

Information Sharing, Creditor Rights, and Corporate Debt Maturity*

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Abstract

This paper investigates private and public credit registries and legal creditor rights as determinants of corporate debt maturity in 45 countries. We find that information sharing among creditors and legal protection of creditor rights are associated with higher ratios of long-term corporate debt to total corporate debt. Ex-ante better credit information acts as a substitute for ex-post stronger creditor protection in lengthening the maturity of corporate debt in less developed countries. Regulations requiring that both positive and negative credit information are distributed and that secured creditors are paid first in bankruptcy influence corporate debt maturity across countries.

Keywords: debt maturity, information sharing, creditor protection, capital structure, financial development.

* The authors thank Martin Brown, Xin Chang, Stijn Claessens, Hans Degryse, Simeon Djankov, Robert Hauswald, Paul Kofman, Michael Lemmon, Steven Ongena, Luc Renneboog, Peer Stein, and seminar participants at the World Bank, the European Finance Association 2007 Meeting (Ljubljana), the Financial Management Association 2009 Meeting (Reno) and the China International Conference in Finance 2010 Meeting (Beijing), for their valuable comments and suggestions. We are grateful to the FSDI team of the World Bank, in particular Stijn Claessens and Konstantinos Tzioumis, for kindly providing us with data. This research was partially funded by the Research Grants program of the Finance, Private Sector and Infrastructure Department, Latin America and the Caribbean Region, World Bank. Email addresses: msorge@ifc.org, chendi.zhang@wbs.ac.uk. Corresponding author: Chendi Zhang, Finance Group, Warwick Business School, Coventry CV4 7AL, UK. Tel: 0044 24 765 28200. Fax: 0044 24 765 23779.

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Abstract

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1. Introduction

A common problem faced by many firms around the world is the scarce availability of long-term sources of funds. Exclusive reliance on short-term borrowing may expose companies to illiquidity risks and reduce their overall growth potential.¹ To address these issues, many countries have embarked on policies promoting the development of long-term loan or bond markets with mixed results. However, while the negative implications of excessive short-term borrowing on growth and stability are well known (e.g. Chang and Velasco, 2001 and Demirguc-Kunt and Maksimovic, 1998), there is no consensus on its underlying determinants and hence the main priorities for reform.

Under various assumptions, the decision to borrow at short-term maturities has been modelled in the corporate finance literature as a solution to debt-related agency problems (Barnea, Haugen and Senbet, 1980), or justified as a disciplinary tool to limit moral hazard (Rey and Stiglitz, 1993), as the result of coordination failures among banks (Dewatripont and Maskin, 1995), driven by the fear of early project termination by uninformed investors (Von Thadden, 1995), or as the consequence of illiquidity problems and inadequate regulation and institutions (Diamond and Rajan, 2000). In a signalling framework under asymmetric information, firms with favorable insider information may distinguish their quality by issuing short-term debt and roll it over, provided issuing costs are sufficiently high (Flannery, 1986, and Diamond, 1991). Although most existing empirical studies on corporate debt maturity focus on individual countries (mainly the US), there is a growing literature on how institutional differences across countries influence maturity choices (see, Demirguc-Kunt and Maksimovic, 1999, and Giannetti, 2003). In the spirit of the law and finance literature initiated by La Porta, Lopez-de-Silanes, Shleifer and Vishny (LLSV, 1997), the above empirical papers capture the effects of legal systems by variables such as legal origins and corruption.

¹ The recent turmoil in financial markets has illustrated the adverse impact of reliance on short-term borrowing on the real economy, even in developed countries. For example, Northern Rock, a large British bank, relied significantly on short-term borrowing from the money market (e.g. commercial papers) to finance its long-term mortgage lending business. Following the US subprime mortgage crisis, liquidity problems at the bank have recently triggered the first bank run in the UK in more than a century. The bank was eventually nationalized in February 2008. Another example of the adverse consequences of short-term borrowing is the recent banking and economic crisis in Iceland. In autumn 2008, three large Icelandic banks, i.e. Glitnir, Kaupthing, and Landsbanki, were nationalized. These banks were among the casualties of the global crisis as their short-term funding from abroad evaporated due to the market turmoil following the collapse of Lehman Brothers.

Recent research in the development of credit markets across countries shows that institutions facilitating sharing of credit information (such as public and private credit registries) or protecting creditor rights through the legal system foster the growth of private credit markets (LLSV, 1998; Jappelli and Pagano, 2002). Very little is known about how these institutions affect debt maturity. Djankov, McLiesh, and Shleifer (DMS, 2007) find that higher levels of information sharing among creditors and stronger creditor rights are associated with a larger private credit market relative to gross domestic product. Institutions facilitating information sharing plays a relatively more important role in less developed countries with weaker legal systems. In other words, both ex ante better information for creditors and ex post stronger creditor rights contribute to credit market expansion. Recent studies also find that information sharing helps lenders to select good borrowers (Pagano and Jappelli, 1993), overcome moral hazard of borrowers (Padilla and Pagano, 2000), reduce non-performing loans and the costs of firm financing (Brown, Jappelli and Pagano, 2009), reduce corruption in bank lending (Barth, Lin, Lin and Song, 2007), decrease bank risk-taking and lead to higher economic growth (Houston, Lin, Lin and Ma, 2010).

As both ex ante information acquisition via credit bureaus and ex post creditor powers in bankruptcy affect the contracting environment, they are likely to have an important impact on firms' debt maturity structure across different countries. For example, better credit information and stronger creditor protection may increase the maturity horizon at which banks feel safe to lend. Absent in the literature is a study of the links between information sharing, creditor rights, and corporate debt maturity. Our study aims to fill the gap between the two strands of literature by investigating the impact of institutions aiming at reducing credit information asymmetries and protecting creditor rights on the structure of corporate debt maturity using panel data from 45 countries. In particular, we focus on public and private credit bureaus and creditor powers in bankruptcy as determinants of debt maturity structure after controlling for the impact of legal enforcement, financial development and other macro and micro factors.

The main findings of the paper can be summarized as follows. First, higher levels of information sharing (as proxied by the existence and coverage of private and public credit registries as well as the depth of credit information) are associated with a higher share of long-term debt as a proportion of total corporate debt in both developed and developing countries. The results are very robust with respect to alternative measures of information sharing, different control variables and different estimation methodology. This suggests that

information sharing helps reduce problems of adverse selection and moral hazard in the bank-firm relationship. Second, countries with weaker legal protection of creditor rights or higher corruption are characterized by higher ratios of short-term debt to total debt in the corporate sector. This is consistent with the view that short-term lending acts as a valuable hedge against uncertainty or a disciplinary device from the lender's perspective. Third, there exists an important interactive effect between information sharing and creditor rights, which supports the substitution hypothesis. More specifically, corporate debt maturity is less sensitive to creditor rights (information sharing) in the presence of information sharing (strong creditor protection) as both types of institutions help banks reduce credit risk and discipline borrowers. Consistent with DMS (2007), creditor protection is relatively more important in more developed countries. Fourth, certain aspects of credit bureaus and bankruptcy laws are particularly important for lengthening debt maturity. They include regulations requiring that both positive and negative credit information are distributed and that secured creditors are paid first in bankruptcy. In addition, some aspects of the collateral law, especially those regarding how firms' assets can be used as collateral, also seem to matter for debt maturity. This supports the view of collateral as a contractual device to increase lenders' incentive to monitor (Rajan and Winton, 1995). Finally, macroeconomic environment and firm characteristics matter for corporate debt maturity. After unobserved heterogeneity across countries is controlled for, we find a higher ratio of long-term to total corporate debt in countries with more developed financial sector, higher GDP growth, lower inflation, or characterized by larger and more profitable firms. Overall, our findings suggest that promoting institutions and policies to improve levels of information sharing and creditor rights around the world is an important prerequisite for increasing access of firms to long-term finance.

The paper contributes to the literature over three important dimensions. First, we contribute to the literature on the determinants of corporate debt maturity across countries (e.g. Dermirguc-Kunt and Maksimovic, 1999, and Giannetti, 2003). Given the significance of debt maturity for economic growth and stability, it is important to understand how credit information and creditor powers, among other macro and micro factors, influence the maturity structure of firms' debt around the world. Perhaps the most related paper is the recent work by Fan, Titman and Twite (2008) who study country- and firm-level determinants of capital structure and debt maturity of firms across countries. While they capture the impact of legal institutions by legal origins and corruption, our paper is the first to

study the complex effects of information sharing and creditor rights on debt maturity. Second, we extend the literature on the roles of information sharing institutions. Recent empirical research shows that information sharing among creditors contributes to higher volumes of lending/borrowing activities (DMS, 2007), lower costs of financing (Brown et al, 2009), lower corruption in banking lending (Barth et al, 2007) and higher economic growth (Houston et al, 2010). This paper analyzes the maturity dimension upon which information sharing influences credit markets. Third, our paper adds to the recent debate on the substitution between information sharing and creditor rights (Bennardo, Pagano and Piccolo, 2009). Previous research suggests that information sharing may act as a substitute for creditor protection in expanding private credit markets in developing countries (DMS, 2007; Brown et al., 2009). This paper contributes to this line of research by analyzing the important interactive effect of these institutions in lengthening debt maturity.

The paper is organized as follows. Section 2 reviews the related literature and develops testable hypotheses on information sharing and creditor rights as determinants of debt maturity. Section 3 introduces the data, and Section 4 discusses the empirical results and robustness checks. Section 5 concludes and draws some policy implications.

2. Effects of information sharing and creditor rights on debt maturity structure

To the extent that information sharing and creditor rights affect the contracting environment, they are likely to have important influences on debt maturity choices of firms. In this section we review the related literature and discuss the channels through which information sharing and creditor rights affect corporate debt maturity. This helps us draw testable hypothesis for our empirical analysis, and highlight our contribution to the literature.

