the respective mean values of each type of debt.

**Table 4**  
**Banking liberalization, institutions, and firm leverage**

Regressions are estimated using the Arellano and Bond (1991) one-step GMM difference estimator for panel data with lagged dependent variables. Three dependent variable are used: total, short-term, and long-term debt. The dependent variables are measured as the ratio between the book value of debt and the market value of total assets. As explanatory variables, we include one lag or two lags of the dependent variable ( $DEBT_{t-1}$  and  $DEBT_{t-2}$ ); PROFIT is estimated as EBIT plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets; GROWTH is growth opportunities and is measured by Tobin's Q. PPE is the ratio between tangible assets (property, plant and equipment) and total assets; SIZE is the natural logarithm of sales; CONC is the fraction of assets held by the three largest commercial banks in each country; RIGHTS measures the protection of property rights; CREDITORS measures the protection of creditor rights; ENFORCE measures the country legal enforcement; BFREEDOM measures the openness of the banking and financial system. T-statistics are in parentheses. \*\*\*, \*\* and \* represent the significance at the 1%, 5% and 10% levels, respectively.

	Total debt		Short-term debt		Long-term debt	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.0196 (0.93)	-0.0755*** (-4.31)	0.0739*** (3.41)	-0.0325* (-1.68)	0.0854*** (4.08)	0.0097 (0.55)
DEBT <sub>t-1</sub>	0.8039*** (52.01)	0.8023*** (51.69)	0.5627*** (23.82)	0.5631*** (23.79)	0.6983*** (37.55)	0.6995*** (37.61)
DEBT <sub>t-2</sub>			0.0548*** (4.77)	0.0550*** (4.79)	0.0202* (1.86)	0.0216* (1.99)
PROFIT	-0.1108*** (-3.52)	-0.1154*** (-3.58)	-0.0583** (-2.29)	-0.0571** (-2.26)	-0.0816*** (-2.89)	-0.0824*** (-2.91)
GROWTH	-0.0005 (-1.39)	-0.0005 (-1.38)	-0.0001 (-0.61)	-0.0001 (-0.53)	-0.0007 (-1.24)	-0.0007 (-1.24)
PPE	0.1042 (1.58)	0.1073 (1.60)	0.0380 (0.95)	0.0451 (1.08)	0.0942 (1.32)	0.1013 (1.35)
SIZE	0.0429*** (3.68)	0.0435*** (3.70)	0.0467*** (3.03)	0.0471*** (3.05)	0.0270** (2.45)	0.0272** (2.47)
CONC	0.0177 (0.98)	0.0412** (2.44)	-0.0553** (-2.43)	-0.0493** (-2.36)	0.0338* (1.65)	0.0523*** (2.76)
RIGHTS x ENFORCE	-0.0019*** (-3.36)	-0.0022*** (-7.23)	-0.0018*** (-3.01)	-0.0003 (-1.17)	-0.0024*** (-4.17)	-0.0020*** (-7.52)
CREDITORS x ENFORCE	0.0019*** (11.49)	0.0103*** (14.16)	0.0007** (3.25)	0.0051*** (6.36)	0.0010*** (4.99)	0.0056*** (7.72)
BFREEDOM	0.0007** (2.08)	0.0025*** (12.24)	-0.0006* (-1.71)	0.0013*** (6.15)	-0.0002 (-0.48)	0.0011*** (5.69)
BFREEDOM x RIGHTS x ENFORCE	-0.0000 (-0.94)		0.00002*** (2.75)		0.0000 (0.56)	
BFREEDOM x CREDITORS x ENFORCE		-0.0002*** (-12.01)		-0.0001*** (-5.75)		-0.0001*** (-6.63)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
m <sub>1</sub>	-35.47***	-35.58***	-27.99***	-28.07***	-24.39***	-24.73***
m <sub>2</sub>	-1.38	-1.22	0.70	0.71	0.38	0.28
# observations	55,987	55,987	44,319	44,319	44,319	44,319
# firms	11,845	11,845	10,645	10,645	10,645	10,645

#### 4.4. Banking liberalization, financial development and structure, and firm leverage

This section analyzes whether the effects of banking liberalization on firms' debt availability and maturity vary across countries depending on their financial structure and development.

