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ABSTRACT

This paper examines the role of public governance quality in determining the composition of a country's external liabilities and the capital structure of firms. In our theory, better institutional quality tends to promote a higher share of foreign direct investment and equity investment in total foreign liabilities, and a higher share of long-term debt within the debt/loan category. Similar prediction holds for the capital structure of firms. We conduct extensive empirical investigation by exploring both firm level data and country level data and find supportive evidence for these predictions.

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1 Introduction

The composition of capital flows matters for economic efficiency (for instance, Levchenko and Mauro (2007), Contessi, De Pace and Francis (2013), Evans and Hnatkovska (2014)) and financial stability. For example, in the immediate aftermath of the Global Financial Crisis of 2008-2009, countries that rely more on external debt exhibit a stronger liquidity shock at home than countries that rely more on foreign direct investment, [1] and long-term debt plays an important role in credit risk and business cycle dynamics.[2]

In this paper, we study the role of the quality of domestic institutions in determining the composition of external liabilities as well as domestic funding structure of investment. In our theory, different degrees of investor patience together with the strength of property rights protection will determine who invest in equity and who invest in bonds/loans. Productivity (or future payoff) differs across projects. This, together with the strength of contract enforcement, will determine the share of long-term debt in total debt. The key mechanism is that as institutional quality strengthens, it reduces the expropriation risk faced by the equity investors and thus promotes equity financing. In the meantime, high institutional quality enhances the protection of property rights and the enforcement of contracts, therefore it stimulates long-term debt financing. Overall, high institutional quality leads to both larger equity share in total financing and larger share of long-term debt in total debt financing.

We take these predictions to data in two ways. First, we examine the structure of a country's external liabilities. We find that countries with stronger institutions tend to have more equity investment (especially foreign direct investment) as a share of their total external liabilities, and more long-term debt as a share of their external debt. These patterns are consistent with the model predictions. Second, we examine the patterns of capital structure of publicly listed firms across countries and find interesting systematic differences across countries. In particular, firms in countries with stronger public institutions tend to have a higher share of equity and to issue more long-term debt relative to short-term debt. These patterns are also consistent with the model predictions.

This paper builds on the two strands of literature - optimal capital structure and governance quality and extends the existing literature on both empirical and theoretical aspects. First, the

[1] Tong and Wei (2010), Claessens, Tong and Wei (2012))
[2] Gomes, Jermann and Schmid (2016) and Miao and Wang (2010)

paper is related to a growing literature on the impacts of governance quality and financial decisions. Gelos and Wei (2002) documents that the quality of a country's domestic institutions in the area of transparency appears to be a significant risk factor in international mutual funds' portfolio holdings. In particular, countries with more opaque institutions tend to attract less equity investment relative to the prediction of a standard international capital asset pricing model (where a country's share of global equity investment should be proportional to its investable assets as a share of the total international equity market). The paper does not examine the determination of relative size of equity versus debt, or the maturity structure of debt. Fratzscher (2012) analyzes the determinants of the volume of capital inflows. It does not explore determinants of the ratio of equity and debt and maturity structure of debt. Alfaro, Kalemli-Ozcan and Volosovych (2008) looks into the positive impact of institutional quality in attracting one specific type of inflow - foreign direct investment - but not on the other capital types. Our work sheds further light on not only FDI but also debt and equity, and it incorporates the trade-offs among different types of capital flow. Kalemli-Ozcan, Sorensen and Yesiltas (2012) documents changes in the leverage ratios by firms and banks across countries before and after the recent global financial crisis. One interesting finding is that countries with better institutions exhibit less de-leveraging by their banks during the crisis. The paper is meant to be descriptive and does not propose or test any formal theory of capital structure of nations. Klein (2005) documents a non-monotonic interaction between the responsiveness of growth to capital account liberalization and institutional quality, and our work provides complementary evidence on how institutional quality affects capital structure, which is an important aspect of financial development and growth. Forbes, Reinhardt and Wieladek (2017) uses UK's Funding for Lending Scheme as a natural experiment and finds that in response to higher capital requirements, UK banks cut lending more to countries with weaker institutions. Qian and Strahan (2007) finds that creditor rights index and effectiveness of contract enforcement are important determinants of bank loan contracts. Our finding confirms that institutional quality is crucial in affecting the quantity of debt flow, and it particularly points out the importance of governance quality in shaping the maturity of external debt.

Second, this paper contributes to a large literature on capital structure determination both on corporate finance and nation's aggregate finance. For instance, Bolton and Scharfstein (1996) builds the insight that banks and bondholders differ in their degree of flexibility in times of financial distress,

and Shleifer and Vishny (1997) survey the classic theories in the literature of corporate financing decisions. More recent studies include De Fiore and Uhlig (2015) highlighting the asymmetric information between loan finance intermediary and bond finance intermediary. Crouzet (2014) endogenizes capital structure in a model with banks and market lenders differing in their ability to deal with financial distress. The closest one to our work is Brunnermeier and Oehmke (2013) . They explain the prevailing short-term debt by inability to commit to a maturity structure by borrowers. In particular, borrowers have an incentive to shorten the maturity of an individual creditor's debt contract because borrowers can effectively gain from diluting other creditors' claims in the event of a bankruptcy. In response, all creditors would opt for short term debt contracts. Brunnermeier and Oehmke (2013) does not discuss the debt-equity ratio within a common framework with debt maturity, and does not engage in empirical investigation. In comparison, we will incorporate the risk of dilution of rights that long-term creditors face as a key element of our model. On the other hand, we will engage in extensive empirical investigations connecting institutional quality and equity/debt ratio and maturity structure of debt for both external liabilities across nations and capital structure of firms across countries.

On the nation's aggregate capital structure, there is also a growing literature. Razin, Sadka and Yuen (1998) develops a pecking order of international capital flows with a model of asymmetric information. Goldstein and Razin (2006) extends asymmetric information to a model foreign direct investments and foreign portfolio investments. Bolton and Huang (2016) takes a corporate finance approach to analyze debt and currency financing of a nation's investments. Chang, Fernández and Gulan (2017) develops a dynamic model to study the a rebalancing from bank loans towards bond of emerging economy's external financing. The existing papers have provided frameworks to analyze the capital structure in terms of equity (including FDI) and debt, yet the maturity structure is not included in the theoretical consideration. Therefore, one contribution of this paper is to endogenize debt financing with multiple maturities and embed it in a model that simultaneously determines equity/debt ratio. Our theory is a succinct and simple one. Future research can enrich the model with more details, such as the distinction between FDI versus investment in the stock market by foreign investors, or the distinction between bonds and bank loans.

The rest of the paper is organized as follows. Section 2 presents a simple theoretical model that connects public governance to the capital structure of nations. Section 3 describes the data. Section

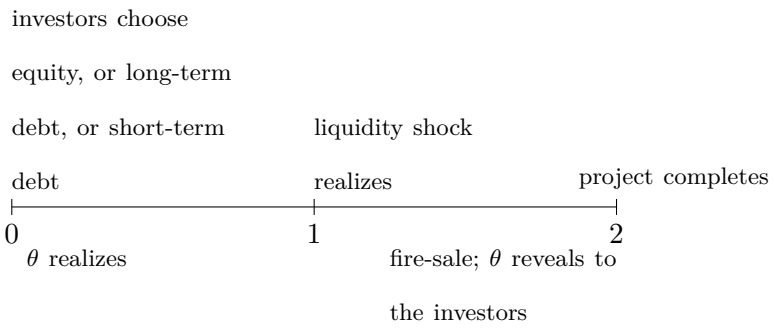
4 supplies the empirical evidence based on balance-of-payments data. Section 5 examines firm-level capital structure and relates it to country-level quality of governance. Finally, Section 6 provides concluding remarks.

2 The Model

Consider a three-period model of financing choice. A production project starts in period 0 and needs a start-up funding that is normalized to one and has to come entirely from external financing. After the project is initiated, the payoff will materialize in period 2. The payoff takes two values 1 and 2, where the probability of resulting in a high payoff (θ) is a random variable with a uniform distribution on $[0, 1]$. There is a large number of potential investors who differ in the probability (λ) of being hit by a liquidity shock in period 1, and λ is uniformly distributed on $[0, 1]$.

There are three channels via which an investor can fund a project: equity (including FDI), long-term debt, and short-term debt. Each investor has an identical outside option as that pays an interest rate of r^*. We adopt the framework of Goldstein and Razin (2006): if investors choose to finance a project as equity holders, they become the full owner of the project. If investors choose debt financing, regardless of the maturity, then there needs to be an outsider to managing the project. With these simplifying assumptions, the model does not discuss a split between internal and external financing. Instead, it focuses on the determination of the structure of external financing. All investors and entrepreneurs are assumed to be risk neutral.

The time line of the model goes as follows. In period 0, investors choose among three forms of financing: equity, long-term debt, or short-term debt investment. Payoff shock (θ) is realized in the same period right after the investment takes place, but its value is only accessible by the entrepreneurs. In period 1, the liquidity shock to investors arrives, upon which the investors need to sell the projects to ease the liquidity shortage. At the time of fire-sale and after the realization of liquidity shock, θ becomes known to debt investors, and the short-term debt investors can make use of the new information to determine the face value of the short-term debt maturing in period 2. In period 2, when the project's payoff materializes, the debt repayment are remitted to the debt investors, and the equity investors enjoy the whole payoff of the project.



Investor heterogeneity is described by the probability of a liquidity shock, λ, which is known to the investors before they make their investment decisions, whereas project heterogeneity is described by project productivity θ (or the probability of a high payoff in period 2), which is known to the entrepreneurs but not to any investor in period 0. Project productivity θ becomes known to all investors in period 1. Investors who hold a one-period bond in t=1 can choose to buy a new rollover one-period bond at t=1 or sit on the sidelines. Investors who hold a long term bond can choose to sell their bond in the secondary market at t=1 or do nothing at t=1 and wait for the bond to mature at t=2.

Institutional quality or quality of public governance can affect the economy in two ways. First, high quality institutions constrain expropriation risk faced by equity investors. Severity of expropriation risk can be represented by a tax on the payoff of equity: an equity investor's net gain in period 2 will be the gross payoff of the project net of the expropriation tax. Unlike a formal tax, an expropriation tax does not generate revenue for the government. Therefore, we model the expropriation risk as a dead weight loss that is algebraically similar to a proportional tax on the project's payoff to the investors.

Second, high quality institutions lead to better enforcement of contracts. In the context of financial contract, the ability to protect long-term creditors' seniority can be linked to quality of institutions. When a borrower issues a long-term debt, it may promise to make the long-term debt senior to all future short-term debt. But when it comes time to roll-over short-term debt, the borrower can obtain a better price on the short-term borrowing if it can promise equal seniority for the short-term debt as the long-term debt in the event of a default. The likelihood for the borrowers to deviate from the promise to the long-term debt without punishment represents an expropriation risk for long-term debt holders.