2.1 Determinants of corporate debt maturity

Since Stiglitz (1974) extended Modigliani and Miller's (1958) contribution to formally establish debt maturity irrelevance in perfect markets, the literature in corporate finance on debt maturity choices has identified a variety of imperfections in capital markets that can explain why the choice of maturity in fact matters.²

² For instance, theories of debt maturity have focused on the role of agency costs (see, Myers, 1977, and Barnea, Haugen and Senbet, 1980), tax (see, Brick and Ravid, 1985), coordination failures among banks (Dewatripont and Maskin, 1995), and marking timing (Greenwood, Stein, and Hanson, 2009).

A number of theoretical studies explain why risky firms with long-term projects might borrow on a short-term basis in the presence of asymmetric information. Using a signalling framework, Flannery (1986) shows that firms with favorable insider information may distinguish their quality by issuing short-term debt and roll it over, provided issuing costs are sufficiently high. The model predicts that debt maturity is shorter when there are more information asymmetries and less risk. By incorporating liquidity risk into a framework similar to that in Flannery's model, Diamond (1991) shows that debt maturity is a non-monotonic function of risk ratings: the shortest maturity for both the lowest and highest risk ratings. Rajan (1992) analyzes how information asymmetries and bargaining power affect the choice between short- and long-term debts from arm's length lenders, and Diamond (1993) links the choice of maturity with the choice of seniority of debt contracts under asymmetric information. Using a hidden-action model, Rey and Stiglitz (1993) have further demonstrated the disciplinary role of short-term lending to resolve moral hazard problems. They show that short-term lenders have desirable incentives to exert control and invest in monitoring, and the possibility of not rolling over loans is an effective threat over firms. Furthermore, Von Thadden (1995) argues that monitoring by lenders helps overcome the short-term bias of corporate investment under asymmetric information. In addition, Sorge and Zhang (2007) emphasize the benefits of short-term contracts as a screening device for banks in high-risk credit markets through repeated short-term lending relationships.³

A number of empirical studies have focused on the impact of information asymmetries on the choice of debt maturity by firms within individual countries,⁴ or across countries.⁵ Using loan-level data for the US, Berger, Espinosa-Vega, Frame and Miller (2005) investigate the importance of information asymmetries and credit risk ratings for loan maturity choices. They find that information asymmetries reduce loan maturities and, consistent with Diamond

³ While earlier models have been primarily concerned with financing choices in closed economies, recent financial turmoil in emerging markets has stimulated research into the linkages between debt maturity, the term structure of interest rates and the possibility of self-fulfilling currency and banking crises (see, e.g., Kaminsky and Reinhart, 1999, Demirguc-Kunt and Detragiache, 1998). Short-term debt has often been criticized as a source of financial instability. On the one hand, a number of theoretical studies show that the accumulation of short-term external debt is important in the generation of self-fulfilling financial crises (see Chang and Velasco, 2001, Rodrik and Velasco, 1999). On the other hand, Diamond and Rajan (2000) argue that the build-up of short-term debt in emerging markets is the consequence of the illiquidity and poor quality of investments in countries lacking adequate regulation and institutions. Detragiache and Spilimbergo (2002) find empirical evidence supporting this theory.

⁴ See, Barclay and Smith (1995), Guedes and Opler (1996), Stoh and Mauer (1996), Barclay, Marx and Smith (2003), Johnson (2003), Berger, Espinosa-Vega, Frame and Miller (2005), Ortiz-Molina and Penas (2008) and Billett, King and Mauer (2007) for the US studies.

⁵ See, Demirguc-Kunt and Maksimovic (1999), Giannetti (2003), and Fan, Titman and Twite (2008). Schmukler and Vesperoni (2006) analyze debt maturity for emerging market firms.

(1991), the relationship between debt maturity and risk ratings is found to be stronger when information asymmetries are higher. Furthermore, recent research also shows that managerial stock ownership and executive compensation influences corporate debt maturity (Datta, Iskendar-Datta, and Raman, 2005; Brockman, Martin, and Unlu, 2010).

This paper contributes to the empirical literature by investigating the impact of institutions aiming at reducing credit information asymmetries or protecting creditor rights on the structure of corporate debt maturity across countries. To the best of our knowledge our paper is the first to study the effects of these institutions as important determinants of debt maturity structure.

2.2 Effects of information sharing on debt maturity

When banks consider loan applications, they can gather credit information from applicants and engage in direct screening. Alternatively, they can acquire this information from an information sharing institution who record borrowers' characteristics, credit history (positive and/or negative), and current debt exposure to other lenders. The institution can be either public (government-owned) or private credit bureaus.

Previous studies show that these information sharing institutions help the development of private credit markets (Jappelli and Pagano, 2002 and DMS, 2007). They contribute to less severe financial constraints faced by firms in developing countries (Galindo and Miller, 2001), better access to credit (Barron and Staten, 2003) and better firm performance (Kallberg and Udell, 2003). In addition, the literature finds that information sharing helps lenders to select good borrowers (Pagano and Jappelli, 1993), overcome moral hazard of borrowers (Padilla and Pagano, 2000), reduce non-performing loans and the costs of firm financing (Brown, Jappelli and Pagano, 2009), reduce corruption in bank lending (Barth et al., 2007), decrease bank risk-taking and lead to higher economic growth (Houston et al, 2010).

Economic theory suggests at least two channels through which the level of information sharing among creditors affects corporate debt maturity. First, information sharing helps reduce the information asymmetry when a bank makes lending decisions. The reduction in asymmetric information helps banks select good borrowers *ex ante* and reduces the adverse selection problem of financing (Pagano and Jappelli, 1993). This may contribute to longer debt maturities as firms are less willing to engage in costly signalling of borrowing short-term

(Flannery, 1986 and Diamond 1991) and banks rely less on short-term lending as a screening device to learn about firms' credit quality (Sorge and Zhang, 2007). Alternatively, long-term debt may be more information-sensitive than short-term debt. When adverse selection is less severe, firms are more willing to issue long-term debt. This implies that information sharing may help lengthen corporate debt maturity. A related implication is that information sharing is relatively more important in less developed countries where accounting standards are less transparent and information asymmetry is higher in the bank-firm relationship.

Second, information sharing improves borrowers' incentives to repay the loans and helps overcome moral hazard of borrowers (Padilla and Pagano, 2000). If a firm defaults, its creditors share this information with other creditors through credit registries. This may increase the costs for the firm to obtain credit in the future and make the borrower more motivated to repay its loan. Experimental evidence by Brown and Zehnder (2007) confirms that a credit registry motivates borrowers to repay loans. As information sharing helps overcome moral hazard of borrowers, higher levels of information sharing may make banks relying less on using short-term debt as a disciplinary tool (Rey and Stiglitz, 1993) and hence more willing to provide long-term credit to firms.⁶

Therefore, as information sharing helps mitigate the problems of adverse selection and moral hazard in the bank-firm relationship, we expect *countries with higher level of information sharing to be associated with a lower ratio of short-term to total corporate debt, all other things being equal.*

2.3 Effects of creditor rights on debt maturity

Creditor rights influence debt maturity in at least three ways. First, stronger creditor protection gives creditors more power in bankruptcy. When the legal system provides better protection to creditor rights, creditors are more likely to force repayment, take collateral, and gain control of borrowers in case of bankruptcy. This increases the recovery rate of loans and reduces creditors' risk. The reduction in credit risk may make creditors more willing to face the higher uncertainty associated with providing longer-term finance. Similarly, weaker

⁶ Better Information sharing may also increase the competition between banks as hold-up problems in lending relationships are reduced. This may reduce credit availability of risky young firms (Petersen and Rajan, 1995) and hence influence debt maturity. However, this competition effect should have little influence on our empirical test as this paper focuses on the debt maturity of listed firms, which tend to have better access to finance than smaller unlisted firms.

creditor rights and costly enforcement may make banks prefer lend short-term as a hedge against uncertainty. In a theory of financial structure based on the degree of legal protection of creditor rights and on legal enforcement costs, Diamond (2007) predicts that firms' debt will be short-term when legal enforcement is costly or corrupt.

Second, stronger creditor rights may increase borrowers' incentives to repay loans and avoid bankruptcy. When creditor rights are stronger, e.g. in terms of replacement of management or restrictions on reorganization, bankruptcy clearly imposes higher costs on a firm's management. This may reduce the likelihood of a firm engaging in excessive risk taking and asset substitution. Acharya, Amihud and Litov (2009) find international evidence that stronger creditor rights lead to lower corporate risk taking in diversifying acquisitions. The reduction in moral hazard of borrowers may make banks more willing to provide long-term finance. In contrast, weak creditor rights encourage borrowers' opportunistic behaviour, which may make banks prefer lending short-term to cope with the increased uncertainty.

Third, legal protection of creditor rights may influence creditors' incentives to monitor firms after loans are granted. As discussed above, stronger creditor rights may increase the recovery rate of loans if a firm defaults. This may weaken the incentives of creditors to invest in costly monitoring (Houston et al, 2010). The reduction in monitoring incentives may encourage banks to use short-term loans as a disciplinary tool with minimum efforts (Rey and Stiglitz, 1993; Rajan and Winton, 1995).