**Table 5**  
**Banking liberalization, financial development and structure, and firm leverage**

Regressions are estimated using the Arellano and Bond (1991) one-step GMM difference estimator for panel data with lagged dependent variables. Three dependent variable are used: total, short-term, and long-term debt. The dependent variables are measured as the ratio between the book value of debt and the market value of total assets. As explanatory variables, we include one lag or two lags of the dependent variable ( $DEBT_{t-1}$  and  $DEBT_{t-2}$ ); PROFIT is estimated as EBIT plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets; GROWTH is growth opportunities and is measured by Tobin's Q. PPE is the ratio between tangible assets (property, plant and equipment) and total assets; SIZE is the natural logarithm of sales; CONC is the fraction of assets held by the three largest commercial banks in each country; RIGHTS measures the protection of property rights; CREDITORS measures the protection of creditor rights; ENFORCE measures the country legal enforcement; BFREEDOM measures the openness of the banking and financial system; STRUCT is a proxy of the market-orientation of the country's financial system; FINAN measures the country's financial development. T-statistics are in parentheses. \*\*\*, \*\*, and \* represent the significance at the 1%, 5%, and 10% levels, respectively.

	Total debt		Short-term debt		Long-term debt	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.0247 (1.62)	0.0027 (0.17)	0.0171 (1.02)	-0.0120 (-0.74)	0.0507*** (3.24)	0.0258* (1.67)
$DEBT_{t-1}$	0.8022*** (49.98)	0.8052*** (49.95)	0.5497*** (22.79)	0.5557*** (23.09)	0.6998*** (36.65)	0.7010*** (36.72)
$DEBT_{t-2}$			0.0542*** (4.55)	0.0569*** (4.77)	0.0203* (1.82)	0.0227** (2.04)
PROFIT	-0.1146*** (-3.59)	-0.1169*** (-3.64)	-0.0620** (-2.48)	-0.0615** (-2.47)	-0.0870*** (-3.08)	-0.0893*** (-3.15)
GROWTH	-0.0005 (-1.36)	-0.0005 (-1.37)	-0.0000 (-0.27)	-0.0001 (-0.32)	-0.0006 (-1.22)	-0.0006 (-1.22)
PPE	0.0942 (1.47)	0.0905 (1.45)	0.0431 (1.04)	0.0395 (0.97)	0.1044 (1.31)	0.1026 (1.31)
SIZE	0.0378*** (3.35)	0.0336*** (3.09)	0.0415*** (2.97)	0.0403*** (2.95)	0.0310*** (2.63)	0.0275** (2.50)
CONC	0.0179 (1.01)	0.0217 (1.25)	-0.0745*** (-3.33)	-0.0652*** (-3.02)	0.0303 (1.51)	0.0320* (1.64)
RIGHTSxENFORCE	-0.0023*** (-6.72)	-0.0021*** (-6.09)	-0.0010*** (-3.02)	-0.0006* (-1.75)	-0.0027*** (-8.31)	-0.0022*** (-7.14)
CREDITORSxENFORCE	0.0020*** (11.42)	0.0022*** (12.19)	0.0009*** (4.03)	0.0010*** (4.70)	0.0011*** (5.16)	0.0012*** (5.97)
BFREEDOM	0.0004*** (3.76)	0.0005*** (4.35)	0.0003*** (2.72)	0.0003*** (3.16)	0.0001 (0.56)	0.0001 (0.98)
BFREEDOM x STRUCT	-0.0001* (-1.71)		-0.0002*** (-4.45)		-0.0002*** (-3.96)	
BFREEDOM x FINAN		-0.0003*** (-5.81)		-0.0004*** (-7.28)		-0.0004*** (-7.53)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
$m_1$	-35.34***	-34.93***	-27.48***	-27.56***	-25.12***	-24.88***
$m_2$	-1.55	-1.72	0.92	0.66	0.24	0.04
# observations	52,509	52,655	41,767	41,901	41,767	41,901
# firms	11,040	11,041	9,991	9,994	9,991	9,994

The results in Table 5 show negative coefficients for the interaction of BFREEDOM and the market orientation of the financial system (STRUCT). The positive coefficients of BFREEDOM and the negative ones of BFREEDOMxSTRUCT in columns (1) and (3) indicate that the positive effect of banking liberalization on debt availability diminishes when the country's market orientation increases. The results in column (5) show that greater market orientation increases the average negative effect of banking

liberalization on debt maturity. These results confirm that banking liberalization has greater positive effects on debt availability and less negative ones on debt maturity in countries with bank-oriented financial systems.

