Judicial Efficiency and Capital Structure: An International Study

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Abstract

This study investigates a particular aspect of creditor rights -- judicial efficiency -- and its influence on firms' corporate leverage in 69 countries. Increasing creditor rights has two potential countervailing effects on capital structure: while credit is more readily available due to a greater supply of loans, firms choose to use less leverage to avoid premature liquidation. Using a sample of 40,734 firms between 1997 and 2012, we find that efficient judicial systems are associated with lower corporate leverage ratios. This negative relationship between judicial efficiency and leverage is the result of debt's agency cost, where managers perceive higher leverage levels in the presence of more efficient judicial systems and stronger creditor rights as a serious threat to the continuation of their jobs or private benefits. We explore how much of creditor rights' effects can be explained by judicial efficiency, with our results indicating that stronger creditor rights alone cannot be effective without efficient enforcement of these rights. Our results are robust to alternative definitions of judicial efficiency, leverage, and to the exclusion of countries that have a high density of firm-year observations.

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1. Introduction

The nexus between law and external finance has attracted increasing academic interest. La Porta et al. (1998) argue that protecting shareholders' and creditor rights is crucial for capital market development through debt and equity financing, and a number of empirical studies have corroborated this argument (e.g., Haselmann et al., 2010; Visaria 2009; Djankov et al., 2007; Beck, et al., 2003; and Levine 1998, 1999). More recent studies have examined firm-level decisions to employ debt. This new evidence suggests that stronger creditor rights do not necessarily increase a firm's leverage. These new studies examine corporate leverage decisions and creditor rights using cross-country data at the firm level and creditor rights indexes at the country level. For example, Acharya et al. (2011) suggest that stronger creditor rights make managers more risk-averse, leading them to make value-decreasing corporate decisions, such as employing sub-optimal leverage. Cho et al. (2014) present empirical evidence from a cross-section of 48 countries showing stronger creditor rights leading to decreased leverage ratios. Fan et al. (2012) and Vig (2013) report similar results supporting Acharya et al.'s (2011) argument. Earlier studies establishing a positive link between law and external finance build their arguments from a funds suppliers' perspective (supply side factors). They argue that when the law provides sufficient protection, investors feel more confident in increasing fund availability. In contrast, the latter group of studies looks at the negative effects of stronger creditor rights on borrowers' risk-taking behavior (demand side factors).

Despite this wealth of studies, we do not know whether the content of the law and its level of enforcement complement or substitute for each other in determining corporate leverage. Examining judicial efficiency allows a direct analysis of the magnitude of the combined effects of suppliers' reticence to lend when confronted with borrowers who might not repay. If the courts are slower and inefficient, borrowers might act opportunistically and refuse to pay back a loan, even if they are solvent. However, if suppliers rationally anticipate weak contract enforcement institutions, they will protect themselves by altering the terms of their formal and informal contracts (Acemoglu and Johnson 2005).Therefore, it remains unclear how effective altering a contract's content can be in reducing the negative impact of slower and inefficient courts.

This study contributes to the above literature by investigating the role of judicial efficiency in corporate capital structure decisions. While most existing studies focus on legal content (e.g., shareholder rights protection and creditor rights protection) in association with corporate financing decisions, little attention has been paid to the role that enforcing those laws plays in corporate financing decisions (with the recent notable exceptions of Fan et al., 2012, and Cho et al., 2014). Our study differs from these studies in several respects.

First, we investigate both direct and indirect effects of judicial efficiency on corporate capital structure. Existing studies assume that creditor rights and judicial efficiency influence all firms' capital structure decisions in a similar fashion. De Jong et al. (2008) argue that countries' macroeconomic and institutional features might influence firms with different attributes differently in their capital structure decisions, e.g., poor/strong judicial systems will have different influences on capital structure decisions made by small or large firms, firms with more or less tangible assets, and firms with more or less volatile cash flows. This

classification can shed better light on the 'composition effect' of judicial efficiency on leverage as suggested by Jappelli et al. (2005) and Fabbri and Padula (2004). The composition effect suggests that judicial efficiency has the potential to reduce credit to one group of borrowers and re-distribute the same to another group of borrowers. In this way, judicial efficiency might not affect the total volume of credit; however, it might change its composition.