Therefore, the effects of creditor rights on corporate debt maturity are complex. On the one hand, stronger creditor rights may lengthen debt maturity as creditors have more power in bankruptcy and borrowers have higher incentives to repay loans. On the other hand, banks may be more willing to issue short-term loans when stronger creditor rights reduce the marginal benefits of investing in costly monitoring. We expect *better protection of creditor rights to be associated with a lower ratio of short-term to total corporate debt, if its negative impact on monitoring is limited.*

2.4 The interactive effects of information sharing and creditor rights

Institutions of information sharing and creditor rights are not mutually exclusive. Both ex ante better information for creditors and ex post stronger creditor rights can influence the contracting environment and affect corporate debt maturity. Prior research shows that creditor rights are relatively more important for private credit in developed countries, whereas

information sharing improves credit access in developing countries (DMS, 2007; Brown et al, 2009). In a model of multiple-bank lending, Bennardo, Pagano and Piccolo (2009) show that information sharing may act as a substitute for creditor rights protection.

Information sharing may interact with creditor rights in two different ways in affecting debt maturity. First, both better information sharing and stronger creditor rights are mechanisms helping banks reduce credit risk. In countries with weak creditor rights, banks may be unwilling to lend long-term due to their limited power *ex post* and reduced recovery rate of loans in bankruptcy. The reluctance of lending long-term may not be as strong if the banks can mitigate the risk by select good borrowers *ex ante* through the help of credit bureaus (Pagano and Jappelli, 1993). Similarly, the impact of information sharing on debt maturity may be weaker in countries with stronger creditor rights: when creditors have strong power *ex post*, e.g. to replace firms' management in bankruptcy, they may be willing to lend long-term even in the absence of information sharing.

Second, both information sharing and strong creditor protection help enhance borrowers' incentives to repay loans and avoid bankruptcy. In countries with weak creditor rights, banks may prefer use short-term debt as a disciplinary tool to limit the excessive risk taking of borrowers. The reliance on short-term lending may not be as strong if borrowers are motivated to repay loans as credit bureaus share information on defaults with other creditors (Padilla and Pagano, 2000).

Therefore, both information sharing and creditor protection help banks reduce credit risk and discipline borrowers. This leads us to expect that *information sharing and creditor rights are substitutes in influencing corporate debt maturity*. As far as we are aware, this paper is the first to analyze the important interactive effect of these institutions in affecting debt maturity.

Taken together, the analysis in Section 2 leads us to expect that a higher level of information sharing is associated with a lower level of short-term debt relative total debt in the corporate sector. Protection of creditor rights may also help reduce the ratios of short-term debt, if its negative impact on monitoring is limited. Furthermore, better information sharing may be a substitute for stronger creditor rights in lengthening corporate debt maturity. In order to test these hypotheses with empirical data, we will use detailed information on private/public credit bureaus and creditor powers across countries and over time. We will use variables on

legal enforcement, financial development, macroeconomic environment and firm characteristics as additional determinants of the debt maturity structure.

3. Data and Summary Statistics

In order to examine the determinants of the debt maturity structure of firms in countries at different levels of development, we construct a novel database including a number of institutional, macro and micro variables, as briefly illustrated below.

We measure the debt maturity structure of a firm by the ratio of short-term interest-bearing debt (i.e. debt obligations with maturity less than one year) to total interest-bearing debt in the firm's balance sheet using the WorldScope. Using the World Bank FSDI database, we calculate this ratio across firms for all countries for which we have data for at least 20 firms, and these firms represent more than 20 percent of the stock market capitalization in that country. This leads to our sample of a total of 14,178 publicly listed firms in 27 industrial economies and 18 developing economies over the period 1994-2004.⁷ In the analysis in Section 4, our dependant variable is the cross-sectional average of the short-term-debt to total-debt ratios across firms for each country in each year. Using the average short-term debt ratio helps filter out the dependence or clustering of firm-specific characteristics within a country.

3.1 Measuring information sharing

As postulated in Section 2, information sharing among creditors is likely to increase the maturity horizon at which financial institutions feel safe to lend. We employ several measures of information sharing among lenders. The main sources for these data are the World Bank/IFC "Doing Business" database as well as the World Bank Public and Private Credit Registries Surveys. In addition, we obtain the credit registries establishment dates from Miller (2003), Love and Mylenko (2003), and Djankov, McLiesh and Shleifer (2007).

⁷ The industrial economies in our sample are Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong (China), Ireland, Israel, Italy, Japan, the Republic of Korea, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, Taiwan (ROC), United Kingdom, and United States. The developing countries are Argentina, Brazil, Chile, China, Czech Republic, Hungary, India, Indonesia, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Russian Federation, South Africa, Thailand, and Turkey.

Following DMS (2007), our first measure *D Information Sharing* is an indicator variable regarding the existence of an information sharing institution (i.e. a public registry or private bureau). The second variable *Depth of Credit Information* is an index measuring the rules affecting the scope, accessibility and quality of credit information available through either public or private credit registries. The data are collected from the World Bank/IFC “Doing Business” database. A value of one is added to the index for each of the following six aspects of a public or private credit registry (or both): (i) both positive credit information (e.g., loan amounts and pattern of on-time repayments) and negative information (e.g., late payments, number and amount of defaults and bankruptcies) are distributed; (ii) data on both firms and individuals are distributed; (iii) data from retailers, trade creditors and utility companies are distributed to financial institutions; (iv) more than two years of historical data are distributed; (v) data on loans below 1% of income per capita are distributed; and (vi) regulations are provided to guarantee borrowers the right to access their data in the largest registry in the economy. The index ranges from zero to six, with higher values indicating the better availability of credit information, from either a public registry or a private bureau, to facilitate lending decisions.

In addition, we employ three more detailed measures of information sharing: (i) *D Private Credit Bureau* and *D Public Credit Registry* are indicator variables regarding the existence of a private or public registry; (ii) *Private Credit Bureau Coverage* and *Public Credit Registry Coverage* measure the extent of coverage of individuals and companies by private or public registries as a percentage of the adult population; and (iii) six indicator variables capture the above mentioned six features of public or private registries: *Positive/Negative Information*, *Firms/Individuals Covered*, *Trade/ Retailers Information*, *Historical Data*, *Small Loans Covered*, and *Borrowers’ Rights*.⁸

3.2 Measuring legal rights of creditors and borrowers

LLSV (1998) develop a creditor rights index to measure the powers of secured creditors in bankruptcy. The creditor rights index is obtained by adding a score of one for each of the

⁸ Each of these proxies for the quality of credit information has its own advantages and disadvantages. The credit bureau coverage variables have more cross-country and time-series variation than indicator variables, but they may be predominantly driven by the coverage of retail borrowers rather than corporate loans. This problem is less pronounced for public credit registries, as most of them have loan cut-off minimum amounts, usually excluding retail or small business loans. Additionally, we find that countries with higher coverage of private credit bureaus also have higher percentage of firms rated by either S&P or Moody's (the correlation coefficient is 0.38 and statistically significant).

following provisions of creditor protections: (i) there are restrictions, such as creditor consent or minimum dividends, for a debtor to file for reorganization; (ii) the bankruptcy laws prohibit an automatic stay on assets; (iii) secured creditors are paid first out of the proceeds of liquidating a bankrupt firm; and (iv) creditors can dismiss managers and replace them with administrators when a firm becomes bankrupt. We use the *Creditor Rights* variable reported in DMS (2007), who introduce time-variations in the index due to reforms of bankruptcy laws. The index ranges from zero (weak creditor rights) to four (strong creditor rights). For a more detailed analysis of creditor rights, we also use four indicator variables to capture the above four components of the index: *Restrictions on Reorganization*, *No Automatic Stay*, *Secured Creditors Paid First*, and *No Management Stay*.

Legal rights of creditors as well as borrowers are likely to influence the maturity horizon at which lending and borrowing activities take place. For example, collateral of borrowers can be motivated as a contractual device to increase lenders' incentive to monitor (Rajan and Winton, 1995). This may reduce banks' use of short-term debt as a disciplinary device (Rey and Stiglitz, 1993). As robustness checks, we use the *Legal Rights* index, as reported in the World Bank/IFC Doing Business database, to measure the degree to which collateral and bankruptcy laws protect the rights of borrowers and lenders. The legal rights index includes eight aspects related to legal rights in collateral law and two aspects in bankruptcy law. A score of one is added for each of the following features of the laws: (i) any business may use movable assets as collateral while keeping possession of the assets, and any financial institution may accept such assets as collateral; (ii) the law allows a business to grant a non possessory security right in a single category of revolving movable assets (such as accounts receivable or inventory), without requiring a specific description of the secured assets; (iii) the law allows a business to grant a non possessory security right in substantially all of its assets, without requiring a specific description of the secured assets; (iv) a security right may extend to future or after-acquired assets and may extend automatically to the products, proceeds or replacements of the original assets; (v) general description of debts and obligations is permitted in collateral agreements and in registration documents; (vi) a collateral registry is in operation that is unified geographically and by asset type and that is indexed by the name of the grantor of a security right; (vii) secured creditors are paid first (e.g., before general tax claims and employee claims) when a debtor defaults outside an insolvency procedure; (viii) secured creditors are paid first when a business is liquidated; (ix) secured creditors are not subject to an automatic stay or moratorium on enforcement

procedures when a debtor enters a court supervised reorganization procedure; and (x) the law allows parties to agree in a collateral agreement that the lender may enforce its security right out of court. The index ranges from zero to ten, with higher scores indicating that collateral and bankruptcy laws are better designed to facilitate lending. In addition to using the aggregate index, we also use ten indicator variables to capture the individual components of the index: *Movable Assets*, *Revolving Movable Assets*, *All Assets*, *Future Assets*, *General Description of Debt*, *Collateral Registry*, *Secured Creditors Paid First (Outside Procedure)*, *Secured Creditors Paid First (In Liquidation)*, *No Automatic Stay*, and *Enforcement Out of Court*. Note that *Movable Assets* will be dropped from the regressions due to the lack of variability.