Results for countries' financial development are similar to those found for market orientation of the financial system. The negative coefficients of  $\text{BFREEDOM} \times \text{FINAN}$  and the positive ones of  $\text{BFREEDOM}$  in columns (2) and (4) indicate that greater financial development in a country reduces the positive effect of banking liberalization on firms' debt availability. The non-significant coefficient of  $\text{BFREEDOM}$  and the negative one of the interaction  $\text{BFREEDOM} \times \text{FINAN}$  in column (6) indicate that greater financial development causes banking liberalization to have a negative effect on firms' long-term debt.

Concentration of the positive effects of banking liberalization in less developed financial systems is consistent with the idea that a relatively well-developed financial system provides firms with a broad range of financial instruments. As a consequence, banking liberalization has a less positive effect on debt availability and a more negative effect on debt maturity in more financially developed economies. These results are consistent with our hypothesis H.4.

#### *4.5. Banking liberalization, firm size, and financial development*

We now analyze if banking liberalization affects small and large firms differently and if this potential differential influence varies depending on financial development. We therefore include in the regressions three interaction terms:  $\text{BFREEDOM} \times \text{SIZE}$ ,  $\text{BFREEDOM} \times \text{FINAN}$ , and  $\text{BFREEDOM} \times \text{SIZE} \times \text{FINAN}$ . In this specification,  $\text{BFREEDOM}$  captures the influence of banking freedom on smaller firms in less developed countries, while  $\text{BFREEDOM} \times \text{SIZE}$  indicates the difference in the impact of banking freedom when firm size increases in less developed countries.  $\text{BFREEDOM} \times \text{FINAN}$  captures the difference in the impact of banking freedom on smaller firms when countries' financial development increases as opposed to smaller firms in less developed countries ( $\text{BFREEDOM}$ ), and  $\text{BFREEDOM} \times \text{SIZE} \times \text{FINAN}$  indicates the difference in the impact of banking freedom in more financially-developed countries when firm size increases. The results are reported in Table 6.

**Table 6**  
**Banking liberalization, firm size, and financial development**

Regressions are estimated using the Arellano and Bond (1991) one-step GMM difference estimator for panel data with lagged dependent variables. Three dependent variable are used: total, short-term, and long-term debt. The dependent variables are measured as the ratio between the book value of debt and the market value of total assets. As explanatory variables, we include one lag or two lags of the dependent variable ( $DEBT_{t-1}$  and  $DEBT_{t-2}$ ); PROFIT is estimated as EBIT plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets; GROWTH is growth opportunities and is measured by Tobin's Q. PPE is the ratio between tangible assets (property, plant and equipment) and total assets; SIZE is the natural logarithm of sales; CONC is the fraction of assets held by the three largest commercial banks in each country; RIGHTS measures the protection of property rights; CREDITORS measures the protection of creditor rights; ENFORCE measures the country legal enforcement; BFREEDOM measures the openness of the banking and financial system; FINAN measures the country's financial development. T-statistics are in parentheses. \*\*\*, \*\*, and \* represent the significance at the 1%, 5%, and 10% levels, respectively.