Both dimensions of institutional quality capture a wide range of instances including control of

corruption, strength of law enforcement, and government efficiency. However, these two emphasize different aspects of institutional quality, hence, they can be separated from each other. For this reason, we use two different parameters to represent them in our theoretical model. In practice, the two are highly correlated: countries with a high expropriation risks on equity investors are also likely to have weak contract enforcement environment that protects the rights of long-term debt holders relative to those of short-term debt holders. In subsequent empirical work, we use proxies for measure them jointly.

Since the agents in the model make decisions sequentially, we solve the model backwards by deriving the expected profits in investment strategies one by one. Comparing the expected profits of all strategies, we obtain the equilibrium capital structure.

Before presenting the detailed solution, it might be useful to discuss the assumptions that we specify in the model. First, the size of each project is set to be one. With this assumption, we abstract away from the intensive margin of investment and focus on the trade-off among different forms of financing arrangements. Second, investors are assumed to have an informational advantage relative to the public - they know the true probability θ of a high state (high payoff of the project) in fire-sale, whereas the public would have no access to this information in period one. Third, the model features two kinds of heterogeneity: heterogeneous probability θ of high payoff across projects, and heterogeneous probability λ of a liquidity shock across investors. The first can be viewed as different productivity, and the second can represent different patience levels or strength of financial status of investors. They will collectively determine interior solutions to the financing arrangement.

For the rest of the session, we will illustrate the investment strategies' expected payoff in the order of equity, short-term, and long-term debt with the backward approach. We then combine the results and discuss the overall capital structure.

2.1 Equity

Considering the equity investment, in period 2, if the project is not sold, since the equity investor is the owner of the project and the project is materialized, her expected payoff is

$$\pi = 1 + \theta$$

In period 1, some investors are hit by a liquidity shock and are forced to sell the project. There

are sufficiently large amount of potential buyers whose outside option is a risk-free investment with return rate r^*, therefore the fire-sale price of the project will be $1 + r^*$. Upon the realization of liquidity shocks, the equity investors who are hit by the liquidity shock sell their projects and obtain $1 + r^*$, while the rest will hold their equities until the end of the projects.

Therefore, the expected return of equity investment is determined by the following condition.

$$V^E(\lambda) = \Big(\lambda \underbrace{(1+r^*)^2}_{fire-sale} + (1-\lambda) \underbrace{\int_0^1 (1+\theta)d\theta}_{hold\ to\ maturity} \Big) \tag{1}$$

The first term is the return if fire-sale, which happens with probability λ. The second term is the return if holding the projects to maturity, which is equal to the expected value of the project's return. Because equity investors differ from each other in terms of the liquidity shock probability, the expected return of equity investment depends on the liquidity shock probability λ. The lower the λ is, the higher probability of avoiding fire-sale and receiving the return rate of mature projects.

To consider the role of institutional quality in equity financing, we assume that the government expropriates τ^E proportion of the equity payoff. As a result, the after-tax expected payoff is

$$V^E(\lambda) = (1-\tau^E)\Big(\lambda(1+r^*)^2 + (1-\lambda)\int_0^1 (1+\theta)d\theta\Big) \tag{2}$$

2.2 Debt

Debt investors differ from equity investors in terms of the return rate of holding the project investment to maturity. Equity investors essentially owns the project and are entitled to the overall value of the projects when they are materialized. In contrast, debt investors will be paid the face value of the debt contract if no default, and will only be able to seize the residual value of the projects if default. As a result, entrepreneurs' profit maximization problem does not align with debt investors', and they have an incentive to minimize the cost of issuing debt. Given a large number of potential investors, entrepreneurs will only sign the debt contracts if the expected cost of debt is equal to the reservation level of potential investors: $1 + r^*$.

There are two types of debt contracts that an entrepreneur can offer to debt investors: a long-term debt with face value d_{02} in the second period (and no payoff in the first period), and a short-term debt with face value d_{01} at the end of period 1. If a project only receives a one-period

loan, by necessity, it has to be financed by another short-term (rollover) debt in period 1. We denote the face value of the rollover debt as d_{12} in period 1. Because of the abundance of potential investors, the return rate on debt per period will be the same as deposit rate r^* to make the investors exactly indifferent between taking the outside option and investing in the project.

Similar to equity investors, debt investors are also subject to a liquidity shock, which, for holders of a two-period debt, would trigger a fire-sale of their debt contracts. When debt investors are forced to sell in period 1, for both the entrepreneurs and the investors, it is essentially equivalent to roll-over short-term debt. Therefore, the fire-sale price will be evaluated in the same way as the roll-over return rate. Note that, entrepreneurs will only offer the roll-over return rate at the reservation level of potential investors $(1 + r^*)$, therefore, the debt contracts' fire-sale also yields the same price as equity fire-sale.

We solve for the maturity structure by guess-and-verify. Since there are two types of debt contracts, if they are offered by firms with different productivity levels (probability of a high payoff), then investors will be able to update the expectation of the payoff when the debt matures. Therefore, we conjecture that there is a threshold value of the probability of a high project payoff, θ^*, below which the entrepreneur would offer a long-term debt contract and above which he would offer a short-term debt contract.

Consider the case where only long-term debt is feasible: the corresponding break-even condition will be

$$\frac{1}{\theta^*}\int_0^{\theta^*}\Big[1-\theta+\theta d_{02}\Big]d\theta = (1+r^*)^2 \tag{3}$$

The first term $(1-\theta)$ on the left-hand side is the payoff to a long-term debt in default, and the second is the non-default case where debt is paid at full face value. To see whether the case of only long-term debt is sustainable or not, we investigate whether the entrepreneur has an incentive to deviate on the margin. Since short-term creditors will be informed of the true value of θ in period 1, the break-even condition for her will be

$$(1-\theta^*)\tau^D(\frac{d_{12}}{d_{02}}) + \theta^* d_{12} = 1 + r^* \tag{4}$$

The first term in equation (4) indicates the payoff in the case of default, which happens with

probability $(1-\theta^*)$.[3] The second term represents the payoff in the case of repayment, which is associated with probability θ^*, and debt investors receive the face value set in the debt contract.

Compared to the long-term counterpart, there are two differences. First, since the true value of productivity is available to the short-term creditor when deciding on the face value of short-term debt rollover, the rollover debt value d_{12} will be determined according to the true value of θ instead of the ex-ante expectation. Second, it is not always true that the short-term creditor will be able to seize the residual value of the project in default, and it is reflected in the first term on the left-hand-side of the break-even condition. Given default, a short-term creditor is able to seize residual values of the project only when the seniority of a long-term creditor is not well-defended (with probability τ^D), which means that the short-term creditor has the same priority to seize the value of the project.

With these differences, the long-term debt face value will only depend on the threshold productivity θ^*, while the short-term rollover face value will be a function of the true productivity θ. After comparing the face values of the long-term (d_{02}) and short-term (d_{12}) debts, the entrepreneur will choose the lower face value to finance the project.

To determine the threshold productivity θ^*, we note that at that threshold, the entrepreneur should be indifferent between offering a short-term and a long-term debt, which translates to the following condition:

$$d_{02}(\theta^*) = d_{12}(\theta^*) \tag{5}$$

Plugging the indifference condition to the two break-even conditions yields the value of θ^*.

Proposition 1. *The entrepreneur will propose a debt contract based on the project's productivity. If $\theta < \theta^*$, the borrowing will be in long-term debt. If $\theta > \theta^*$, the borrowing will be in short-term debt. If $\theta = \theta^*$, the entrepreneur will be indifferent between the two forms of debt contracts. θ^* is determined by (3), (4), and (5).*

It can be verified that the entrepreneurs whose project's productivity is lower than θ^* have no incentive to deviate from long-term debt contract, and so with the entrepreneurs whose project's

[3] Here, since we consider the first potential short-term creditor, whose measure is zero, the overall debt $\bar{d} = \alpha d_{12} + (1-\alpha)d_{02}$ is equal to d_{02}. Also, since the expected payoff is larger than one, low productivity directly leads to default. Under the current assumption, the high productivity is large enough to pay back the debt while the low productivity is not enough to pay back the debt (expected return rate is r^*), therefore the default probability is $1-\theta^*$.

productivity is higher than θ^*.[4] The intuition is that since the short-term creditors will be able to work out the true value of θ when choosing the rollover face value, they will demand a high face value if the productivity is low.

Those projects with a relatively low productivity will find the long-term face value (without the knowledge of true productivity on the creditors' side) to be lower than the short-term rollover face value. In contrast, projects with a sufficiently high probability of a high payoff can benefit from a chance to update the creditor about the true productivity in period 1 and obtain a relatively favorable (i.e., low) rollover face value, which would increase the payoff to the entrepreneur.

2.3 Capital Structure

Combining the results, we can determine the capital structure in two steps. In the first step, since the debt contract always yields the payoff of $(1 + r^*)^2$, a comparison between the equity investment expected payoff $V^E(\lambda)$ and $(1+r^*)^2$ determines the threshold λ^E below which the equity investment will be implemented. In the second step, Proposition 1 solves for the composition of long-term and short-term debt contracts.

As discussed before, the equity investment payoff is negatively related to the expropriation risk τ^E, therefore the lower the expropriation risk (higher institutional quality), the larger is the proportion of projects financed by equity investment. This relationship is formally summarized in Proposition 2.

Proposition 2. *The share of equity investment in total investment increases with institutional quality.*

The proof of Proposition 2 is straightforward. As the net payoff of equity investment is negatively correlated with the expropriation tax and positively correlated with institutional quality, the threshold λ which makes potential investors indifferent between equity financing and debt financing increases with institutional quality.

With regard to the debt maturity, poorer institutional quality translates into poorer protection of long-term debt holders' seniority (i.e., higher τ^D), reducing the amount of long-term debt in equilibrium. This suggests a positive relationship between the amount of long-term debt as a share of total debt and institutional quality, which can be stated by Proposition 3.

[4] Proof is provided in Appendix A.

Proposition 3. *The share of long-term debt in total debt increases with institutional quality.*

The proof of Proposition 3 follows that the higher the chance to be granted the equal seniority as long-term debt investors, the lower roll-over face value the short-term debt investors will ask. In the meantime, given a higher probability to have to share the residual value of the projects with short-term debt investors in the case of default, long-term debt investors will demand a higher expected return which leads to a higher threshold of productivity.

Based on Proposition 2 and 3, for a given level of institutional quality, the capital structure can be described by a partition of the (λ, θ) space. Those investors with a relatively low $\lambda \leq \lambda^*$ - relatively patient investors - would choose to provide equity financing, and those with a relatively high $\lambda > \lambda^*$ would choose to provide debt financing. On the other hand, entrepreneurs with a high project productivity ($\theta \geq \theta^*$) would choose to ask for short-term debt financing (in hope of obtaining an attractive rollover bond price at t=1), and those with a low project productivity ($\theta < \theta^*$) would ask for long-term debt financing. This defines the equilibrium capital structure for given institutional quality. As a graphic example, patterns of equilibrium capital structure for the case of $\tau^E = \tau^D = 0.2$ and $r^* = 0.05$ are summarized by the left graph of Figure 1. With a relatively low risk of expropriation, equity financing is the most important source of funding for investment.