3.3 Country controls and firm characteristics

The differences in corporate debt maturity structures across countries may reflect varying quality of legal institutions and contracting environments (see Demirguc-Kunt and Maksimovic, 1998). Not only laws matter for credit contracting, but also the actual enforcement of laws. A proxy for the level of enforcement is *Contract Enforcement Days*, which measures the average days it takes for a creditor to secure an outstanding payment through the courts if a debtor defaults (DMS, 2007). We control for the level of enforcement and corruption in the legal system by including variables on the logarithm of *Contract Enforcement Days*, as well as the (reverse of) *Corruption* perception indices provided by Transparency International.

In order to control for characteristics of the local banking sector and the degree of domestic financial development, we use the ratio of total deposits in the financial system to GDP, the ratio of the private bond market capitalization to GDP, and the ratio of overhead costs to bank assets (as a measure of banking sector efficiency) obtained from Beck, Demirguc-Kunt and Levine (2000). In addition, we control for whether or not a country is one of the world's major financial centers, i.e. US, UK, Switzerland and Japan, and whether or not a country is experiencing a systemic banking crisis as defined in Caprio and Klingebiel (2003).

Macroeconomic variables may also influence firms' choices of debt maturity. In particular, GDP growth rate is a proxy for the growth opportunity faced by firms (Smith and Watts, 1992), and the inflation rate provides evidence for firms and banks on whether the local currency is a stable or risky measure of value to be used in long-term contracting. Hence we

include among our controls the growth rate of GDP per capita as well as indices of consumer price inflation. A dummy variable is also added to control for any structural differences between developed and developing economies not already captured by other explanatory variables.

Finally, we use a set of micro-level variables to control for the differences in firm characteristics across countries. The choice of these variables is based on the prior literature. First, larger firms may face reduced information asymmetries and less financial constraints. Therefore we control for firm size by using the natural logarithm of firms' total assets. Second, we use the return on assets to capture profitability and liquidity of firms. Third, the ratio of fixed assets to total assets is included to reflect the maturity structure of firms' assets. Firms with more fixed assets have higher collateral value but lower asset liquidity (Grudes and Opler, 1996) and tend to raise more long-term debt in order to match the maturity of their assets and liabilities (Stohs and Mauer, 1996). Fourth, we include the standard deviation of firms' default probabilities in each country, based on Altman's (1968) Z-score, to control for the higher dispersion in the credit risk of firms in certain markets and hence the banks' increased need for screening their clients. Fifth, the debt to assets ratio is included to control for firms' leverage (Barclay et al, 2003).

3.4 Summary Statistics

We start with a brief summary of the key variables that will enter into our analysis. Figure 1 displays the average ratios of short-term debt to total debt for firms in our sample of 45 countries over the 1994-2004 period. China has the highest short-term debt ratio, whereas the United States have the lowest, at about one-third of China's. There is a clustering of developing countries at the top of the range, such as Malaysia, Turkey and Hungary, indicating that firms in lower-income countries use more short-term debt as a proportion of total debt.

Figure 2 shows on the world map which countries currently have public credit registries, private credit bureaus or both. Many countries started their public or private credit bureaus during our sample period, which allows us to evaluate the impact of institutional reforms in credit reporting systems on corporate debt maturities. For instance, Peru, Portugal and Thailand established their first private bureaus in 1995, 1996 and 1999, respectively. After

these dates, the average short-term to total debt ratios for firms in these countries dropped by 8%, 8% and 9%, respectively, compared to the years prior to the establishment of credit bureaus. In addition, according to the Loanware/Bondware Capital Markets database, the average maturity of loans and bonds for borrowers domiciled in these countries becomes significantly longer after the establishment of credit bureaus than before. More specifically, the average maturities increase by 130%, 70% and 40%, respectively, in these countries comparing the period before and after the establishment of credit bureaus. This anecdotal evidence seems to support our hypothesis of a positive relation between information sharing and debt maturity.

Table 1 presents summary statistics for the variables used in our regression analysis. The average short-term debt to total debt ratio is 46% for firms across 45 countries over the 1994-2004 period. The average Depth of Credit Information across countries is 4 out of the maximum value of 6, whereas the average Creditor Rights index is 2 out of 4. More details on variable definitions and data sources are provided in the Appendix (Tables A1 and A2)⁹.

4. Empirical Results

4.1 Information sharing and creditor rights as determinants of corporate debt maturity

We attempt to disentangle the impact of better credit information and stronger creditor rights by estimating the following pooled OLS regression:

$$STD/TD = f(\text{Information Sharing, Creditor Rights, Information Sharing} \times \text{Creditor Rights, Country Controls, Firm Characteristics})$$

where the dependent variable *STD/TD* is the average short-term debt to total debt ratio of all available listed companies for each country in each year. The interaction term between Information Sharing and Creditor Rights is included to test the substitution hypothesis. Our estimation sample contains country-year observations for 45 countries over 11 years. In all of the regressions we use robust standard errors clustered by country to allow for heteroskedasticity and within-country dependence of our observations.

⁹ In Appendix Table A2, we report the average short-term debt ratio, the average private and public credit registries coverage, the average annual GDP growth and consumer price inflation rate for each country in our sample over the 1994-2004 period. Credit bureaus in countries with the lowest short-term debt ratios, namely US, Norway, New Zealand and Canada, cover more than 80% coverage of the population, whereas the coverage in China is zero.

Country Controls consist of variables on Legal Environment, Financial Development and Macroeconomic Environment. We include the logarithm of Contract Enforcement Days and a Corruption index as measures of the quality of *Legal Environment*. Furthermore, we use five variables to capture the degree of domestic *Financial Development* which may influence firms' debt maturity choices, namely the Deposit to GDP ratio, the Private Bond to GDP ratio, the Bank Costs to Assets ratio, a Financial Center indicator and a Banking Crisis indicator. In addition, GDP Growth, Inflation and a Developed Country dummy are included to control for the *Macroeconomic Environment*. As discussed earlier, it is important to control for firm-level factors which may influence firms' debt maturity choices. Therefore we also include five variables to account for specific *Firm Characteristics* across countries: Log of Total Assets, Return on Assets, the Fixed Assets to Total Assets ratio, the Dispersion of Default Risks, and the Debt to Total Assets ratio (all calculated as averages of all available listed companies for each country in each year).

In addition, the effects of information sharing and creditor rights in developing countries may be different from those in developed countries. We therefore also interact these institution variables with indicator variables for advanced/developed countries (*Adv*) and developing countries (*Dev*) to allow for different estimates for countries with different levels of development.

Table 2 presents the baseline results. We find that higher levels of information sharing in a country are associated with lower short-term to total debt ratios in the corporate sector. This holds for each of the information sharing measures (i.e. the presence of Information Sharing institutions and the Depth of credit information) and countries with different levels of economic development. The presence of a credit registry would reduce the average short-term to total debt ratio by 19% (for a country with zero creditor rights). The results are statistically significant as well as economically significant given the average short-term to total debt ratio of 46% in our sample. The results support our hypothesis that information sharing helps mitigate the problems of adverse selection and moral hazard. This makes firms resort less to costly signalling of borrowing short term. There is also less need for banks to use short-term debt as a screening or disciplinary device (see discussions in Section 2).

We also find that weaker protection of creditor rights is associated with higher levels of short-term debt. This supports the hypothesis that short-term debt acts as a valuable hedge against uncertainty or a disciplinary device from the lender's perspective. The marginal impact of creditor rights on debt maturity is relatively higher in richer countries: a one point

increase in creditor rights reduces the average short-term to total debt ratio by 12% in developed countries versus 6% in developing countries. This parallels with the findings of DMS (2007) that creditor rights is relatively more important for expanding private credit in more developed countries.

As explained in Section 2, ex ante better credit information may be a substitute for ex post stronger protection for creditor rights. Consistent with this hypothesis, we find an important interactive effect between information sharing and creditor rights. The presence of information sharing appears to attenuate the positive effects of creditor rights on debt maturity. Put it differently, corporate debt maturity is less sensitive to creditor rights (information sharing) in the presence of information sharing (strong creditor protection). For example, the negative effects of creditor rights on short-term debt are virtually cancelled in the presence of information sharing (the marginal effects of creditor rights = $-6.1 + 6.9 * D$ Information Sharing). Similarly, the negative effects of information sharing on short-term debt are largely eliminated for a median level of creditor rights index of 2 (the marginal effects of depth of credit information = $-4.3 + 1.9 * \text{Creditor Rights}$). This suggests that when creditors have strong power ex post, e.g. to replace firms' management in bankruptcy, they may be willing to lend long-term even in the absence of information sharing.

In a theory of financial structure based on the degree of legal protection of creditor rights and on legal enforcement costs, Diamond (2007) predicts that firms' debt will be short-term when legal enforcement is costly or corrupt. In line with the theory we find that a higher level of corruption is associated with higher ratios of short-term to total corporate debt.

We also find that corporate debt maturity is influenced by the development of domestic financial sectors. On average, countries with a larger amount of (short-term) deposit in the banking sector, compared to the size of the economy, are characterized by a higher share of short-term corporate debt. This result is similar to the finding by Fan, Titman and Twite (2008) who argue that banks as suppliers of capital with short-term liabilities have a comparative advantage of holding short-term debt. We also observe a significant higher level of short-term debt for countries incurring banking crises (consistent with the literature, e.g. Chang and Velasco, 2001). However, these estimates may be biased if these variables of financial development are affected by unobserved factors which also influence corporate debt maturity. We will discuss these results further in Section 4.2 when fixed-effects models are employed to control for unobserved heterogeneity across countries.