	Total debt		Short- term debt		Long- term debt	
	(1)	(2)	(3)	(4)	(5)	(6)
Intercept	0.0376** (2.47)	0.0025 (0.16)	0.0018 (0.12)	-0.0116 (-0.71)	0.0390*** (2.64)	0.0261* (1.68)
DEBT <sub>t-1</sub>	0.8063*** (52.92)	0.8079*** (51.15)	0.5749*** (25.84)	0.5633*** (24.36)	0.7022*** (37.71)	0.7045*** (36.87)
DEBT <sub>t-2</sub>			0.0568*** (4.94)	0.0586*** (4.90)	0.0218** (2.01)	0.0240** (2.15)
PROFIT	-0.1107*** (-3.63)	-0.1077*** (-3.58)	-0.0644*** (-2.63)	-0.0703*** (-2.81)	-0.0854*** (-3.14)	-0.0889*** (-3.24)
GROWTH	-0.0005 (-1.39)	-0.0005 (-1.35)	-0.0002 (-0.81)	-0.0001 (-0.54)	-0.0007 (-1.24)	-0.0007 (-1.23)
PPE	0.1028 (1.60)	0.1012 (1.55)	0.0232 (0.68)	0.0235 (0.68)	0.0956 (1.37)	0.1064 (1.37)
SIZE	0.0370*** (9.86)	0.0328*** (8.50)	0.0275*** (8.04)	0.0256*** (7.33)	0.0187*** (5.36)	0.0159*** (4.29)
CONC	0.0148 (0.88)	0.0222 (1.28)	-0.0665*** (-3.22)	-0.0636*** (-2.98)	0.0340* (1.82)	0.0334* (1.71)
RIGHTSxENFORCE	-0.0024*** (-7.65)	-0.0021*** (-6.17)	-0.0004 (-1.52)	-0.0005 (-1.62)	-0.0022*** (-7.97)	-0.0022*** (-7.06)
CREDITORSxENFORCE	0.0019*** (11.46)	0.0022*** (12.18)	0.0007*** (3.31)	0.0010*** (4.65)	0.0010*** (5.05)	0.0012*** (5.91)
BFREEDOM	0.0004*** (4.09)	0.0005*** (4.70)	0.0002*** (2.63)	0.0003*** (3.01)	0.0000 (0.40)	0.0002 (1.57)
BFREEDOMxSIZE	-0.0000 (-1.15)	-0.0000 (-1.51)	-0.0000 (-1.30)	-0.0000 (-0.51)	-0.000008*** (-2.57)	-0.00001*** (-3.04)
BFREEDOMxFINAN		-0.0003*** (-5.85)		-0.0004*** (-6.06)		-0.0005*** (-7.71)
BFREEDOMxFINANxSIZE		0.00001* (1.95)		-0.0000 (-0.10)		0.00001*** (2.79)
Country dummies	Yes	Yes	Yes	Yes	Yes	Yes
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
m <sub>1</sub>	-35.59***	-35.79***	-29.26***	-28.32***	-23.82***	-24.26***
m <sub>2</sub>	-1.39	-1.76*	0.62	0.58	0.27	-0.09
# observations	55,987	52,655	44,319	41,901	44,319	41,901
# firms	11,845	11,041	10,645	9,994	10,645	9,994

The positive coefficient of BFREEDOM and the negative one of BFREEDOMxFINAN in column (2) indicate that the positive effect of banking liberalization on total debt diminishes when a country's financial development increases. The positive coefficient of BFREEDOMxFINANxSIZE indicates that it is the smaller firms in more financially-



developed countries that see a smaller increase in access to debt when banking liberalization increases. Columns (3) to (6) show how the variation in total debt is explained by changes in short and long-term debt. The non-significant coefficients of  $BFREEDOM \times SIZE$  and  $BFREEDOM \times FINAN \times SIZE$  in columns (3) and (4) do not suggest that the positive impact of banking liberalization on short-term debt depends on firm size. The statistically significant coefficients of these two interaction terms in columns (5) and (6), however, suggest that firm size is important in explaining the impact of banking liberalization on long-term debt. The non-significant coefficient of  $BFREEDOM$  and the negative one of  $BFREEDOM \times SIZE$  suggest that banking liberalization reduces debt maturity to a greater extent in larger firms in less financially-developed countries. This result is consistent with the adverse effects of financing constraints on large firms that Laeven (2003) finds for financial liberalization in firms from 13 emerging countries. He argues that large firms may have had better access to preferential direct credit before the financial liberalization.

We find the opposite result in more developed countries. The negative coefficient of  $BFREEDOM \times FINAN$  and the positive one of  $BFREEDOM \times FINAN \times SIZE$  indicate that smaller firms in more developed countries are the most negatively affected in access to long-term debt when banking liberalization increases. This reduction in long-term debt for smaller firms in more developed countries explains the lower benefits for total debt experienced by these firms when banking liberalization increases. This result is consistent with those found by Petersen and Rajan (1994, 1995) and Zarutskie (2006) in US firms. The model in Petersen and Rajan (1995) suggests that greater competition among creditors discourages them from lending to firms whose credit qualities are not well known, and subsidizing such higher-risk loans by charging higher interest rates as they age. Our result suggests that this relationship banking basically involves smaller firms only in developed countries, whereas in less developed countries it is the larger firms that suffer the greatest reduction in long-term debt when banking liberalization increases.