As institutional quality deteriorates, the area for equity financing shrinks, and among debt financing, the share of long-term debt financing also declines. The calibration results for the case of worse institutions, $\tau^E = \tau^D = 0.8$ (and still $r^* = 0.05$) are summarized by the right graph of Figure 1. With a relatively high risk of expropriation, short-term debt becomes the dominant source of funding for investment.

As another way to illustrate Propositions 2 and 3, we plot the share of equity in total investment, and the share of long-term debt in total debt, respectively, as a function of the severity of expropriation risk (under the assumption of $\tau^E = \tau^D$ and $r^* = 0.05$). The results are in Figure 2. The simulation demonstrates that equity investment declines with deterioration of institutional quality and so does the share of long-term debt. When the institutional quality is sufficiently poor (e.g., $\tau^E = \tau^D > 0.9$), then the only available form of financing would be short-term debt.

3 The Data

In this section, we introduces the datasets that we employ for the empirical analysis on the relationship between capital structure and institutional quality. Our empirical exercise will start with the composition of a nation's external liabilities from balance-of-payments data: the share of equity (including FDI) in total external financing, and the share of long-term debt in total external debt.

We combine two primary data sources: the External Wealth of Nations (EWN) Dataset data from Lane and Milesi-Ferretti (2007), and the Quarterly External Debt (QED) Statistics maintained jointly by BIS, IMF, and the World Bank. The EWN Dataset provides a detailed break-down of international investment positions by investment type at an annual frequency for most IMF member countries. We define the share of equity in the total financing of each country i at year t by:

$$\text{equity}_{it} = \frac{\text{FDI liabilities}_{it} + \text{portfolio equity liabilities}_{it}}{\text{total liabilities}_{it}}$$

Since the EWN Dataset does not contain information on the maturity structure of loans and deposits, we make use of the relatively new QED Statistics, which collects the external debt of each country by maturity at a quarterly frequency starting from 1998. We calculate the share of long-term debt in total debt as follows:

$$\text{long-term}_{it} = \frac{\text{long-term debt of commercial banks}_{it} + \text{long-term debt of other sectors}_{it}}{\text{total debt of commercial banks and other sectors}_{it}}$$

The final data set includes an unbalanced panel of the equity shares for 123 countries with a maximum time span from 1998 to 2011, and an unbalanced panel of the long-term debt shares for 93 countries with a maximum span from 1998 to 2014.

Other macro statistics such as real GDP per capita, private sector debt as a share of GDP (a proxy for level of the financial development), and trade volume as a share of GDP (a proxy for the trade openness), are relatively standard and come from the World Development Indicators (WDI) database of the World Bank.

The institutional quality data is compiled from the World Bank Institute (WBI). Each year, the WBI uses of all available data on institutional quality and proposes a set of six measures: control

of corruption, government efficiency, political stability, regulatory quality, rule of law, and voice and accountability. All the indices are constructed in such a way that each is bound between (-2, +2), and a higher value means a higher quality of institution. Note, while the six dimensions can in principle capture different aspects of a country's public institutions and governance, the pairwise correlations among them are all positive and in excess of 70%. The exact pairwise correlations are reported in Table 1. Therefore, out of practical considerations, we will use the simple average of the six measures as a composite measure of the quality of institutions. The summary statistics of the variables on the nation's external financing are reported in Table 2.

On the domestic side, aggregate measures of capital structure are relatively scarce[5], so we turn to firm-level micro data. There are two data samples that we constructed: a world-wide sample of listed firms from Worldscope and an European firms sample (both listed and private) from Amadeus of Bureau van Dijk.[6] Both of them have their own merits as the former one provides a comprehensive picture of the listed firms from different types of countries and the latter one offers a close look at both the listed and the private firms. For each firm in the sample, we define the share of equity financing and the share of long-term debt as follows:

$$\text{equity}_{ft} = \frac{\text{shareholders funds}_{ft}}{\text{total liability}_{ft}}$$

$$\text{long-term}_{ft} = \frac{\text{long-term debt}_{ft}}{\text{total debt}_{ft}}$$

After excluding the financial sector and public administration sector along with outliers, the Worldscope sample contains 130,167 firms from 2003 to 2015, and the Amadeus sample yields over 3 million observations from 2004 to 2015. The country composition and summary statistics can be found in Table 3, Table 4, Table 15, and Table 16, respectively.

4 Capital Structure of External Financing

Based on the theoretical results, there are two hypotheses that we would like to test the relationship between capital structure and institutional quality.

[5]The World Financial Development dataset from the World Bank contains the information on the measures of financing, but the data is only available for major emerging countries. Also, the measures are based on firm survey whose sample is relatively small compared to the existing firm-level datasets.

[6]The results of Amadeus sample is in Appendix C.

Hypothesis 1: *The share of equity financing is positively correlated with institutional quality.*

Hypothesis 2: *The share of long-term debt financing is positively correlated with institutional quality.*

As we discussed before, the underlying mechanism of the first hypothesis is that the improvement in institutional quality reduces expropriation risk and motivates investors to pursue ownership of target firm's equity, and the second hypothesis is the channel that better institutional quality enhances the seniority of long-term debt and eases the investor's concern of debt dilution.

To begin with, we plot the unconditional relationship between capital structure and institutional quality in Figure 3. As one may expect, it is unclear how to draw the relationship between the two in an unconditional way as there are factors such as economic development that may affect both. Therefore, we conduct a simple cross-sectional OLS (with the cross-section data of the average value across years of each country) controlling for real GDP per capita, trade, and financial development to see the conditional relationship. The results are presented in the first and fourth columns of Table 5. The conditional relationship indicates a positive correlation between long-term debt financing and institutional quality while insignificant regarding equity financing. OLS regression could be contaminated by unobservable country specific characteristics, therefore we utilize the cross-time variation within each country and estimate a country fixed-effect panel model as well. The third and last columns in Table 5 reveal the significant positively correlation of both equity financing and long-term debt financing with institutional quality, which means that along with the improvement of institutional quality within a country, the foreign investors becomes more willing to hold equity shares and extend a longer maturity of debt.

Although we control for real GDP per capital, trade, and financial development, there can still exist unobservables that potentially contaminate the estimates. To address the endogeneity issue, we employ an instrumental variable (IV) approach. Alesina and Zhuravskaya (2011) suggest that linguistically more segregated countries, i.e., those where different linguistic groups live more spatially separated, have a lower quality of government. We use language segregation as an IV for institutional quality. As constructed by Alesina and Zhuravskaya (2011), the index of segregation is a population-weighted average of homogeneity across groups within country based on historical data.

As the index of segregation does not allow across-time variation, we run 2SLS on the cross-section sample.

The second and the fifth columns in Table 5 present the 2SLS results. Firstly, consistent with Alesina and Zhuravskaya (2011), the significant correlation between institutional quality and language segregation supports the strongly negative relationship between linguistic segregation and institutional quality. Secondly, the weak IV test validates language segregation as a strong instrument for institutional quality. Thirdly, the IV estimates indicate strongly positive impact of institutional quality on boosting cross-border equity financing and long-term external debt. An improvement in institutional quality by one standard deviation (about 0.85) would increase the share of equity in total liability by 35% (more than two standard deviations) and raise the share of long-term debt in total debt by 15% (about 0.7 standard deviation). These effects are both economically significant and statistically significant.

One concern about the cross-sectional analysis is that different countries enter the sample in different years due to data availability, therefore the effect of institutional quality on external capital structure may be driven by the difference in the development stage across countries. To address this issue, we take a balanced panel from 2002 to 2014 and redo the IV regressions. As shown in Table 6, the effects of institutional quality in promoting equity and long-term debt financing remain significant.

5 Structure of Domestic Financing and Institutional Quality

While the previous section examines the structure of the external liabilities of nations, we now turn attention to capital structure at the firm level. While firms can obtain financing from both domestic and international sources, domestic financing would be the more important source in most cases. For a given country (and therefore a given national level governance), there will be a distribution of capital structure across firms. Our research question is whether and how different levels of national institutional quality across different countries and over time shift the distribution of firm-level capital structure.

We undertake three types of exercises. First, using data on all listed firms in 61 countries covered by Worldscope, we investigate the relationship between firm-level capital structure and national level institutional quality for listed firms. Second, since the change in institutional quality

given a short horizon is usually less significant than firm-level financial characteristics, we take a long-difference perspective and analyze the relationship between change in capital structure and change in institutional quality. Third, as internal fund is a part of the funding sources, we investigate how the share of internal funding is affected by institutional quality by utilizing the Compustat executives' compensation data. In appendix C, using data on both listed and unlisted European firms available from Amadeus, we also investigate if the relationship holds for both listed and non-listed firms and if there is any difference between the two types of firms.

5.1 The Capital Structure of Listed Firms

We begin with all listed firms in 61 countries covered by the Worldscope database. Using detailed balance sheet information of the these firms, we construct the share of equity in total liabilities and the share of long-term debt in total debt. We relate each to country-level institutional quality in two bin scatter plots reported in Figure 4. We observe a positive slope in both plots. On average, both shares rise as a country's institutional quality improves.

We now turn to regression analysis where we can control for other variables, especially firm-level characteristics deemed important by the existing literature. For instance, Opler et al. (1999) suggest book-to-market ratio, size, cash flow, working capital, leverage[7] as determinants of the capital structure (in terms of liquidity holdings), whereas Frank and Goyal (2003), and Frank and Goyal (2009) also add fixed assets and sales as possible determinants. Rajan and Zingales (1995) consider tangible asset, book-to-market ratio, sales, and profitability, and they are all included in our regressions.

We present the results in Table 7 for equity and long-term debt. In Table 7, we first estimate the baseline specification with firm, country, and time fixed effects, and this exercise is intended to estimate how firm-level capital structure evolves in different time points as national institutional quality changes. Including year fixed effect is to ease the concern that the relationship between long-term debt and institutional quality may be simultaneously driven by some underlying global trends; therefore year fixed effect is able to purge the effects of common global trends. All standard errors are clustered at the country level (which is more general than the country-year level). As shown in the first column, the coefficient of institutional quality on equity financing is positive and statistically

[7]Leverage is not included in the regression as it is highly correlated with the left-hand variable of capital structure.

significant at the 5% level, consistent with the notion that better public institutions are associated with more equity financing. Based on the point estimate, with an improvement in institutional quality by one standard deviation, the share of equity financing increases by $5(0.062 \times 0.802)$ percentage points. For the firm characteristics, liquidity, profit, and revenue promote equity financing and long-term debt financing because they indicate optimistic perspective on future cash flow. Total asset and especially fixed asset increase particularly strengthens debt financing as more tangible assets can be used as pledgeable collateral.

In the second column, we lag all regressors by one year to ensure that they are all pre-determined relative to the dependent variable. This exercise is to exclude the possibility of reverse causality. The lagged control variables' change makes very little difference to the point estimate and the statistical significance of the coefficient on institutional quality: with an improvement in institutional quality by one standard deviation, the share of equity financing increases by 6.4 (0.080×0.802) percentage points.