As for macroeconomic fundamentals, lower GDP growth rates are associated with a shortening of debt maturity (consistent with the literature). Furthermore, several firm characteristics appear important in explaining corporate debt maturity structures across countries. In line with our expectations, larger firms obtain easier access to long-term finance. Although we only have data for publicly listed firms, which tend to be relatively large firms, we expect that the effects of credit information and creditor rights on debt maturity would be even stronger for smaller unlisted firms. In addition, countries with higher dispersion of firms' credit qualities are characterized by more long-term debt. This is consistent with the view that when the pool of obligors is more heterogeneous, screening high-risk from low-risk firms is relatively easier and banks resort to less to short-term lending (Sorge and Zhang, 2007). Finally, leverage is positively associated with debt maturity, consistent with the prior literature (Barclay et al, 2003; Johnson, 2003).

We also employ alternative measures of information sharing and creditor rights in our analysis. Results with more detailed measures of information sharing are shown in Table 3. In line with previous results, we find that improvements in the coverage of private and public credit registries increase firms' access to long-term finance. Among the components of the depth of credit information index, two aspects of credit registries seem to matter significantly: whether both positive and negative credit information are reported, and whether credit information from a wide range of sources (e.g. trade creditors, retailers and utility companies) are included.

Table 4 reports results with alternative measures of legal rights of creditors and borrowers. Across different specifications (*Creditor Rights* and *Legal Rights*), whether the bankruptcy law allows secured creditors to be paid first in bankruptcy has a significant impact on corporate debt maturity. In addition, certain aspects of the collateral law, especially those regarding how firms' assets can be used as collateral, also seem to matter. This is consistent with the use of collateral as a contractual device to increase lenders' incentive to monitor (Rajan and Winton, 1995). This reduces the use of short-term debt as a disciplinary device (Rey and Stiglitz, 1993).

The overall conclusion of the above empirical analysis is that – controlling for other macro and micro characteristics – information sharing among creditors and legal protection of creditor rights are crucial determinants of firms' debt maturity choices around the world. Information sharing acts as a substitute for creditor protection in lengthening debt maturity in less developed countries.

4.2 Fixed effects estimations

The results reported so far are based on pooled estimations with cross-sectional time-series data. If important country characteristics are omitted the results may be biased. Therefore we introduce *Country Fixed Effects* to control for unobserved heterogeneity across countries. The coefficients of the fixed-effects models are estimated through the within-country (time-series) variations. Hence time-invariant variables are dropped from the regressions.

After controlling for unobserved and time-invariant country characteristics, we find that improvements of information sharing, as results of reforms of a country's credit reporting system, significantly increase corporate debt maturity. An interesting difference with previous results is that, after a country establishes credit registries, the substitution effect between information sharing and creditor rights mainly works through public instead of private credit registries. This is consistent with DMS's (2007) finding that public credit registries benefit private credit markets in developing countries with poorer creditor rights. In addition, legal variables such as creditor rights and corruption lose their statistical significance, possibly due to the fact that these variables are very stable over time (DMS, 2007).

The level of financial development matters for debt maturity. Interestingly, several variables change signs compared with previous results based on pooled estimations. This suggests that previous results on financial development are driven by the cross-sectional variations in the data. When the identification of coefficients mainly comes through time-series variations as in the fixed-effect models, we find that the Deposit/GDP ratio is negatively associated with short-term debt. This implies that firms have better access to long-term finance as a country's financial system becomes more developed. Furthermore, during a banking crisis, the short-term to total debt ratio is lower than the level before or after the crisis period. It seems to suggest that firms find it difficult/costly to roll over short-term debt during a banking crisis, a view consistent with Chang and Velasco (2001). In addition, we find that inflation increases short-term debt ratios whereas corporate debt maturity is longer when firms become larger or more profitable.

4.3 Instrumental variables

We turn to investigate potential endogeneity bias in our regressions. In Section 4.2 we have used country fixed effects in regressions to control for unobserved heterogeneity among firm across countries. This ensures that our results are not driven by potential missing variables at the country level.

Nevertheless we further consider whether the maturity structure of corporate debt and credit information-sharing institutions may be co-determined. Based on available evidence it appears that the establishment of credit bureaus across countries has been driven by factors other than the availability of long-term corporate debt markets, including the growth of retail credit markets (Vietnam), a minimum size of the economy (Central America), the existence of a regulatory framework for information sharing (Egypt), the adoption of standardized formats for credit data reporting (South Africa) and the development of information technology (IFC, 2006). Although the potential for reverse causality in our regression is very limited, we use an instrumental variable (IV) approach to address the potential endogeneity of information sharing and creditor rights.

The selection of instrumental variables is based on the law and finance literature. As legal origins of a country are determined exogenously e.g. by colonial power and history (LLSV, 1999; Acemoglu and Johnson, 2005), we use legal origins (English, French, German, Nordic and Socialist) as instruments for measures of information sharing and creditor rights. In addition, political and financial institutions are also shaped by a country's culture heritage and religious composition (Stulz and Williamson, 2003). Therefore we include the composition of religions of a country (Buddhist, Catholic, Muslim, Orthodox Christian, and Protestant) as additional instruments.

Table 6 presents the empirical results of two-stage least squares regressions when variables of information sharing and creditor rights (and their interactions) are instrumented. The coefficients of variables on information sharing and creditor rights remain negative and significant. This confirms our finding that information sharing (especially via public credit registries) and creditor protection help lengthen corporate debt maturity. The interaction term between creditor rights and information sharing institutions (especially public credit registries) is positive and significant.¹⁰ This confirms our substitution hypothesis. Other controls at the country and the firm levels yield similar results to those reported previously. In

¹⁰ Unlike private bureaus, a public credit registry is established by the central bank or the bank supervisor of a country, and it typically only covers large loans of supervised institutions (IFC, 2006). Public credit registries are more popular in countries with French legal origins than English origins (DMS, 2007).

addition, the instrumental variable models yield lower R-squared and larger coefficient estimates than the OLS estimations. This indicates the potential measurement error and reduced efficiency in IV estimations.

4.4 Other robustness checks

We have performed a number of further robustness checks for our results. First, different measures of the debt maturity structure and explanatory variables were used. For instance, following Demirguc-Kunt and Maksimovic (1999), we used the ratio of short-term debt to total assets. We also used the medians (instead of the means) of the short-term debt ratios and our results are unchanged. We also replaced the corruption index by the Rule of Law variable obtained from International Country Risk Guide and also included alternative macro and micro characteristics variables such as term spread (see e.g., Brick and Ravid, 1985), bank concentration, non-performing loans (see Brown et al, 2009), market-to-book ratios of firms (see e.g., Johnson, 2003) and time dummies (to control for business cycles). Our main results are robust to alternative specifications of the model.

Second, firms' debt maturity and leverage may be simultaneously determined by the contracting environment (Myers, 1977; Barclay et al, 2003; Johnson, 2003). To address the potential endogeneity in firms' leverage, we extend the IV analysis in the previous subsection. In addition to variables on information sharing and creditor rights, firms' leverage is also instrumented by legal origins and religious composition. In the first-stage regressions, information sharing, creditor rights as well as firms' leverage are estimated endogenously depending on institutional, financial, macro and micro factors. The predicted variables are then included in the second-stage regressions as determinants of corporate debt maturity. Our results are very similar to those reported in Table 6 (Tables are available upon request). The only difference compared with the previous results is that, using this IV analysis, the relationship between leverage and debt maturity becomes insignificant.

Second, we examine whether the development of domestic financial sectors, as well as firms' profitability and default risk, may be co-determined with firms' financial decisions including debt maturity choices. To address this issue, we use one-year lagged values of financial development variables (except the financial center and banking crisis indicators) and firm characteristics variables as instruments. This approach assumes that past values of these

variables are correlated with their current values but not with the current error terms. The results confirm our main results reported in Section 4.1.

5. Conclusion and policy implications

The scarce availability of long-term sources of funds is a common problem faced by many firms around the world. While the negative implications of excessive short-term borrowing on growth and stability are well known, there is no consensus on its underlying determinants and hence the main priorities for reform. This paper provides new empirical evidence suggesting that information sharing among creditors and legal protection of creditor rights are key elements to explain the maturity structure of corporate debt. Using panel data from 45 developed and developing countries, we find that better credit information (as proxied by the existence and quality of private and public credit registries) and stronger creditor rights are associated with a higher share of long-term debt as a proportion of total corporate debt. Information sharing acts as a substitute for creditor protection in lengthening debt maturity in less developed countries: the presence of information sharing (strong creditor protection) attenuates the influence of creditor rights (information sharing) on debt maturity. This suggests that when creditors have better information about borrowers *ex ante*, they may be willing to lend long-term even in the absence of strong legal protection *ex post*. This does not imply that, in and of itself, better credit information or stronger creditor rights is a sufficient condition for developing long-term corporate debt markets. Our results do suggest, however, that improving credit reporting systems and creditor protection around the world may increase the maturity horizon at which financial institutions feel safe to lend. This would contribute to lengthening the maturity of corporate debt thus placing firms on a more solid footing to avoid illiquidity risks and exploit their full growth potential.

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Table 1: Summary statistics

This table presents the summary statistics for our regression data. Variables with a prefix “D” are binary dummies.