## **5. Conclusions**

We analyze the effect of banking liberalization on debt structure of firms using a panel database of 11,845 firms in 39 countries during the period from 1995 to 2004. Our results show that banking liberalization increases debt availability and reduces debt maturity because we observe an increase in the total debt ratio based not on an increase in the short-term debt ratio but on a reduction or a non-increase in the long-term debt ratio. These findings suggest the relevance of informational asymmetries to

explain the effects of banking liberalization. When the greater informational asymmetries of long-term debt increase the relevance of relationship banking for solving adverse selection and moral hazard, they reduce the benefits of banking liberalization. This result is consistent with the model of Petersen and Rajan (1995) in which greater banking market competition reduces lending to firms whose credit qualities are not well known because it prevents banks from subsidizing current higher-risk loans by charging higher interest rates in the future and from getting to know the real quality of firms.

We also find that the influence of banking liberalization varies across countries. The increase in debt availability and the reduction in debt maturity are higher in countries with stronger official and private supervision, better protection of property rights and lower protection of creditor rights, and in those with more bank-oriented and less-developed financial systems. We also find that the effect of banking liberalization varies with firm size depending on financial development. Larger firms in poorly-developed financial systems and smaller firms in well-developed financial systems benefit the least from banking liberalization.

The results have important policy implications for banking liberalization processes. The empirical results suggest caution when a banking liberalization process is adopted because, although it will increase the total debt available for firms, it will also reduce debt maturity. Although the effects are not equal across countries, we can propose some policy recommendations for banking liberalization. In particular, successful banking liberalization requires a good-quality institutional environment as we even find a reduction in firms' access to short-term debt in countries with the lowest protection of property rights. Banking liberalization also requires strong official supervision to provide positive effects for firms' debt availability. This implies that liberalization policies must go together with reinforcement of the power of authorities in countries where official supervision is less developed. Moreover, banking liberalization reduces firms' access to long-term debt, specially in countries with more developed and market-oriented financial systems. Unlike the mixed effects of banking liberalization, better protection of creditor rights increases access to both short-term and long-term debt, so increasing such protection would be an effective way of improving the credit channel.

## Appendix A

### Variables

The table shows the definition of variables used in the paper and their sources.

Name	Definition	Source
DEBT STRUCTURE		
Total debt	The ratio between total debt and market value of assets. The market value of assets is estimated adding the market value of equity and the book value of debt.	Worldscope
Short-term debt	The ratio between short-term debt and market value of assets. The market value of assets is estimated adding the market value of equity and the book value of debt.	Worldscope
Long-term debt	The ratio between long-term debt and market value of assets. The market value of assets is estimated adding the market value of equity and the book value of debt.	Worldscope
BANKING LIBERALIZATION		
BFREEDOM	Composite index of the extent of government regulation of financial services; the extent of state intervention in banks and other financial services; the difficulty of opening and operating financial services firms (for both domestic and foreign individuals); and government influence on the allocation of credit.	Heritage Foundation
OTHER COUNTRY VARIABLES		
RIGHTS	Indicator of the degree to which private property rights are protected and the degree to which government enforces laws that protect private property. It also accounts for the possibility that private property may be expropriated, and analyzes the independence of the judiciary, corruption within the judiciary, and the ability of individuals and businesses to enforce contracts. It ranges between 1 and 5. We reverse the scale of the original index, so that a high score indicates greater legal protection of property.	Heritage Foundation
CREDITORS	This index measures four powers of secured lenders in bankruptcy: (1) whether there are restrictions, such as creditor consent, when a debtor files for reorganization; (2) whether secured creditors are able to seize their collateral after the petition for reorganization is approved, that is, whether there is no automatic stay or asset freeze imposed by the court; (3) whether secured creditors are paid first out of the proceeds of liquidating a bankrupt firm; and (4) whether an administrator, and not management, is responsible for running the business during the reorganization. A value of one is added to the index when a country's laws and regulations provide each of these powers to secured lenders, consequently it varies between 0 (poor creditor rights) and 4 (strong creditor rights).	Djankov <i>et al.</i> (2007)
ENFORCE	Annual index of law and order of the International Country Risk Guide (ICRG). This ranges from 0 to 6 with a higher figure indicating a better quality and enforcement of the legal system.	ICRG published by the Political Risk Service Group
CONC	The fraction of bank assets held by the three largest commercial banks in the country.	World Bank Database
OFFICIAL	Official supervisory power, ranging from 0 to 16, captures the power of supervisors to take prompt corrective action, to restructure and reorganize troubled banks, and to declare a troubled bank insolvent. Higher values indicate greater power of supervisors.	Barth <i>et al.</i> (2001)
MONITOR	Private oversight, ranging from 0 to 12, measures the intensity of audit and information disclosure requirements, and whether subordinated debt is allowable as a part of regulatory capital. Higher values indicate greater private oversight.	Barth <i>et al.</i> (2001)
STRUCT	The first principal component of two variables that measure the comparative activity and size of markets and banks. Each of the underlying components is constructed so that higher values indicate more market-based financial systems. The first component is the natural logarithm of the ratio of value traded to bank credit. Value traded equals the value of stock transactions as a share of national output. Bank credit equals the claims of the banking sector on the private sector as a share of GDP. The second component equals the natural logarithm of the ratio of market capitalization to bank credit. Market capitalization is defined as the value-listed shares divided by GDP, and is a measure of the size of stock markets relative to the economy.	Financial Structure and Economic Database (Beck <i>et al.</i> , 2003)
FINAN	The first principal component of two underlying measures of financial development. The first is a measure of the overall activity of financial intermediaries and markets. It equals the natural logarithm of the product of private credit (the value of credits by financial intermediaries to the private sector divided by GDP) and value traded (the value of total shares traded on the stock market exchange divided by GDP). Private credit includes credits by both bank and non-bank intermediaries. The second is a measure of the overall size of the financial sector and equals the natural logarithm of the sum of private credit and market capitalization.	Financial Structure and Economic Database (Beck <i>et al.</i> , 2003)
CONTROL VARIABLES AT FIRM LEVEL		
PROFIT	Earnings before interest and taxes plus depreciation expenses and provisions (non-cash deductions from earnings) divided by total assets	Worldscope
GROWTH	The market-to-book ratio	Worldscope
PPE	The percentage of property, plant and equipment in total assets	Worldscope
SIZE	The natural logarithm of total sales	Worldscope