In the third column, we control for global industry-specific patterns in the equity financing. This is to allow for different capital structure in different industries due to technological or industrial organizational reasons. The new regressor is added on top of controlling for firm fixed effects and global time trends. Unsurprisingly, firm level equity financing share is positively correlated with average equity financing across all firms in the same industry in the world. Although, with this additional control, the coefficient on national institutional quality becomes smaller, it is still positive and statistically significant and also close to the baseline estimate in the first column.

In the last three columns of Table 7, we present a similar set of analysis for long-term financing as a share of total debt financing. Same as the case for long-term debt financing, in the fourth columns, we include firm, country, and year fixed effects. The coefficient on institutional quality are both positive and statistically significant at the 10% level. The point estimate indicates that with an improvement in public institutional quality by one standard deviation, the equity share in total external financing tends to go up by $0.802 \times 0.124 = 9.9$ percentage points. The alternative specifications with lagged control variables and industry-specific long-term debt financing, in the last two columns, respectively, confirm the significant positive relationship between institutional quality and long-term debt financing. The results also provide a strong support for the baseline regression as the point estimate for the relationship between institutional quality and long-term

debt financing stays around 0.12 in all three specifications.

We can obtain more precise information on corporate bonds at issuance from FISD database. FISD reports issuing date, amount, spread, and maturity. A given firm can of course issue multiple bonds in a year. Therefore, for a given firm in a given year, we can compute the average maturity of its bonds weighted by the proceeds of each bond. We investigate the relationship between the average bond maturity (at the firm level) and institutional quality (at the national level). We use firm characteristics from Worldscope (after matching the firms in the two databases) as controls, and we cluster all standard errors at the country level.

The results are reported in Table 8. We see that the average maturity of corporate bonds is significantly positive correlated with institutional quality, and the estimates in all three specifications are positive and significant at 5% level. Generally speaking, with a standard deviation improvement in institutional quality, the average maturity of corporate bonds would go up by 0.72 (0.24×3.0) years.

To conclude, with better public governance, both equity share in total financing and the maturity of debt would go up. The magnitude of the correlation is both statistically and economically significant. These patterns are consistent with the theory presented in Section 2 that high institutional quality is associated with external financing tilting toward equity and long maturity debt.

Next, we further inspect the aspect of institutional quality that is the most important in influencing capital structure. So far, our measure of institutional quality is the average of six indicators from the World Bank's World Governance Indicators: corruption control, government efficiency, political stability, regulation quality, rule of law, and voice accountability. While the pairwise correlations among the six indicators are all in excess of 70% (see Table 1), it might be useful nonetheless to see which subset of governance indicators may be the most relevant for the capital structure question.

We re-run the regressions on the share equity financing, where quality of governance is measured by each of the six indicators individually, and report the results in Table 9. Note that the specification includes firm and year fixed effects, and the standard errors are clustered at the country level. We see that corruption control, government efficiency, rule of law, and voice of accountability are the important ones in explaining the share of equity financing. Of the which, the share of equity financing appears to be most responsive to variations in the strength of control of corruption and

voice of accountability. In comparison, political stability and regulation quality are not statistically different from zero. These results are perhaps not too surprising in light of our theory in which the relevant institutions are those that minimize the expropriation risk of equity holders (e.g., tax on their equity returns).

We do a similar exercise for the share of long-term debt financing in total debt, and report the results in Table 10. In this case, the most significant relationship is between maturity of debt (measured in both share of long-term debt financing and the maturity of corporate bond) and rule of law. This result is intuitive as the most relevant institutional quality for long-term debt holders is how their long-term debt holding are well protected without debt dilution, and rule of law plays a crucial role in protecting the right of long-term debt holders against the dilution risk.

5.2 Internal versus External Financing

The previous empirical evidence has shown that external financing, by means of both equity financing and long-term debt financing, is positively correlated with the improvement of institutional quality. However, besides external financing, firms also make use of internatl financing, and the share of internal financing is affected by institutional quality too. In the literature, Myers and Majluf (1984) among many others, show that - driven by different costs of financing - firm's financing pecking order starts with internal financing (the cheapest source of funding), followed by external debt or equity. Suppose the marginal costs of using either internal or external financing are increasing and concave, the share of internal financing is determined by where the marginal costs of the internal and external funding sources are equalized. If improved institutional quality effectively reduces the borrowing cost of external financing, then the share of internal financing is expected to be negatively correlated with institutional quality. Appendix B provides an extension to the basic model which allows for internal financing for a project. In that model, the share of internal financing tends to decline as the institutional quality improves.

To analyze this relationship between internal financing and institutional quality, we employ the data of Compustat firms. The Compustat executive compensation data is collected directly from each company's annual proxy (DEF14A SEC form), and we use the executives' shareholding relative to total outstanding shares as a proxy for internal financing. Table 11 reports the summary statistics: the final sample contains over 10,000 observations from 1995 -2015 with a majority of US

firms. Using the same regression specification as external financing, we analyze the relationship between internal financing and institutional quality, and the estimation results are reported in Table 12.[8] The fixed effect estimate shows a significant negative correlation between institutional quality and the share of internal financing: one standard deviation increase in institutional quality is associated with 0.25 ($0.009 \times 0.109/0.004$) standard deviation decrease in the share of internal financing.

Given that executives' shares represent a part of internal financing, our estimates might be a lower bound for the relationship between internal financing and institutional quality. Firm characteristics also matters. For instance, when liquidity, growth, or profit grows, or when financial development deepens, our estimates show that they tend to simultaneously increase the share of external financing and reduce the share of internal financing.

5.3 Long-difference Analysis

Because institutional quality is a slow-moving variable, variations at the annual frequency analysis might contain much noise. One way to reduce noises and check for robustness of the conclusion is to perform long differencing. To include as many firms as possible, we choose the Worldscope subsample of year 2003 and 2015 and investigate the relationship between the change in capital structure and that in institutional quality.

In this span of time over a decade, there is a significant change in institutional quality across the world. As can be observed in Figure 5, the change spreads out away from zero. For instance (from Table 13), Indonesia improved institutional quality by 0.71, a 76% increase from the level in 2003, and Colombia's institutional quality rose by 62% from -0.66 to -0.23. On the contrary, Greece's institutional quality dropped by 71% from 0.74 to 0.21, and similarly in Hungary who experienced a deterioration of 47% from 0.96 to 0.45.

These large movements in institutional quality provide significant variations for analyzing the relationship between institutional quality and capital structure. In Figure 6, we plot the bin-scatter of the change in capital structure against that in institutional quality, and the figure shows a solid positive relationship between the two.

[8] As a majority of the firms in the sample are US firms, each US firm is assigned a weight based on firm characteristics matching propensity score with the non-US firms, and the weight is then adjusted to keep each country's weighted sample size equal.

To compare the long-difference results with the short-run estimates before, we adopt the same specification with firm and year fixed effects. From the results shown in Table 14, we find that the long-run relationship between institutional quality and capital structure is consistently significant. Moreover, the point estimates are both larger in magnitude compared to the short-run estimates. The significance and magnitude in the long-run relationship provides more validity of our baseline short-run analysis, as it is highly likely that the short-run effect that we estimate is the lower bound of the long-run effect.

Setting the long-difference span as 2003 to 2015 allows us to fully utilize the large change in institutional quality, however, one concern is that the global financial crisis might induce changes in the relationship between institutional quality and capital structure. Therefore, we separate the long-difference into two segments: 2003 to 2007, and 2007 to 2015. From the last four columns of Table 14, we can observe that the relationship between equity financing and institutional quality is stronger in pre-crisis period, while the relationship between long-term debt financing and institutional quality is prominent in post-crisis. This difference may come from debt financing experienced the most adverse shock in crisis, so given the improvement in institutional quality would be of great help in enhancing debt financing.

6 Conclusion

It is important to understand the determinants of the capital structure for nations and firms. The paper examines the role of public governance in the capital structure of both nations and firms. We propose a simple theory in which the equity debt ratio, and the share of long-term debt in total debt, are determined by institutional quality, heterogeneity across investors in terms of liquidity risk, and heterogeneity across firms (projects) in terms of underlying productivity. The key prediction is that as institutions improve, equity financing as a share of total financing should rise, and long-term debt as a share of total debt should also rise.

We take these predictions to data on the structure of external liabilities (from balance of payments) across countries, and find clear supportive evidence. We also take the predictions to firm level data from Worldscope and Amadeus. We find cross-country differences in the financing structure of firms depend on a country's institutional quality in ways that are consistent with the theory.

This paper documents the role of national institutions as an important common determinant of the capital structure for all firms in a country and for the composition of external liabilities of a country. Many extensions can be pursued. For example, within debt, it might be useful to distinguish between loans from banks versus bonds from the capital market. These are left for future research.

References

Alesina, Alberto, and Ekaterina Zhuravskaya. 2011. "Segregation and the Quality of Government in a Cross Section of Countries." *The American Economic Review*, 101(5): 1872–1911.

Alfaro, Laura, Sebnem Kalemli-Ozcan, and Vadym Volosovych. 2008. "Why doesn't capital flow from rich to poor countries? An empirical investigation." *The Review of Economics and Statistics*, 90(2): 347–368.

Bolton, Patrick, and David S Scharfstein. 1996. "Optimal debt structure and the number of creditors." *Journal of Political Economy*, 104(1): 1–25.

Bolton, Patrick, and Haizhou Huang. 2016. "The capital structure of nations." *Mimeo.*

Brunnermeier, Markus K, and Martin Oehmke. 2013. "The maturity rat race." *The Journal of Finance*, 68(2): 483–521.

Chang, Roberto, Andrés Fernández, and Adam Gulan. 2017. "Bond finance, bank credit, and aggregate fluctuations in an open economy." *Journal of Monetary Economics*, 85: 90–109.

Claessens, Stijn, Hui Tong, and Shang-Jin Wei. 2012. "From the financial crisis to the real economy: Using firm-level data to identify transmission channels." *Journal of International Economics*, 88(2): 375–387.

Contessi, Silvio, Pierangelo De Pace, and Johanna L Francis. 2013. "The cyclical properties of disaggregated capital flows." *Journal of International Money and Finance*, 32: 528–555.

Crouzet, Nicolas. 2014. "Aggregate implications of corporate debt choices." *Mimeo.*

De Fiore, Fiorella, and Harald Uhlig. 2015. "Corporate debt structure and the financial crisis." *Journal of Money, credit and Banking*, 47(8): 1571–1598.

Evans, Martin, and Viktoria V Hnatkovska. 2014. "International capital flows, returns and world financial integration." *Journal of International Economics*, 92(1): 14–33.

Forbes, Kristin, Dennis Reinhardt, and Tomasz Wieladek. 2017. "The spillovers, interactions, and (un) intended consequences of monetary and regulatory policies." *Journal of Monetary Economics*, 85: 1–22.

Frank, Murray Z, and Vidhan K Goyal. 2003. "Testing the pecking order theory of capital structure." *Journal of financial economics*, 67(2): 217–248.

Frank, Murray Z, and Vidhan K Goyal. 2009. "Capital structure decisions: which factors are reliably important?" *Financial management*, 38(1): 1–37.