	Variables	Mean	Median	Std. Dev.
Short-Term Debt	STD/TD	46.13	47.10	11.52
Information	Depth of Credit Information	4.12	5.00	2.08
Sharing	Private Credit Bureau Cov.	33.33	22.70	30.34
	Public Credit Registry Cov.	3.74	0.00	9.74
Creditor Rights	Creditor Rights	1.99	2.00	1.12
	Legal Rights	6.40	7.00	2.21
Legal	Contract Enforcement Days	5.50	5.68	0.75
Environment	Corruption	4.06	4.20	2.45
Financial	Deposit /GDP	70.78	57.10	47.11
Development	Private Bond /GDP	0.22	0.15	0.25
	Bank Costs /Assets	0.04	0.03	0.02
	D Financial Center	0.09	0.00	0.28
	D Banking Crisis	0.18	0.00	0.38
Macroeconomic	GDP Growth	3.19	3.00	3.94
Environment	Inflation	7.94	2.83	24.08
	D Developed Country	0.55	1.00	0.50
Firm	Log of Total Assets	13.80	13.78	0.93
Characteristics	Return on Assets	4.70	4.92	6.97
	Fixed Assets /Total Assets	0.14	0.13	0.09
	Dispersion of Default Risk	15.32	14.03	7.36
	Debt /Total Assets	26.22	25.51	7.09

Table 2: Determinants of debt maturity structure

The tables below present our estimation results for the determinants of corporate debt maturity structure based on observations at the country-year level. The dependent variable is the average ratio of short-term debt to total debt of firms in each of the countries in our sample in each year (STD/TD). The t-statistics are in brackets, calculated with robust standard errors clustered by country to correct for potential heteroskedasticity and within-country dependence. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dep. Variable	STD/TD	1	2	3
Information Sharing	D Information Sharing	-18.978 [1.78]*		
	Depth of Credit Information		-4.298 [2.87]***	
	Depth of Credit Information * Adv			-6.225 [1.95]*
	Depth of Credit Information * Dev			-4.026 [3.05]***
Creditor Rights	Creditor Rights	-6.112 [1.72]*	-8.755 [2.87]***	
	Creditor Rights * Adv			-12.312 [2.40]**
	Creditor Rights * Dev			-6.339 [2.43]**
Information Sharing * Creditor Rights	D Information Sharing * Creditor Rights	6.93 [1.88]*		
	Depth of Credit Information * Creditor Rights		1.921 [3.63]***	
	Depth of Credit Information * Creditor Rights * Adv			2.507 [2.50]**
	Depth of Credit Information * Creditor Rights * Dev			1.978 [3.53]***
Legal Environment	Contract Enforcement Days	1.716 [0.88]	2.025 [1.13]	2.237 [1.12]
	Corruption	2.356 [3.39]***	2.44 [3.66]***	2.653 [4.09]***
Financial Development	Deposit /GDP	0.089 [2.52]**	0.105 [3.07]***	0.098 [3.17]***
	Private Bond /GDP	6.004 [1.03]	6.536 [1.27]	5.322 [1.16]
	Bank Costs /Assets	28.534 [0.49]	58.789 [1.04]	81.396 [1.37]
	D Financial Center	-4.587 [1.12]	-5.997 [1.54]	-5.351 [1.49]
	D Banking Crisis	7.385 [2.80]***	6.126 [2.33]**	5.578 [2.16]**
Macro Environment	GDP Growth	-0.31 [2.09]**	-0.253 [1.81]*	-0.252 [1.97]*

	Inflation	0.037 [0.90]	0.032 [0.79]	0.031 [0.73]
	D Developed Country	0.465 [0.09]	1.458 [0.31]	19.991 [1.13]
Firm Characteristics	Log of Total Assets	-4.343 [3.25]***	-4.249 [3.37]***	-4.114 [3.44]***
	Return on Assets	-0.14 [0.69]	-0.122 [0.64]	-0.109 [0.57]
	Fixed Assets /Total Assets	10.499 [0.65]	23.399 [1.47]	32.036 [1.82]*
	Dispersion of Default Risk	-0.314 [2.18]**	-0.297 [2.27]**	-0.232 [1.68]*
	Debt /Total Assets	-0.253 [1.94]*	-0.197 [1.73]*	-0.168 [1.38]
	Constant	129.679 [5.07]***	123.602 [5.40]***	112.093 [4.67]***
	Observations	385	385	385
	R-squared	0.56	0.60	0.62

Table 3: More detailed measures of information sharing

The tables below present our estimation results for the determinants of corporate debt maturity structure based on observations at the country-year level. The dependent variable is the average ratio of short-term debt to total debt of firms in each of the countries in our sample in each year (STD/TD). The t-statistics are in brackets, calculated with robust standard errors clustered by country to correct for potential heteroskedasticity and within-country dependence. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dep. Variable	STD/TD	1	2	3
Information Sharing	D Private Credit Bureau	-13.918 [3.51]***		
	D Public Credit Registry	-3.322 [0.90]		
	Private Credit Bureau Cov.		-0.148 [2.39]**	
	Public Credit Registry Cov.		-0.343 [2.27]**	
	Positive/Negative Information			-5.911 [1.76]*
	Firms/Individuals Covered			1.339 [0.35]
	Trade/Retailers Information			-7.166 [2.70]**
	Historical Data			-4.383 [1.60]
	Small Loans Covered			-6.982 [1.37]
	Borrowers' Rights			-3.449 [1.11]
Creditor Rights	Creditor Rights	-5.046 [2.85]***	-0.794 [0.47]	-8.143 [2.64]**
Information Sharing * Creditor Rights	D Private Credit Bureau * Creditor Rights	5.66 [3.53]***		
	D Public Credit Registry * Creditor Rights	5.108 [2.70]***		
	Private Credit Bureau Cov. * Creditor Rights		0.045 [1.39]	
	Public Credit Registry Cov. * Creditor Rights		0.247 [2.16]**	
	Depth of Credit Information * Creditor Rights			1.895 [3.84]***
Legal Environment	Contract Enforcement Days	0.31 [0.17]	2.454 [1.12]	-0.007 [0.00]
	Corruption	2.551 [4.03]***	2.305 [3.21]***	2.122 [3.14]***
Financial Development	Deposit /GDP	0.073 [2.98]***	0.077 [2.15]**	0.084 [2.12]**

	Private Bond /GDP	2.23 [0.47]	6.161 [1.02]	7.703 [1.75]*
	Bank Costs /Assets	71.653 [1.36]	49.771 [1.03]	85.008 [1.44]
	D Financial Center	0.084 [0.02]	-3.853 [0.78]	-6.125 [1.49]
	D Banking Crisis	6.658 [2.98]***	5.192 [1.96]*	6.539 [2.63]**
Macro Environment	GDP Growth	-0.166 [1.19]	-0.178 [1.25]	-0.249 [1.84]*
	Inflation	0.023 [0.60]	0.041 [0.96]	0.034 [0.92]
	D Developed Country	3.622 [0.90]	1.957 [0.42]	0.231 [0.05]
Firm Characteristics	Log of Total Assets	-5.055 [3.80]***	-3.677 [2.52]**	-4.329 [3.31]***
	Return on Assets	-0.075 [0.42]	-0.147 [0.78]	-0.181 [0.95]
	Fixed Assets /Total Assets	26.177 [1.67]	13.242 [0.74]	20.658 [1.40]
	Dispersion of Default Risk	-0.116 [0.90]	-0.227 [1.56]	-0.289 [2.22]**
	Debt /Total Assets	-0.336 [2.40]**	-0.179 [1.52]	-0.207 [1.76]*
	Constant	135.85 [5.48]***	97.569 [3.81]***	135.023 [5.55]***
	Observations	385	385	385
	R-squared	0.65	0.59	0.62

Table 4: More detailed measures of legal rights of creditors and borrowers

The tables below present our estimation results for the determinants of corporate debt maturity structure based on observations at the country-year level. The dependent variable is the average ratio of short-term debt to total debt of firms in each of the countries in our sample in each year (STD/TD). The t-statistics are in brackets, calculated with robust standard errors clustered by country to correct for potential heteroskedasticity and within-country dependence. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dep. Variable	STD/TD	1	2	3
Information Sharing	Depth of Credit Information	-2.976 [2.20]**	-3.522 [1.73]*	-6.653 [3.39]***
Legal Rights	Restrictions on Reorganization	-2.835 [0.88]		
	No Automatic Stay	-3.873 [1.48]		
	Secured Creditors Paid First	-16.093 [5.22]***		
	No Management Stay	-3.809 [1.11]		
	Legal Rights		-2.996 [2.33]**	
	Revolving Movable Assets			-7.63 [3.09]***
	All Assets			-4.731 [1.85]*
	Future Assets			-3.276 [1.21]
	General Description of Debt			6.528 [1.32]
	Collateral Registry			-4.609 [1.63]
	Secured Creditors Paid First (outside procedure)			-3.011 [0.99]
	Secured Creditors Paid First (in liquidation)			-8.433 [2.42]**
	No Automatic Stay			-0.007 [0.00]
	Enforcement Out of Court			-2.149 [0.89]
Information Sharing * Legal Rights	Depth of Credit Information * Creditor Rights	1.206 [2.45]**		
	Depth of Credit Information * Legal Rights		0.523 [1.96]*	0.924 [3.41]***
Legal Environment	Contract Enforcement Days	1.781 [1.09]	1.192 [0.59]	1.858 [0.98]
	Corruption	2.062 [3.55]***	2.42 [3.41]***	2.904 [4.83]***
Financial	Deposit /GDP	0.111	0.111	0.085