Second, unlike the existing studies that have used broader and generic proxies for judicial efficiency as robustness checks, we keep our primary focus on judicial efficiency in leverage determination and use several more refined and alternative measures. Our first measure is time in days spent in resolving a judicial case from the point of instituting the case until implementing the final decision by a court. The second measure is the costs of a court trial, including court fees, enforcement costs and average attorney fees, as a percentage of the claim amount. The third measure is the number of procedures followed to solve a case from the point of case initiation until the decision is implemented by the court. These alternative measures help us to ensure that our results are not an artifact of a specific definition of judicial efficiency.

Third, we use a large data set of over 40,700 firms from 69 countries between 1997 and 2012. Previous studies have used smaller data sets; for example, Fan et al. (2012) used data from 39 countries covering 1991 to 2006, and Cho et al. (2014) used data from 42 countries covering 1991 to 2010.

Fourth, the most recent data set also allows us to consider the financial crisis period following 2008 and test our hypotheses both in normal and in crisis periods. This allows us to weigh in on the debate between the 'positive effect' hypothesis, which was initially suggested by La Porta et al. (1998) and later supported by many studies (e.g., Demirg¨uc-Kunt and Maksimovic, 1998; Galindo, 2001), and the more recent 'liquidation bias' hypothesis. The positive effect hypothesis states that better laws and their enforcement should increase the availability of external finance because lenders will feel more confident in their lending decisions. On the other hand, Vig (2013) and Acharya et al. (2011), propose the 'liquidation bias' hypothesis, which suggests that stronger creditor rights intensify the fear of bankruptcy among borrowers, who then hesitate to employ more leverage in their firms. If this argument is true, then the 'liquidation bias' hypothesis must hold compellingly during the crisis period. We separate out the pre-crisis and crisis time periods and our results support strongly the 'liquidation bias' hypothesis.

Fifth, we consider the interaction of creditor rights and judicial efficiency to analyze whether the two are complementary or substitutive in nature. As we are not aware that this has been investigated previously, we believe it to be of interest to policy makers to see whether legal content and legal enforcement have similar implications. If the two are substitutive in nature, then it would be just a matter of cost and benefit analysis or ease of implementation to decide which one to target actively.

Before beginning, we must address our empirical design's inherent endogeneity. If a country experiences increased creditor rights, this may lead to fewer violations resulting in fewer days needed to resolve cases and lower court costs for a constant level of judicial efficiency. We might then erroneously conclude that judicial efficiency improved, resulting in lower leverage, although the true cause of the change was a strengthening of creditor rights. While

we cannot directly test this possibility, we will highlight why these effects are mitigated. First, the above scenario requires that judicial efficiency be at least strong enough to be relevant; otherwise, the change in creditor rights could not have any effect. Second, although strengthening creditor rights might be the catalyst resulting in fewer cases, quicker turnaround, and lower costs, the mechanism for the change is judicial efficiency. After all, it is also possible that increasing creditor rights increases the number of firms who will be in court proceedings, thereby, increasing the number of cases and burdening the system by increasing the turnaround time and court costs.

The rest of the paper is organized as follows. Section 2 reviews the theoretical and empirical literature on the association of enforcement of law, content of law, and external financing. Section 3 presents details of the sample used, choice of variables, and statistical methods. Section 4 presents results and discussion on the results. Section 5 concludes the paper.

2. Literature Review

2.1 Cross-country studies on leverage

Academic interest in studying corporate capital structure decisions using cross-country data increased with Rajan and Zingales (1995), who found that both firm-specific and country-specific factors explain variation in corporate leverage ratios in seven developed countries. Booth et al. (2001) found that firm-specific factors in developing countries affect capital structure decisions in a similar way as Rajan and Zingales (1995) had found in developed countries. However, macro-factors in these countries affect leverage ratios differently. Demirg¨uc-Kunt and Maksimovic (1999) studied both developed and developing countries and found that institutional factors (such as legal systems, financial institutions, government subsidies, and stock market trading activity) explain greater variation in leverage ratios across developed and developing countries. While conducting cross-country analyses on a sample of 39 countries, Fan et al. (2012) found that capital market development, banking sector .development, and the country corruption index play important roles alongside previously identified factors in determining corporate capital structures. With the development of a creditor rights index by Djankov et al. (2007), several studies investigated how stronger creditor rights can influence availability of and demand for external financing. Djankov et al. (2007) used country-level data to analyze the link between external financing and creditor rights. They found that the private credit-to-GDP ratio is significantly higher in countries where creditor rights are well-protected. In a more recent paper investigating the role of creditor rights on corporate leverage, Cho et al. (2014) argued that stronger creditor rights can discourage managers/shareholders from taking higher risk, resulting in lower leverage ratios. They tested their hypothesis using data from 39 countries and found strong evidence in support of their hypothesis. Similar results are reported by Vig (2013), who found that after strengthening creditor rights, secured debt, total debt, and debt maturity significantly declined in India. He attributes this decline to the 'liquidation bias,' i.e. the additional fear of bankruptcy among managers and shareholders due to stronger creditor rights.