Fratzscher, Marcel. 2012. "Capital flows, push versus pull factors and the global financial crisis." *Journal of International Economics*, 88(2): 341–356.

Gelos, R Gaston, and Shang-Jin Wei. 2002. "Transparency and international investor behavior." National Bureau of Economic Research.

Goldstein, Itay, and Assaf Razin. 2006. "An information-based trade off between foreign direct investment and foreign portfolio investment." *Journal of International Economics*, 70(1): 271–295.

Gomes, Joao, Urban Jermann, and Lukas Schmid. 2016. "Sticky leverage." *American Economic Review*, 106(12): 3800–3828.

Hennessy, Christopher A, and Toni M Whited. 2007. "How costly is external financing? Evidence from a structural estimation." *The Journal of Finance*, 62(4): 1705–1745.

Kalemli-Ozcan, Sebnem, Bent Sorensen, and Sevcan Yesiltas. 2012. "Leverage across firms, banks, and countries." *Journal of international Economics*, 88(2): 284–298.

Kaplan, Steven N, and Luigi Zingales. 1997. "Do investment-cash flow sensitivities provide useful measures of financing constraints?" *The quarterly journal of economics*, 112(1): 169–215.

Klein, Michael W. 2005. "Capital account liberalization, institutional quality and economic growth: theory and evidence." National Bureau of Economic Research.

Levchenko, Andrei A, and Paolo Mauro. 2007. "Do some forms of financial flows help protect against âĂIJsudden stopsâĂİ?" *The World Bank Economic Review*, 21(3): 389–411.

Lyandres, Evgeny. 2007. "Costly external financing, investment timing, and investment–cash flow sensitivity." *Journal of Corporate Finance*, 13(5): 959–980.

Miao, Jianjun, and Pengfei Wang. 2010. "Credit risk and business cycles." *working paper*.

Myers, Stewart C, and Nicholas S Majluf. 1984. "Corporate financing and investment decisions when firms have information that investors do not have." *Journal of financial economics*, 13(2): 187–221.

Opler, Tim, Lee Pinkowitz, René Stulz, and Rohan Williamson. 1999. "The determinants and implications of corporate cash holdings." *Journal of financial economics*, 52(1): 3–46.

Qian, Jun, and Philip E Strahan. 2007. "How laws and institutions shape financial contracts: The case of bank loans." *The Journal of Finance*, 62(6): 2803–2834.

Rajan, Raghuram G, and Luigi Zingales. 1995. "What do we know about capital structure? Some evidence from international data." *The journal of Finance*, 50(5): 1421–1460.

Razin, Assaf, Efraim Sadka, and Chi-Wa Yuen. 1998. "A pecking order of capital inflows and international tax principles." *Journal of International Economics*, 44(1): 45–68.

Shleifer, Andrei, and Robert W Vishny. 1997. "A survey of corporate governance." *The journal of finance*, 52(2): 737–783.

Tong, Hui, and Shang-Jin Wei. 2010. "The composition matters: capital inflows and liquidity crunch during a global economic crisis." *The Review of Financial Studies*, 24(6): 2023–2052.

Appendix A Proofs

Proposition 1. *The entrepreneur will propose debt contract based on the project's productivity. If $\theta < \theta^*$, long-term debt will be implemented. If $\theta > \theta^*$, short-term debt will be implemented. If $\theta = \theta^*$, the entrepreneur will be indifferent between the two contracts. θ^* is determined by (3), (4), and (5).*

Proof. The no deviation condition for the entrepreneurs who choose long-term debt is proved in the main context by equation (4). What remains is the no deviation condition for the entrepreneurs who engage in short-term, and it boils down to show that the face value of the rollover short-term debt is lower than the long-term debt. Intuitively, the long-term debt ends up with the low productivity firms so that the creditors demand high face value. Since the short-term financing entrepreneurs have high productivity projects, the creditor will be willing to sign up for a lower face value given the same return of return $(1 + r^*)^2$. Therefore, to maximize their profit, the entrepreneurs will choose the lower face value, i.e. the short-term debt.

Formatting the intuition, we can show that $d_{02}(\theta^*) > d_{12}$ for any $\theta > \theta^*$ based on the definition of $d_{02}(\theta^*)$, d_{12} in the following equations.

$$\frac{1}{\theta^*}\int_0^{\theta^*}(1-\theta+\theta d_{02}(\theta^*))d\theta = (1+r^*)^2$$

$$(1-\theta)+\theta d_{12} = (1+r^*)$$

□

Appendix B Internal Financing and External Financing

The benchmark model in Section 2 can be extended to incorporate internal financing, following Kaplan and Zingales (1997). The entrepreneurs now have two options in financing the project: internal fund I whose maximal amount is $\bar{I}$ and external fund E. Suppose that the payoff is a function of total financing (including both internal and external fund) and project productivity θ, denoted by $F(\mathcal{I}, \theta)$, where $\mathcal{I} = I + E$. Also, we assume that the marginal product of investment increases with productivity. External financing is associated with extra financing cost which is well-justified by the literature such as Hennessy and Whited (2007) and Lyandres (2007). We assume

that the cost $C(E, g)$ increases with the amount of external financing E, decreases with institutional quality g, and the marginal cost of external financing decreases with institutional quality g but increases with the amount of external financing E. The opportunity cost of internal financing is the same as external financing, which is equal to r^*. Therefore, the profit maximization problem can be specified as follows.

$$\begin{aligned} \max \quad & F(\mathcal{I}, \theta) - C(E, g) - (1 + r^*)\mathcal{I} \\ s.t. \quad & \mathcal{I} = I + E \\ & I \leq \bar{I},\ E \geq 0 \end{aligned}$$

The first order conditions are

$$F_1(\mathcal{I}, \theta) = 1 + r^* + \zeta_I \tag{6}$$

$$F_1(\mathcal{I}, \theta) + \zeta_E = 1 + r^* + C_1(E, g) \tag{7}$$

where $\zeta_I, \zeta_E \geq 0$ are the Lagrangian multipliers of the constraint $I \leq \bar{I}$ and $E \geq 0$, respectively. Since the marginal product of investment increases with productivity, i.e. $F_{12}(\mathcal{I}, \theta) > 0$, from (6), we can see higher productivity projects will use up internal financing and continue investing with external financing. Furthermore, note that the marginal cost of external financing is higher with lower institutional quality g, (7) leads to the result that the amount of external financing increases with institutional quality. Formally,

$$\frac{\partial E}{\partial g} = \frac{-C_{12}(E, g)}{C_{11}(E, g)} > 0$$

Appendix C Going Beyond Listed Firms

In all countries, firms that are not listed on a stock exchange outnumber those that are. We now make an attempt to compare the role of governance quality in determining the capital structure of these two types of firms. Data on non-listed firms are generally harder to come by since they do not face the same type of reporting requirements as their listed counterparts. For many European countries, Amadeus database provides information on both listed and private firms. The firm-level information of Amadeus comes from various resources, for instance, Creditreform, national statistic

agencies such as Chamber of Commerce and Industry of Romania and National Bank of Belgium. The criteria of firm selection vary country by country, and the sorts of criterion involves firm size, types of firm, etc. For instance, Bulgaria firm sample requires "All companies, which match 2 of the following 3 criteria: at least 50 persons staff, total assets at least euro 500,000, turnover at least euro 1,000,000", while Hungary solicits "Private and public limited liability companies, general and limited partnerships, cooperatives have to file accounts to the State Authorities".

We employ a specification that includes both firm fixed effects and year fixed effects, and cluster all standard errors at the country level. Table 17 reports the regression results. The baseline estimates, as presented in the first and third columns, suggest a strong positive relationship between capital structure and institutional quality, and the magnitude is close that of Worldscope.

In the second and fourth columns, we add a dummy for listed firms in order to account for possible differences between listed and non-listed firms. The estimates show that high institutional quality benefits the listed firms more in terms of raising equity and long-term debt. The consistency between the Worldscope sample and the Amadeus sample provides strong support for the robustness of the close relationship between institutional quality and capital structure regardless of the firm's advantage in access to the financial markets.

Figure 1: Capital Structure: High Institutional Quality vs. Low Institutional Quality