Development

		[3.84]***	[3.38]***	[2.29]**
	Private Bond /GDP	11.269	7.598	8.242
		[2.21]**	[1.45]	[1.49]
	Bank Costs /Assets	3.182	32.31	34.499
		[0.06]	[0.58]	[0.62]
	D Financial Center	-2.812	-5.545	-5.598
		[0.78]	[1.19]	[1.30]
	D Banking Crisis	3.117	6.1	5.391
		[2.28]**	[2.29]**	[2.15]**
Macro Environment	GDP Growth	-0.17	-0.276	-0.392
		[1.40]	[1.90]*	[2.51]**
	Inflation	0.041	0.027	0.017
		[1.57]	[0.65]	[0.50]
	D Developed Country	-1.906	1.114	2.761
		[0.51]	[0.23]	[0.54]
Firm Characteristics	Log of Total Assets	-4.891	-4.812	-5.049
		[4.25]***	[3.55]***	[3.84]***
	Return on Assets	-0.252	-0.058	-0.019
		[1.68]	[0.32]	[0.10]
	Fixed Assets /Total Assets	16.368	11.7	-1.55
		[1.07]	[0.75]	[0.10]
	Dispersion of Default Risk	-0.244	-0.232	-0.235
		[1.95]*	[1.79]*	[1.93]*
	Debt /Total Assets	-0.006	-0.313	-0.356
		[0.05]	[2.07]**	[2.61]**
	Constant	128.952	139.792	142.272
		[7.24]***	[5.14]***	[6.23]***
	Observations	385	385	385
	R-squared	0.70	0.58	0.62

Table 5: Fixed-effects estimations

The tables below present our estimation results for the determinants of corporate debt maturity structure based on observations at the country-year level. The dependent variable is the average ratio of short-term debt to total debt of firms in each of the countries in our sample in each year (STD/TD). The results are based on country fixed-effects (within group) estimations to control for unobserved country characteristics. The t-statistics are in brackets, calculated with robust standard errors clustered by country to correct for potential heteroskedasticity and within-country dependence. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dep. Variable	STD/TD	1	2	3
Information Sharing	D Information Sharing	-7.144 [3.16]***		
	Depth of Credit Information		-1.691 [2.32]**	
	D Private Credit Bureau			-6.32 [3.12]***
	D Public Credit Registry			-10.293 [3.02]***
Creditor Rights	Creditor Rights	-1.434 [0.76]	-1.781 [0.90]	-1.751 [0.94]
Information Sharing * Creditor Rights	D Information Sharing * Creditor Rights	1.907 [1.38]		
	Depth of Credit Information * Creditor Rights		0.392 [1.24]	
	D Private Credit Bureau * Creditor Rights			1.406 [1.00]
	D Public Credit Registry * Creditor Rights			5.972 [2.75]***
Legal	Corruption	0.24 [0.50]	0.175 [0.36]	-0.08 [0.15]
Financial Development	Deposit /GDP	-0.091 [1.97]*	-0.089 [1.94]*	-0.114 [2.39]**
	Private Bond /GDP	-0.08 [0.02]	0.486 [0.14]	0.603 [0.19]
	Bank Costs /Assets	-6.384 [0.33]	-7.241 [0.38]	-15.117 [0.86]
	D Banking Crisis	-2.022 [2.21]**	-2.195 [2.38]**	-1.919 [2.64]**
Macro Environment	GDP Growth	-0.161 [2.26]**	-0.164 [2.28]**	-0.144 [2.24]**
	Inflation	0.046 [3.55]***	0.046 [3.56]***	0.033 [2.15]**
Firm Characteristics	Log of Total Assets	-4.824 [7.78]***	-4.87 [7.92]***	-4.644 [7.22]***
	Return on Assets	-0.203 [2.15]**	-0.204 [2.16]**	-0.15 [1.53]
	Fixed Assets /Total Assets	10.602	11.027	7.016

	[1.26]	[1.33]	[0.79]
Dispersion of Default Risk	0.031	0.028	0.077
	[0.61]	[0.53]	[1.42]
Debt /Total Assets	-0.026	-0.033	0.016
	[0.52]	[0.65]	[0.28]
Constant	126.539	128.526	122.731
	[12.56]***	[12.13]***	[11.76]***
Observations	385	385	385
R-squared	0.35	0.35	0.38

Table 6: Instrumental variable estimations

The tables below present our estimation results for the determinants of corporate debt maturity structure based on instrumental variable estimations. The dependent variable is the average ratio of short-term debt to total debt of firms in each of the countries in our sample in each year (STD/TD). Instrumental variables include legal origins and religious composition of a country. The t-statistics are in brackets, calculated with robust standard errors clustered by country to correct for potential heteroskedasticity and within-country dependence. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Dep. Variable	STD/TD	1	2	3
Information Sharing	D Information Sharing	-42.134 [1.77]*		
	Depth of Credit Information		-7.606 [2.53]**	
	D Private Credit Bureau			-23.284 [1.21]
	D Public Credit Registry			-22.811 [1.88]*
Creditor Rights	Creditor Rights	-15.227 [1.74]*	-15.877 [2.33]**	-5.649 [0.58]
Information Sharing * Creditor Rights	D Information Sharing *Creditor Rights	14.573 [1.17]		
	Depth of Credit Information * Creditor Rights		3.137 [2.48]**	
	D Private Credit Bureau * Creditor Rights			0.528 [0.05]
	D Public Credit Registry * Creditor Rights			15.669 [2.54]**
Legal Environment	Contract Enforcement Days	1.258 [0.72]	1.966 [1.18]	-2.498 [0.73]
	Corruption	2.467 [2.92]***	2.527 [3.65]***	2.623 [3.25]***
Financial Development	Deposit /GDP	0.108 [2.46]**	0.127 [2.83]***	0.086 [1.51]
	Private Bond /GDP	7.698 [1.45]	7.982 [1.75]*	3.475 [0.58]
	Bank Costs /Assets	34.465 [0.53]	86.269 [1.26]	225.312 [2.60]**
	D Financial Center	-4.679 [1.01]	-6.441 [1.43]	1.908 [0.25]
	D Banking Crisis	8.97 [3.12]***	6.511 [2.20]**	8.861 [2.25]**
Macro Environment	GDP Growth	-0.347 [2.13]**	-0.236 [1.61]	-0.231 [1.07]
	Inflation	0.046 [1.10]	0.036 [0.83]	-0.037 [0.84]
	D Developed Country	1.217 [0.21]	2.516 [0.48]	8.822 [1.77]*

Firm Characteristics	Log of Total Assets	-5.069	-4.608	-6.487
		[3.85]***	[3.81]***	[4.48]***
	Return on Assets	-0.198	-0.159	0.114
		[0.84]	[0.73]	[0.44]
	Fixed Assets /Total Assets	3.32	26.286	8.248
		[0.17]	[1.44]	[0.37]
	Dispersion of Default Risk	-0.363	-0.324	0.091
		[2.08]**	[2.15]**	[0.43]
	Debt /Total Assets	-0.292	-0.186	-0.583
		[2.02]**	[1.50]	[2.10]**
Constant		168.849	143.98	184.311
		[3.94]***	[5.40]***	[6.24]***
Observations		385	385	385
R-squared		0.52	0.56	0.29

Figure 1: Average short-term debt to total debt ratios

This figure presents the average short-term debt to total debt ratios of firms in each country for the 1994-2004 period. The countries in the figure are ordered with the share of short-term corporate debt increasing from left to right.

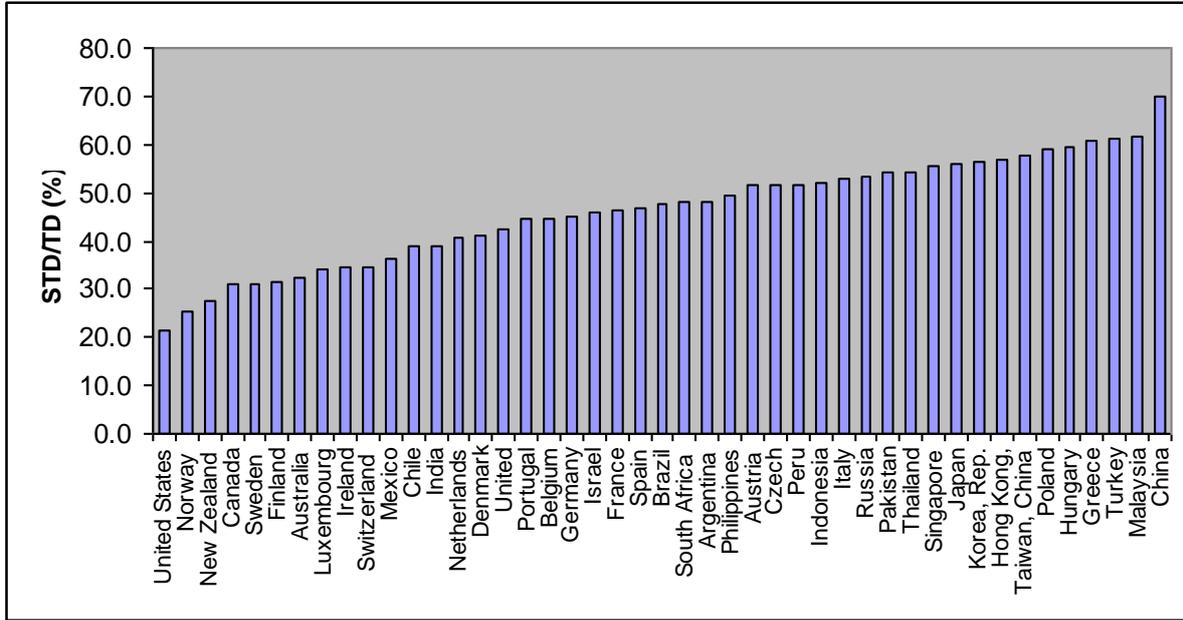
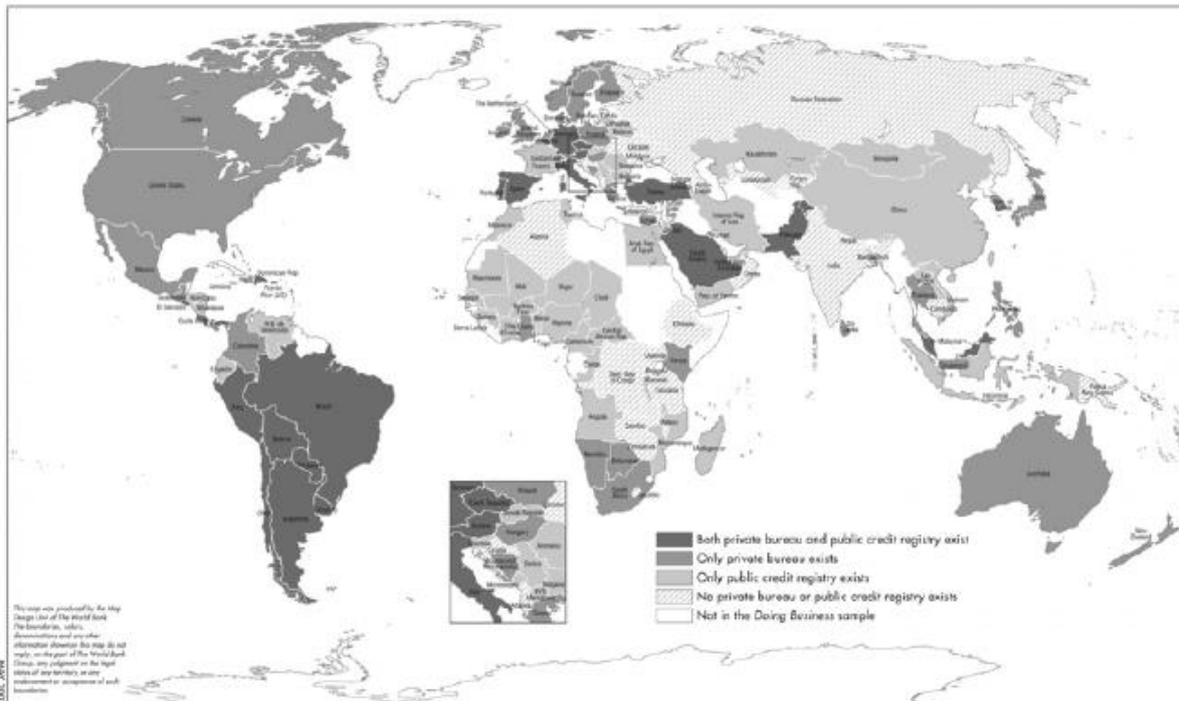