2.2 Creditor Rights and Corporate Capital Structure

La Porta et al. (1997) argue that protecting the rights of shareholders and bondholders either through the content of the law or its enforcement leads to equity and bond market development. Their analyses focused on those supplying funds. They emphasize that better protecting financier rights enhances the financiers' confidence in offering entrepreneurs money at better terms. They used a sample of 49 countries and found overwhelming evidence in support of their hypothesis. Several other studies followed La Porta et al. (1997) in investigating investor rights protection and aggregate lending and borrowing in cross-country settings[2]. In contrast to using aggregate country-level data, several recent studies have used firm-level data to show how fund suppliers behave when they know their rights are well-protected. These studies have investigated the impact of creditor rights protection from different dimensions. For example, Boubakri and Ghouma (2010) used data for more than 8000 firms across 22 countries to investigate how bondholders' rights protection affects bond yields and ratings. They found that improving debtholders' rights generally reduces bond yields-spread and improves bond ratings. They further highlight that law enforcement is important for both bondholders and rating agencies. Similarly, Gungoraydinoglu and Öztekin (2011) found that improving creditor rights positively influences leverage ratios. Yet from a different perspective, Bae and Goyal (2009) and Qian and Strahan (2007) argue that creditor rights protections enable banks to write loan contracts at favorable terms with their clients (e.g., by altering loan maturity and interest rates). Furthermore, Benmelech and Bergman (2011) found that better protecting creditor rights gives financial institutions more confidence to take greater risk.

While all of the above evidence provides unqualified support to the notion that creditor rights play a positive role in capital market development, these studies focus only on the supply side factors of external finance. Another strand of papers that focus on demand side determinants of external finance tells a decidedly different story, highlighting instead the dark side of strengthening creditor rights. Rajan and Zingales (1995) argued that stronger creditor rights can seriously jeopardize the existence of a financially-distressed firm, thus leading managers to prefer staying away from debt. This might be specifically true for managers who are not monitored effectively by shareholders. Several recent papers have built their arguments following Rajan and Zingales. For example, Acharya et al. (2011) argue that stronger creditor rights negatively affect corporate risk taking. In a cross-country analysis, they found that in countries where stronger creditor rights exist, firms try to reduce cash flow volatility, reduce their leverage ratios, and go for diversifying acquisitions. They argue that increases in the leverage ratio in turn increases the chances of bankruptcy, and that stronger creditor rights further intensifies this fear among borrowers. Thus, improving creditor rights should reduce leverage. Vig (2013) supports Acharya et al.'s (2011) arguments. He notes that making secured creditors more powerful might increase secured debt capacity and reduce borrowing costs; however, it also exposes borrowing firms to the risk of being prematurely liquidated. Firms that place greater value on continuation will hesitate to employ higher levels of secured credit. In fact, Vig (2013) found strong support for his hypothesis using India as a quasi-natural experiment where secured creditors were given more protection in the year 2002 and

[2] See, e.g Haselmann et al., (2010), Visaria (2009), Djankov et al., (2007), Beck, et al. (2003) and Levine (1998, 1999)

onward[3]. Vig (2013) found that after strengthening secured creditor rights, a decline was observed in the leverage ratios, debt maturity, and asset growth of Indian firms. He termed this effect a 'liquidation bias' resulting from strengthening creditor rights. In a more recent paper, Cho et al. (2014) evaluated both the demand and supply side view of strengthening creditor rights using a sample of 17,452 firms from 48 countries over the 1991–2010 period. They found that improving creditor rights had a significantly negative impact on the ratio of long-term debt. Their results indicate that the demand side view of creditor rights is dominant in explaining the observed leverage ratios in international settings.

2.3 Judicial Efficiency and Corporate Capital Structure

Much of the empirical literature dedicated to establishing the link between 'law and finance' has been devoted to the content of the law. In contrast, enforcement of these laws are either given less attention in empirical papers by including them as control variables or are ignored entirely. For example, Sherwood et al. (1994: p. 4), noted that "self-evident though it may seem, the proposition that a strong judicial process enhances economic performance is far from proven."