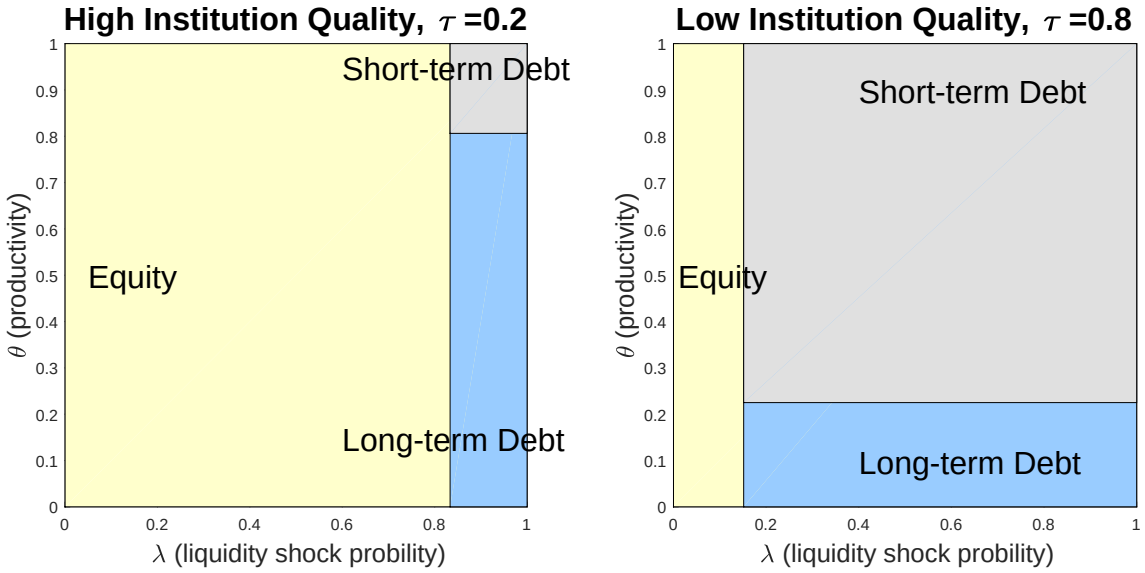


Figure 2: Capital Structure and Institutional Quality

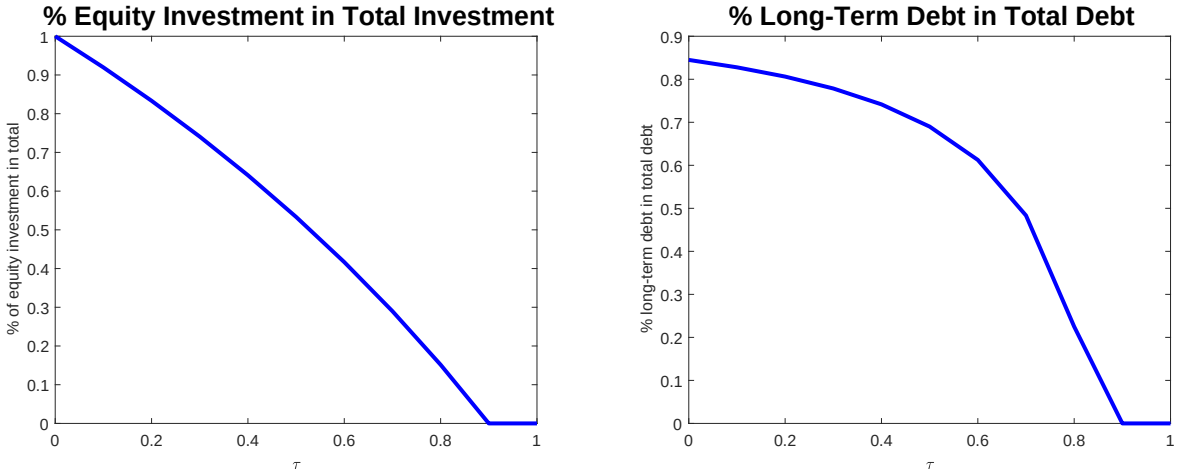


Figure 3: Capital Structure of External Financing and Institutional Quality

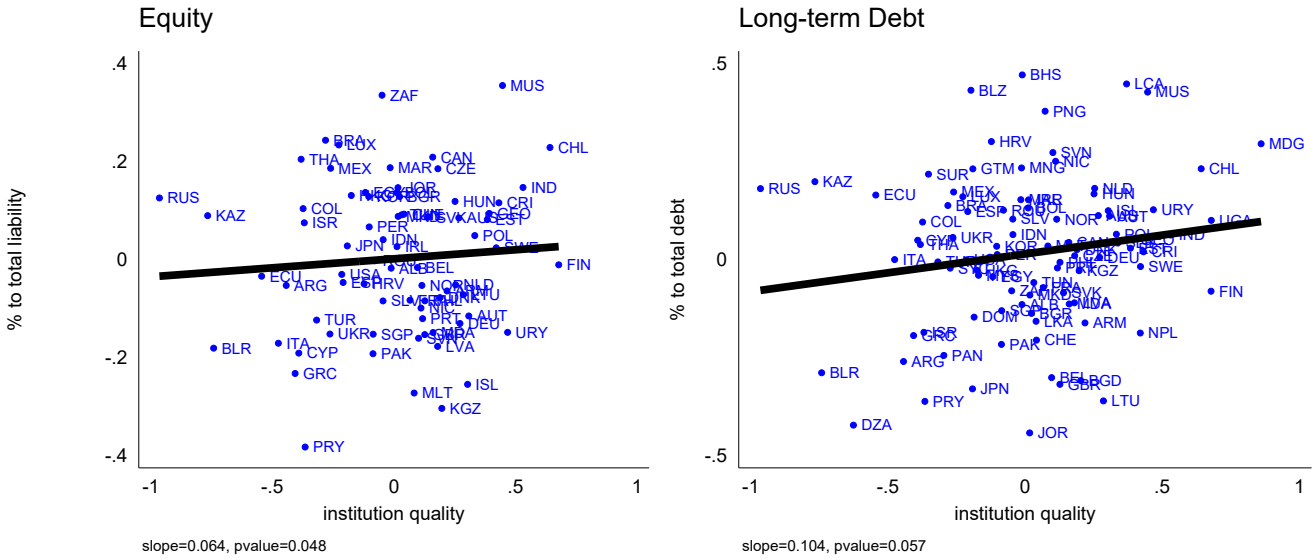


Figure 4: Capital Structure and Institutional Quality (Worldscope)

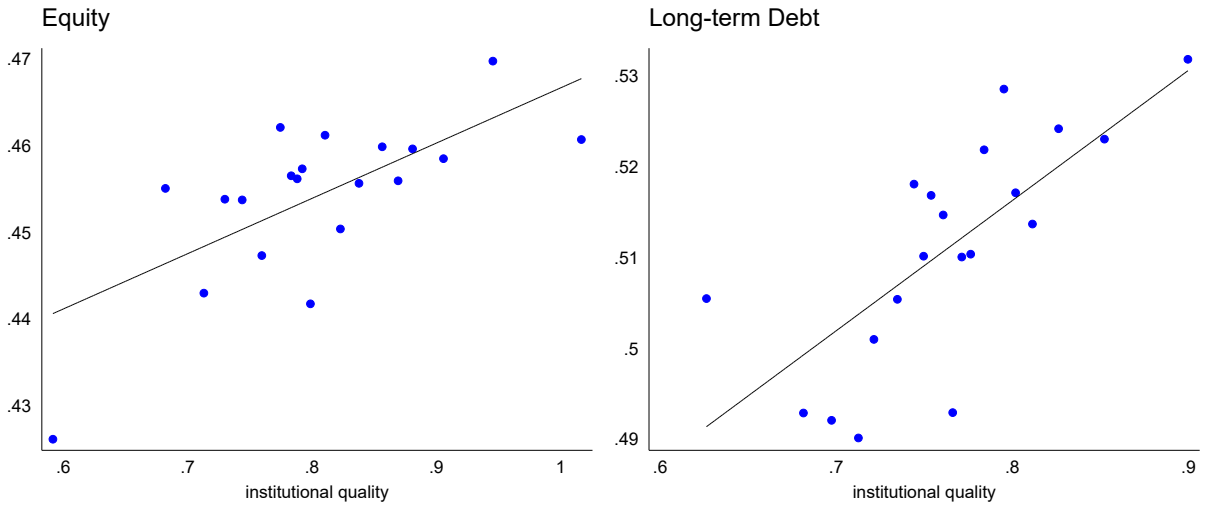
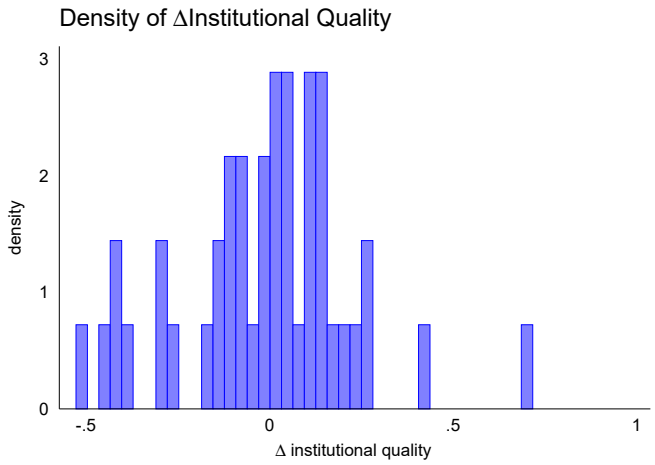
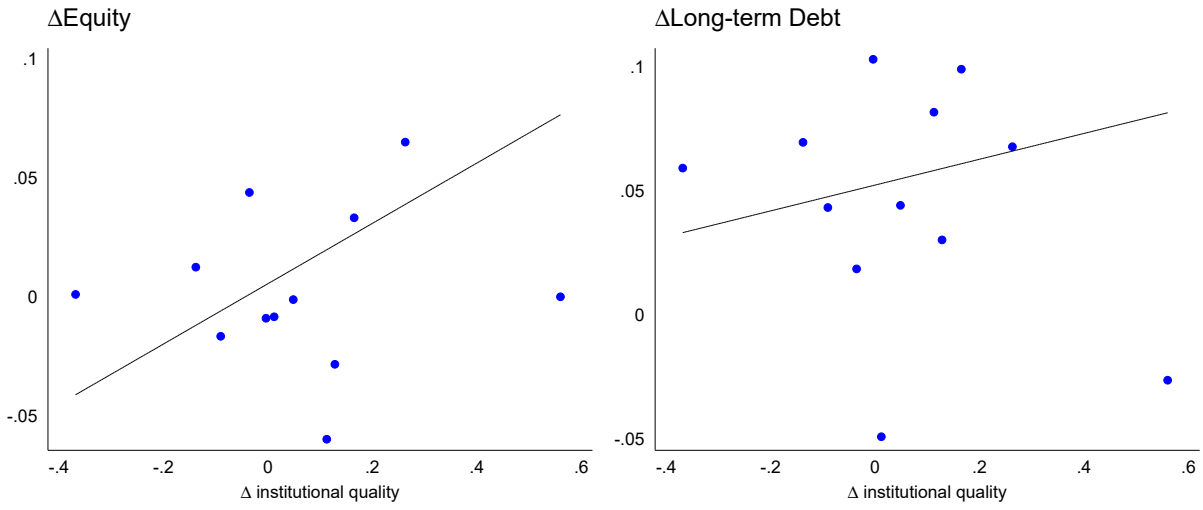


Figure 5: Density of Institutional Quality Long-Difference



Note: Δ institutional quality is the long-difference between 2003 and 2015.

Figure 6: Capital Structure of Domestic Financing and Institutional Quality



Note: Δ institutional quality is the long-difference between 2003 and 2015.

Table 1: Cross-correlation table

Variables	corruption control	rule of law	political stability	voice accountability	regulation quality	government efficiency
corruption control	1.00					
rule of law	0.82	1.00				
	(0.00)					
political stability	0.94	0.77	1.00			
	(0.00)	(0.00)				
voice accountability	0.78	0.63	0.75	1.00		
	(0.00)	(0.00)	(0.00)			
regulation quality	0.96	0.81	0.92	0.83	1.00	
	(0.00)	(0.00)	(0.00)	(0.00)		
gov efficiency	0.96	0.81	0.93	0.73	0.95	1.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	

Note: This table examines the correlation among different measures of institutional quality. The significant level is shown in parenthesess.