Figure 2: Existence of public or private credit registries around the world



Source: World Bank.

Appendix Table A1: Variable definitions and sources

	Variables	Descriptions and Data Source
Share of Short-Term Debt	STD/TD	Short-term debt (i.e. less than one year maturity) divided by total debt of a firm. Average across firms in each country. Source: Worldscope and World Bank FSDI
Information Sharing	D Information Sharing	Dummy =1 if a private or public credit bureau exists. Source: Doing Business (2006), Miller (2003), Love and Mylenko (2003) and Djankov, McLiesh and Shleifer (2007)
	Depth of Credit Information	The index ranges from 0 to 6, with a score of 1 assigned for each of the following 6 features of the credit information system: <ul style="list-style-type: none"> . Both positive and negative credit information is distributed. . Data on both firms and individuals are distributed. . Data from retailers, trade creditors or utilities as well as financial institutions are distributed. . More than 2 years of historical data are distributed. . Data on loans above 1% of income per capita are distributed. . By law, borrowers have the right to access their data.
	Private Credit Bureau (D- / -Cov.)	Variable with a prefix "D": Dummy =1 if a private credit bureaus exists; Variable with a postfix "Cov.": Private credit bureaus coverage as a % of the adult population. Source: Doing Business (2006), Miller (2003), Love and Mylenko (2003) and Djankov, McLiesh and Shleifer (2007)
	Public Credit Registry (D- / -Cov.)	Variable with a prefix "D": Dummy =1 if a public credit registry exists; Variable with a postfix "Cov.": Public credit registries coverage as a % of the adult population. Source: Doing Business (2006), Miller (2003), Love and Mylenko (2003) and Djankov, McLiesh and Shleifer (2007)
Creditor rights	Creditor Rights	Creditor right index (0 least - 4 most rights). Source: LLSV (1998) and Djankov, McLiesh and Shleifer (2006)
	Legal Rights	Index of legal rights of borrowers and lenders (0 least - 10 most rights). Source: Doing Business (2009)
Legal Environment	Contract Enforcement Days	Logarithm of the number of calendar days to enforce a contract of unpaid debt worth 50% of the country's GDP per capita as at January 2003. Source: Djankov et al (2003) and DMS (2007).
	Corruption	Corruption perception index (reversed: 0 least - 10 most corrupted). Source: Transparency International
Financial Development	Deposit /GDP	Demand, time and saving deposits in deposit money banks and other financial institutions as a share of GDP. Source: Beck, Demirguc-Kunt and Levine (2000)
	Private Bond /GDP	Private bond market capitalization divided by GDP. Source: Beck, Demirguc-Kunt and Levine (2000)
	Bank Costs /Assets	Banks' overhead costs divided by bank assets in each country. Source: Beck, Demirguc-Kunt and Levine (2000)
	D Financial Center	Dummy =1 if the country is US, UK, Switzerland, or Japan, and =0 otherwise. This classification follows Eichengreen, Hausmann and Panizza (2003).
	D Banking Crisis	Dummy =1 if there is a systemic banking crises, and =0 otherwise. Source: Caprio and Klingebiel (2003)
Macro Environment	GDP Growth	Growth rate of GDP per capita. Source: World Development Indicators
	Inflation	Consumer Price Inflation. Source: World Development Indicators
	D Developed Country	Dummy =1 if the country is a developed country, and =0 if it is a developing country. The classification is based on Gross National Income per capita. Source: World Bank
Firm Characteristics	Log of Total Assets	Natural logarithm of average total assets (in thousand US\$) across firms in each country. Source: Worldscope and World Bank FSDI
	Return on Assets	Return of assets (net income before interest divided by total assets of a firm). Average across firms in each country. Source: Worldscope and World Bank FSDI
	Fixed Assets /Total Assets	Fixed assets (net property, plant and equipment) divided by total assets of a firm. Average across firms in each country. Source: Worldscope and World Bank FSDI
	Dispersion of Default Risk	Standard deviation of default probabilities (based on Altman's (1968) Z-score) across firms in each country. Source: Worldscope and World Bank FSDI
	Debt /Total Assets	Total debt (short-term and long-term debt) divided by total assets of a firm. Average across firms in each country. Source: Worldscope and World Bank FSDI

Appendix Table A2: Sample characteristics (average for the 1994-2004 period)

Country	Number of Years	Short-Term Debt /TD	Private Credit Bureau Cov.	Public Credit Registry Cov.	GDP Growth	Inflation
Argentina	11	48.3	49.8	15.3	2.0	4.7
Australia	11	32.4	74.3	0.0	2.9	2.6
Austria	11	51.4	31.5	0.8	1.9	1.8
Belgium	11	44.6	53.3	11.0	2.2	1.8
Brazil	11	47.7	43.7	3.4	3.1	44.8
Canada	11	30.8	82.4	0.0	3.4	2.0
Chile	11	38.8	22.6	21.5	4.8	4.4
China	11	69.9	0.0	0.1	9.0	3.9
Czech Republic	6	51.7	14.6	0.3	2.6	5.3
Denmark	11	41.2	5.9	0.0	2.0	2.2
Finland	11	31.7	10.1	0.0	3.4	1.4
France	11	46.3	0.0	1.2	2.2	1.6
Germany	11	45.2	70.8	0.4	1.3	1.5
Greece	11	60.6	8.8	0.0	3.0	5.2
Hong Kong, China	11	56.9	23.8	0.0	3.8	1.2
Hungary	7	59.3	1.2	0.0	3.5	12.8
India	11	38.8	0.0	0.0	5.0	6.3
Indonesia	11	52.1	0.0	0.2	3.3	13.6
Ireland	11	34.6	75.5	0.0	6.4	3.0
Israel	11	45.9	0.7	0.0	1.3	5.6
Italy	11	52.9	43.0	5.6	1.7	2.7
Japan	11	56.0	76.2	0.0	1.3	0.0
Korea, Rep.	11	56.5	80.7	0.0	5.6	3.9
Luxembourg	1	33.9	50.0	0.0	3.5	1.9
Malaysia	11	61.8	46.1	12.6	5.6	2.5
Mexico	11	36.4	34.7	0.0	2.9	14.6
Netherlands	11	40.9	54.0	0.0	2.3	2.3
New Zealand	11	27.5	83.3	0.0	2.3	2.1
Norway	11	25.4	94.9	0.0	2.6	2.1
Pakistan	11	54.1	0.3	0.0	1.3	7.1
Peru	7	51.8	14.2	9.6	4.2	5.7
Philippines	11	49.3	0.9	0.0	4.0	6.1
Poland	5	59.1	38.0	0.0	4.3	10.7
Portugal	11	44.5	2.9	50.9	1.9	3.3
Russia	6	53.3	0.0	0.0	2.2	48.9
Singapore	11	55.3	49.6	0.0	5.3	1.1
South Africa	11	48.0	48.4	0.0	3.1	6.4
Spain	11	46.9	5.0	31.3	2.5	3.2
Sweden	11	31.2	53.4	0.0	2.9	1.2
Switzerland	11	34.6	18.3	0.0	1.3	0.8
Taiwan, China	11	57.6	3.5	0.0	4.8	1.3
Thailand	11	54.1	10.2	0.0	3.3	3.4
Turkey	11	61.0	19.3	0.4	4.0	60.8
United Kingdom	11	42.5	68.4	0.0	2.9	2.7
United States	11	21.6	82.7	0.0	3.4	2.5
Average	10.2	46.1	33.3	3.7	3.2	7.9