## Appendix B

### Index of Banking Freedom

The table describes the ten categories of the Banking and Finance Index established by the Heritage Foundation. The scale runs from 0 to 100: A higher score signifies a less restrictive banking industry. Source: 2009 Index of Economic Freedom. Heritage Foundation

Score	Government influence	Criteria
100	Negligible	Independent central bank supervision and regulation of financial institutions are limited to enforcing contractual obligations and preventing fraud.
90	Minimal	Independent central bank supervision and regulation of financial institutions are minimal but may extend beyond enforcing contractual obligations and preventing fraud.
80	Nominal	Independent central bank supervision and regulation of financial institutions are minimal but may extend beyond enforcing contractual obligations and preventing fraud. Government ownership of financial institutions is a small share of overall sector assets. Financial institutions face almost no restrictions on their ability to offer financial services.
70	Limited	Credit allocation is slightly influenced by the government, and private allocation of credit faces almost no restrictions. Foreign financial institutions are subject to few restrictions.
60	Significant	The central bank is not fully independent, its supervision and regulation of financial institutions are somewhat burdensome, and its ability to enforce contracts and prevent fraud is insufficient. The government exercises active ownership and control of financial institutions with a significant share of overall sector assets. The ability of financial institutions to offer financial services is subject to some restrictions.
50	Considerable	Credit allocation is significantly influenced by the government, and private allocation of credit faces significant barriers. The ability of financial institutions to offer financial services is subject to significant restrictions. Foreign financial institutions are subject to some restrictions.
40	Strong	The central bank is subject to government influence, its supervision and regulation of financial institutions are heavy, and its ability to enforce contracts and prevent fraud is weak. The government exercises active ownership and control of financial institutions with a large minority share of overall sector assets.
30	Extensive	Credit allocation is extensively influenced by the government. The government own or controls a majority of financial institutions or is in a dominant position. Financial institutions are heavily restricted, and bank formation faces significant barriers. Foreign financial institutions are subject to significant restrictions.
20	Heavy	The central bank is not independent, and its supervision and regulation of financial institutions are repressive. Foreign financial institutions are discouraged or highly constrained.
10	Near repressive	Credit allocation is controlled by the government. Bank formation is restricted. Foreign financial institutions are prohibited.
0	Repressive	Supervision and regulation are designed to prevent private financial institutions. Private financial institutions are prohibited.

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