Table 2: Summary Statistics for External Financing

	mean	sd	min	max	N
equity/total liability	0.43	0.16	0.06	0.80	1331
long-term debt/total debt	0.55	0.22	0.00	1.00	885
institution quality	0.50	0.85	-1.18	1.99	1331
real GDP per capita	9.38	1.20	6.01	11.61	1331
private credit/GDP	0.74	0.51	0.04	2.62	1331
trade/GDP	0.99	0.72	0.19	4.46	1331

Table 3: Summary Statistics of Worldscope firms

Variable	N	mean	sd	min	max
equity/total liability	121795	.458	.186	0	.932
long-term debt/total debt	121795	.511	.329	0	1
institutional quality	121795	.763	.802	-1.477	1.985
corruption control	121795	.887	.985	-1.412	2.557
government efficiency	121795	1.078	.764	-1.36	2.431
political stability	121795	.275	.801	-2.806	1.66
regulation quality	121795	.899	.767	-1.923	2.263
rule of law	121795	.908	.851	-1.777	2.12
voice accountability	121795	.533	.98	-1.863	1.826
liquidity	121795	3.843	7.719	-.142	53.084
size	121795	19.002	2.494	12.072	26.064
growth	121795	.145	.325	-.642	4.818
fixed asset	121795	3.228	2.151	0	9.301
profit	121795	1.893	3.585	-149.126	24.137

Table 4: Country Composition of Worldscope Sample

country name	Percent	Cum.
Argentina	0.38	0.38
Australia	2.35	2.73
Austria	0.37	3.1
Bahamas	0.02	3.12
Bahrain	0.02	3.14
Bangladesh	0.05	3.2
Barbados	0.02	3.21
Belgium	0.47	3.69
Brazil	1.43	5.16
Bulgaria	0.3	5.46
Canada	2.18	7.65
Chile	0.16	7.8
China	11.46	19.26
Croatia	0.19	19.47
Cyprus	0.13	19.6
Czech Republic	0.06	19.67
Denmark	0.58	20.24
Egypt	0.28	20.52
Estonia	0.05	20.58
Fiji	0.03	20.61
Finland	0.71	21.31
France	3	24.31
Germany	2.3	26.62
Greece	0.89	27.52
Hong Kong	3.12	30.64
Hungary	0.09	30.73
Iceland	0.05	30.78
India	6.84	37.62
Indonesia	0.02	37.64
Ireland	0.36	38
Israel	0.94	38.94
Italy	1.13	40.07
Jamaica	0.02	40.09
Japan	20.73	60.82
Jordan	0.16	60.98
Korea (South)	0.1	61.16
Kuwait	0.12	61.28
Latvia	0.04	61.32
Lithuania	0.06	61.39
Luxembourg	0.2	61.59
Macedonia	0.05	61.64
Malaysia	3.85	65.49
Malta	0.03	65.51
Mauritius	0.04	65.56
Mexico	0.81	66.36
Morocco	0.15	66.52
Netherlands	0.84	67.36
New Zealand	0.33	67.69
Nigeria	0.07	67.76
Norway	0.55	68.32
Peru	0.51	69.51
Philippines	0.5	70.01
Poland	1.23	71.24
Portugal	0.24	71.49
Russian Federation	1.34	72.88
Saudi Arabia	0.33	73.22
Serbia	0.07	73.28
Singapore	2.25	75.53
Slovakia	0.02	75.56
Slovenia	0.11	75.67
South Africa	1.47	77.13
Spain	0.7	77.83
Sri Lanka	0.35	78.18
Sweden	1.2	79.38
Switzerland	1	80.38
Thailand	1.85	82.23
Tunisia	0.09	82.32
Turkey	0.73	83.05
Ukraine	0.05	83.1
United Kingdom	4.23	87.33
United States	12.67	100
Total	121795	

Table 5: External Capital Structure and Institutional Quality

	equity			long-term debt		
	ols	IV	panel	ols	IV	panel
institutional quality	-0.015	0.413**	0.087**	0.093**	0.172**	0.136*
	(0.033)	(0.127)	(0.039)	(0.014)	(0.060)	(0.079)
ln GDP per capita	0.013	-0.149***	0.110	-0.071*	-0.088**	0.021
	(0.007)	(0.028)	(0.072)	(0.018)	(0.043)	(0.135)
private credit/GDP	-0.023	-0.244**	-0.159***	-0.124**	-0.252***	0.054
	(0.102)	(0.113)	(0.041)	(0.011)	(0.011)	(0.035)
trade/GDP	0.045	0.011	0.040	-0.108**	-0.205***	-0.053
	(0.016)	(0.080)	(0.037)	(0.022)	(0.045)	(0.076)
N	123	79	1331	92	58	885
First stage regression						
language segregation		-0.318**			-0.447**	
		(0.193)			(0.247)	
First_stage_F		6.61			13.9	
DW_pvalue		0.083			0.064	

Note: This table examines the relationship between external capital structure and institutional quality. The first three columns are for the share of equity portfolio investment, and the last three are for the share of long-term debt (relative to total debt). Column (1) and (4) are the OLS regression on the cross-section sample, column (2) and (5) are the IV 2SLS results of language segmentation on the cross-section sample, and (3) and (6) are the panel fixed effect results. Standard error clustered at country level for OLS and IV, at country-year level for panel, reported in parentheses. *, **, and *** indicate significance level 10%, 5%, and 1%, respectively.

Table 6: External Capital Structure and Institutional Quality - Balanced Sample

	equity		long-term debt	
	ols	IV	ols	IV
institutional quality	0.007	0.054*	0.195***	0.569***
	(0.043)	(0.021)	(0.058)	(0.135)
ln GDP per capita	-0.006	-0.040	0.069	-0.267**
	(0.065)	(0.028)	(0.045)	(0.082)
private credit/GDP	-0.051	-0.151*	0.050	-0.482**
	(0.088)	(0.044)	(0.089)	(0.218)
trade/GDP	0.059	-0.112**	0.130*	-0.335***
	(0.036)	(0.020)	(0.070)	(0.091)
N	66	66	51	51
language segregation		-0.413**		-0.401**
		(0.171)		(0.203)
First_stage_F		7.61		13.7
DW_pvalue		0.083		0.064

Note: This table examines the relationship between external capital structure and institutional quality using a balance sample from 2002 to 2014. The first two columns are for the share of equity portfolio investment, and the last two are for the share of long-term debt (relative to total debt). Column (1) and (3) are the OLS regression on the cross-section sample, column (2) and (4) are the IV 2SLS results of language segmentation on the cross-section sample. Standard error clustered at country level for OLS and IV, at country-year level for panel, reported in parentheses. *, **, and *** indicate significance level 10%, 5%, and 1%, respectively.

Table 7: Institutional Quality and Capital Structure

	(1)	(2)	(3)	(4)	(5)	(6)
	equity	equity	equity	longdt	longdt	longdt
institutional quality	0.062**	0.080**	0.059**	0.124*	0.119*	0.124*
	(0.020)	(0.026)	(0.020)	(0.071)	(0.070)	(0.070)
liquidity	0.002***	0.002***	0.002***	0.001	0.000	0.001
	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
revenue	-0.001	0.004***	-0.001	0.016***	0.008***	0.015***
	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
growth	-0.009***	-0.011***	-0.009***	0.028***	0.031***	0.028***
	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)	(0.004)
fixed_asset	-0.003*	-0.005***	-0.003*	0.019***	0.011***	0.018***
	(0.002)	(0.001)	(0.002)	(0.003)	(0.002)	(0.003)
profit	0.004***	0.003***	0.004***	-0.002***	-0.003***	-0.002***
	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
ln GDP per capita	-0.058***	-0.074***	-0.056***	-0.053	-0.045	-0.051
	(0.009)	(0.010)	(0.009)	(0.096)	(0.094)	(0.095)
inflation	0.000	0.001	0.000	-0.001	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
financial development	-0.032**	-0.032**	-0.031**	0.019	0.017	0.017
	(0.014)	(0.014)	(0.014)	(0.025)	(0.025)	(0.025)
tax rate	-0.000	-0.000	-0.000	-0.001	-0.000	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
equity (industry)			0.372***			
			(0.057)			
long-term debt (industry)						0.294***
						(0.046)
N	121795	121795	121795	121795	121795	121795
CountryFE	Y	Y	Y	Y	Y	Y
FirmFE	Y	Y	Y	Y	Y	Y
YearFE	Y	Y	Y	Y	Y	Y
IndTimeTrend	N	N	Y	N	N	Y

Note: This table examines the relationship between equity financing/long-term debt financing and institutional quality with different fixed effects and controls. The first three columns are for equity financing, and the last three are for long-term debt financing. Column (1) and (4) contain firm fixed effects and year fixed effects. Column (2) and (5) replace the control variables with their lagged values. Column (3) and (6) control industry-level financing. Standard errors are clustered at country level and reported in parentheses. *, **, and *** indicate significance level 10%, 5%, and 1%, respectively.

Table 8: Institutional Quality and Corporate Bond Maturity

	(1) maturity	(2) maturity	(3) maturity
institutional quality	3.032**	3.014**	2.902**
	(1.081)	(1.085)	(1.169)
liquidity	5.308***	3.475***	4.467***
	(0.549)	(0.764)	(0.542)
revenue	-0.158**	-0.048	-0.114
	(0.053)	(0.062)	(0.083)
growth	-0.315**	-0.331**	-0.034
	(0.147)	(0.138)	(0.127)
fixed_asset	0.396***	0.436***	0.227**
	(0.069)	(0.041)	(0.098)
profit	3.409***	3.312***	0.981
	(0.364)	(0.709)	(0.676)
ln GDP per capita	-4.078	-6.957	-12.824
	(21.672)	(20.890)	(21.772)
inflation	0.042	-0.051	-0.257
	(0.888)	(0.904)	(0.802)
financial development	1.722	1.700	4.928
	(3.753)	(3.826)	(3.254)
tax rate	-0.044	-0.052	-0.130
	(0.304)	(0.305)	(0.304)
maturity (industry)			0.686***
			(0.014)
N	2302	2302	2302
CountryFE	Y	Y	Y
FirmFE	Y	Y	Y
YearFE	Y	Y	Y
IndTimeTrend	N	N	Y

Note: This table examines the relationship between corporate bond maturity and institutional quality with different fixed effects and controls. Column (1) contains firm fixed effects and year fixed effects. Column (2) replaces the control variables with their lagged values. Column (3) controls industry-level financing. Standard errors are clustered at country level and reported in parentheses. *, **, and *** indicate significance level 10%, 5%, and 1%, respectively.

Table 9: Equity and Different Measures of Institutional Quality

	(1) corruption control	(2) government efficiency	(3) rule of law	(4) political stability	(5) regulation quality	(6) voice accountability
institutional quality	0.033***	0.027	0.024**	-0.016	0.037**	0.051**
	(0.009)	(0.017)	(0.011)	(0.013)	(0.018)	(0.021)
revenue	-0.001	-0.002	-0.002	-0.002	-0.002	-0.002
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
growth	-0.009***	-0.009***	-0.009***	-0.009***	-0.009***	-0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
fixed_asset	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**	-0.004**
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
profit	0.004***	0.004***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ln GDP per capita	-0.062***	-0.053***	-0.051***	-0.045***	-0.054***	-0.060***
	(0.009)	(0.010)	(0.010)	(0.011)	(0.009)	(0.009)
inflation	0.001	0.000	0.001	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
financial development	-0.024*	-0.032**	-0.038**	-0.039**	-0.042**	-0.034**
	(0.014)	(0.014)	(0.016)	(0.015)	(0.014)	(0.014)
tax rate	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	121795	121795	121795	121795	121795	121795
CountryFE	Y	Y	Y	Y	Y	Y
FirmFE	Y	Y	Y	Y	Y	Y
YearFE	Y	Y	Y	Y	Y	Y

Note: This table examines the relationship between equity financing and different measures of institutional quality. From column (1) to (6), the institutional quality is corruption control, government efficiency, rule of law, political stability, regulation quality, and voice accountability. Standard errors are clustered at country level and reported in parentheses. *, **, and *** indicate significance level 10%, 5%, and 1%, respectively.

Table 10: Long-term Debt and Different Measures of Institutional Quality

	(1) corruption control	(2) government efficiency	(3) rule of law	(4) political stability	(5) regulation quality	(6) voice accountability
institutional quality	0.034*	0.060*	0.103*	-0.001	0.049	0.049
	(0.020)	(0.034)	(0.052)	(0.008)	(0.037)	(0.043)
revenue	0.016***	0.016***	0.016***	0.015***	0.015***	0.015***
	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
growth	0.029***	0.029***	0.028***	0.029***	0.029***	0.029***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
fixed_asset	0.018***	0.018***	0.018***	0.018***	0.018***	0.018***
	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)
profit	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ln GDP per capita	-0.042	-0.038	-0.037	-0.029	-0.036	-0.040
	(0.094)	(0.091)	(0.081)	(0.096)	(0.101)	(0.100)
inflation	-0.001	-0.002	-0.002	-0.000	-0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
financial development	0.019	0.017	0.006	0.005	0.000	0.009
	(0.025)	(0.025)	(0.022)	(0.020)	(0.020)	(0.023)
tax rate	-0.000	-0.000	-0.001	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
N	121795	121795	121795	121795	121795	121795
CountryFE	Y	Y	Y	Y	Y	Y
FirmFE	Y	Y	Y	Y	Y	Y
YearFE	Y	Y	Y	Y	Y	Y

Note: This table examines the relationship between long-term debt financing and different measures of institutional quality. From column (1) to (6), the institutional quality is corruption control, government efficiency, rule of law, political stability, regulation quality, and voice accountability. Standard errors are clustered at country level and reported in parentheses. *, **, and *** indicate significance level 10%, 5%, and 1%, respectively.

Table 11: Summary Statistics of Compustat firms

Variable	mean	sd	min	max	N
external equity/total liability	0.43	0.166	-0.493	0.76	11134
long-term debt/total debt	0.868	0.208	0	1	11134
internal equity/total liability	0.003	0.004	-0.011	0.082	11134
institutional quality	1.287	0.109	-1.01	1.852	11134
liquidity	0.085	0.086	0	0.686	11134
size	7.751	1.512	2.417	13.089	11134
growth	0.061	0.147	-0.789	0.581	11134
fixed asset	0.782	0.2	0.127	1	11134
profit	0.088	0.067	-0.282	0.339	11134
Country				N	%
Canada				40	0.36
Chile				37	0.33
UK				89	0.80
Israel				111	1.00
Singapore				7	0.06
USA				10,850	97.45

Table 12: External/Internal Financing and Institutional Quality

	external equity financing / total financing	longdt / total debt	internal equity financing / total financing
institutional quality	0.145**	0.234**	-0.009***
	(0.060)	(0.082)	(0.001)
liquidity	0.308***	0.145	-0.002*
	(0.079)	(0.208)	(0.001)
size	-0.083***	-0.055*	0.000
	(0.015)	(0.032)	(0.000)
growth	-0.012	0.066	-0.001**
	(0.029)	(0.051)	(0.000)
fixed asset	-0.156**	-0.411**	0.000
	(0.069)	(0.143)	(0.001)
profit	0.629***	-0.465	-0.005**
	(0.106)	(0.355)	(0.002)
ln GDP per capita	0.450***	-0.198	-0.001
	(0.122)	(0.269)	(0.002)
inflation	-0.001	-0.007	0.000
	(0.002)	(0.005)	(0.000)
financial development	0.034**	0.054	0.002***
	(0.017)	(0.045)	(0.000)
tax rate	0.002	0.001	0.000
	(0.002)	(0.003)	(0.000)
N	11134	11134	11134
CountryFE	Y	Y	Y
FirmFE	Y	Y	Y

Note: This table examines the relationship between capital structure (both internal and external financing) and institutional quality. Column (1), (2), and (3) are for external equity financing, long-term debt financing, and internal equity financing, respectively. Robust standard errors are reported in parentheses. *, **, and *** indicate significance level 10%, 5%, and 1%, respectively.

Table 13: Top Ten and Bottom Ten Countries in the Change of Institutional Quality (2003 vs. 2015)

bottom 10	Δgov_q	top 10	Δgov_q
Greece	-0.53	Indonesia	0.71
Hungary	-0.45	Colombia	0.41
Thailand	-0.41	Japan	0.27
Egypt	-0.41	Poland	0.26
Spain	-0.40	Philippines	0.23
Portugal	-0.29	Singapore	0.19
Mexico	-0.29	Germany	0.18
Italy	-0.28	Switzerland	0.15
South Africa	-0.17	Israel	0.13

Table 14: Long Difference

	Δequity 2003-2015	Δlongdt 2003-2015	Δequity 2003-2007	Δlongdt 2003-2007	Δequity 2007-2015	Δlongdt 2007-2015
Δinstitutional quality	0.240***	0.036***	0.072*	0.122*	0.083**	0.565***
	(0.055)	(0.010)	(0.038)	(0.066)	(0.028)	(0.156)
Δliquidity	0.003***	-0.001***	0.001***	-0.001***	0.004***	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Δsize	-0.000	0.019**	0.003	0.018**	-0.005	0.022**
	(0.006)	(0.005)	(0.008)	(0.008)	(0.003)	(0.006)
Δgrowth	-0.007	0.016	-0.014**	0.063***	-0.038***	0.046**
	(0.011)	(0.020)	(0.006)	(0.016)	(0.010)	(0.013)
Δfixed asset	-0.001	0.011**	0.002	0.019***	0.002	0.018**
	(0.003)	(0.005)	(0.004)	(0.005)	(0.002)	(0.006)
Δprofit	0.006***	-0.003***	0.005***	-0.003**	0.005***	-0.009***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
Δln GDP per capita	-0.013	0.285***	0.155	-0.113	-0.079**	-0.238**
	(0.058)	(0.074)	(0.126)	(0.126)	(0.024)	(0.102)
Δinflation	-0.007	0.011	-0.001	-0.009	0.002	-0.026**
	(0.006)	(0.010)	(0.008)	(0.009)	(0.002)	(0.010)
Δfinancial development	0.082**	0.018	-0.039	0.059	0.028*	0.022
	(0.033)	(0.045)	(0.029)	(0.041)	(0.014)	(0.050)
Δtax rate	-0.001	-0.006**	-0.002	-0.001	-0.001*	-0.004*
	(0.002)	(0.002)	(0.002)	(0.003)	(0.001)	(0.003)
N	7501	7501	7501	7501	7501	7501

Note: This table examines the relationship between capital structure and institutional quality in long difference as 2003 vs. 2015. The first column is equity, and the second one is long-term debt. Standard errors are clustered at country level and reported in parentheses. *, **, and *** indicate significance level 10%, 5%, and 1%, respectively.

Table 15: Summary Statistics of Amadeus Firms

	mean	sd	min	max	N
equity/total liability	0.25	0.26	-0.85	1.00	3218433
long-term debt/total debt	0.65	0.30	0.00	1.00	3218433
institutional quality	0.82	0.57	-0.81	1.99	3218433
liquidity	0.08	0.12	0.00	1.00	3218433
size	14.24	2.17	6.91	19.83	3218433
growth	0.22	1.24	-1.00	21.16	3218433
fixed asset	0.46	0.31	0.00	1.00	3218433
profit	0.04	0.12	-3.06	1.34	3218433
long-term debt (industry)	0.75	0.07	0.00	1.00	3218433
equity (industry)	0.22	0.05	0.02	15.93	3218433

Table 16: Country Composition of Amadeus Sample

	total share	private firm share	list firm share
Belarus	0.01	100	0
Belgium	0.38	96.2	3.8
Bulgaria	0.78	92.2	7.8
Switzerland	0.3	97	3
Cyprus	5.12	48.8	51.2
Czech Republic	0.03	99.7	0.3
Denmark	0.47	95.3	4.7
Estonia	0.18	98.2	1.8
Finland	0.65	93.5	6.5
France	0.58	94.2	5.8
Germany	0.38	96.2	3.8
Greece	2.76	72.4	27.6
Italy	0.01	99.9	0.1
Hungary	0.16	98.4	1.6
Iceland	0.5	95	5
Ireland	0.3	97	3
Lithuania	0.17	98.3	1.7
Latvia	0.26	97.4	2.6
Liechtenstein	0.31	96.9	3.1
Luxembourg	0	100	0
Macedonia	0.53	94.7	5.3
Malta	5.73	42.7	57.3
Netherlands	0.66	93.4	6.6
Norway	0.1	99	1
Poland	0.34	96.6	3.4
Portugal	2.38	76.2	23.8
Serbia	0.19	98.1	1.9
Slovakia	4.83	51.7	48.3
Slovenia	0.27	97.3	2.7
Spain	0.26	97.4	2.6
Sweden	0.39	96.1	3.9
Switzerland	1.18	88.2	11.8
Turkey	2.21	77.9	22.1
Ukraine	1.38	86.2	13.8
United Kingdom	0.67	93.3	6.7
Total	100 (3218433 obs)		

Table 17: Capital Structure of Domestic Financing and Institutional Quality

	equity		long-term debt	
	baseline	+listed interaction	baseline	+listed interaction
institutional quality	0.020***	0.015***	0.111***	-0.019
	(0.006)	(0.005)	(0.030)	(0.019)
listed (dummy)		0.223***		0.051***
		(0.097)		(0.024)
listed× institutional quality		0.024***		0.062***
		(0.010)		(0.029)
liquidity	0.113***	0.096***	0.024***	0.022***
	(0.022)	(0.019)	(0.005)	(0.004)
size	0.000	-0.001	0.008***	0.012***
	(0.000)	(0.000)	(0.001)	(0.002)
growth	-0.005***	-0.007***	0.001***	0.003*
	(0.001)	(0.001)	(0.000)	(0.002)
fixed asset	0.057***	0.039***	0.155***	0.190***
	(0.008)	(0.031)	(0.038)	(0.007)
profit	0.413***	0.449***	-0.022***	-0.119**
	(0.083)	(0.090)	(0.004)	(0.024)
ln GDP per capita	0.005	0.002**	0.108***	0.006
	(0.004)	(0.000)	(0.022)	(0.006)
inflation	0.000***	0.000***	-0.000***	0.000**
	(0.005)	(0.000)	(0.012)	(0.006)
financial development	-1.448	0.427	-0.984	0.522
	(1.046)	(0.218)	(0.845)	(0.322)
tax rate	0.000	0.003	-0.000	0.000
	(0.003)	(0.004)	(0.000)	(0.006)
equity (industry)	0.210***	0.150**		
	(0.042)	(0.038)		
long-term debt (industry)			0.281***	0.122***
			(0.056)	(0.024)
N	3218433	3218433	3218433	3218433
CountryFE	Y	Y	Y	Y
FirmFE	Y	Y	Y	Y
YearFE	Y	Y	Y	Y
IndTimeTrend	Y	Y	Y	Y

Note: This table examines the relationship between firm-level capital structure and institutional quality. The first three columns are for equity financing, and the last three are regarding long-term debt financing. Column (1) and (3) are the baseline fixed effect regression with controlling the industry capital structure's time trend, and column (2) and (4) add the listed firm dummy and its interaction with institutional quality. Standard errors are clustered at country level and reported in parentheses. *, **, and *** indicate significance level 10%, 5%, and 1%, respectively.