Modigliani and Perotti (1996, p. 520) highlight the importance of enforcement because "it is important to realize that legal rules alone are not sufficient to create a favorable legal framework; their proper enforcement is just as important." There are several reasons why efficient enforcement of investor rights matters. First, slower courts reduce the time value of punishment which courts might impose on the party in breach of the contract (Chemin 2010). Second, Jappelli et al. (2005) argue that if the judicial process is slow and costly, even a solvent opportunistic borrower might choose to default as the cost of loan recovery through the judicial system might not make economic sense for the lender. Third, a slow judicial process reduces recovery rates and increases the time spent in repossessing collateral following default (Bae and Goyal 2009). Fourth, Modigliani and Perotti (1996) argue that financial transactions are sensitive to legal characteristics of the market in which they take place. Given that, financial securities derive their value from the enforcement of their associated rights which are not specified contractually between the holder and the issuer, but determined by the available legislature. In conclusion, they point out that poor enforcement of investor rights leads to underdevelopment of capital markets. Contrary to all of the above, one can argue that if lenders are *ex-ante* aware of the state of the judicial system, they might work around it through formal and informal arrangements to protect themselves (Acemoglu and Johnson 2005). This counter-argument makes the effect of judicial efficiency on leverage unclear.

Several studies have investigated the role of judicial efficiency on corporate leverage and debt-maturity structure. In a theoretical model, Jappelli et al. (2005) point out that the role of courts is important in credit market development because well-functioning courts can stop solvent borrowers from defaulting on loans. In their empirical analysis of Italian districts, they found that poor judicial efficiency is associated with lower levels of lending and shorter loan maturities. In a similar vein, Shah (2011) provided evidence from Pakistani judicial

[3] "The Securitization and Reconstruction of Financial Assets and Enforcement of Security Interests Act of 2002" was promulgated in India to give secured creditors the rights to bypass the lengthy judicial process and seize and sell the collateral directly.

districts on the positive role of judicial efficiency in increasing corporate debt-maturity structure. Furthermore, he found that poor judicial efficiency has a larger negative impact on the debt-maturity structure of small firms rather than large firms. They argue that larger firms have lower information asymmetry problems and are less affected by court inefficiency. Laeven et al.'s (2005) cross-country analysis investigated the impact of judicial efficiency on banks' lending spreads. They reported that inflation and judicial efficiency are the two most important determinants of banks' lending spreads and suggest that improving court efficiency is needed to reduce the cost of financial intermediation. Bae and Goyal (2009) add support to Laeven et al.'s (2005) arguments that an inefficient judicial system increases uncertainty about the borrower's loan repayment. As the risk of default increases, fund suppliers will demand higher interest rates. In some cases, lenders will ration borrowers instead of charging higher interest rates (Stiglitz and Weiss 1981). In either case, the lending volume is expected to decline.

A common chord connecting all of the above papers is how fund suppliers and users view *ex-post* judicial efficiency and respond to it. The *ex-ante* effects of judicial efficiency on borrower behavior, however, present a very different view. Amihud and Lev (1981) argue that managers invest non-diversifiable human capital in their firms which they try to hedge by adopting tactics that ensure firm survival, which in turn would ensure their continued employment in the firm. Since excessive leverage increases the probability of premature default, managers might see leverage as a threat to the firm's future existence, and therefore to their jobs. Friend and Lang (1988) conjecture that managers prefer to employ lower debt ratios in order to reduce non-diversifiable employment risk. In a more recent study, Berk et al. (2010) develop a model of human capital, bankruptcy, and capital structure wherein they propose that the optimal capital structure of a firm results from a trade-off between the human costs of bankruptcy and the tax advantage of debt.

In the present study, we argue that higher judicial efficiency should intensify the fear of bankruptcy among managers. With an increase in the efficiency of the judicial process, lenders can cheaply and quickly recover their funds through bankruptcy or firm liquidation. In either case, these firms' managers lose their jobs. In fact, there is evidence to support the argument for managers' increased fear of bankruptcy. For example, Claessens et al. (2003) used data about 1472 listed firms in five East Asian countries and concluded that judicial system efficiency was a significant determinant of whether lenders forced borrowers into liquidation.

3. Data and Methodology

3.1. Sample

We obtained firm level data from the Compustat Global database and North America database for all firms between the year 1997 and 2012. The choice of years was primarily determined by the availability of different governance indices and judicial efficiency statistics. Firms from financial industries, government and quasi-government firms were excluded from the analysis; thus, firms with SIC codes from 6 to 9 were excluded. Firms with

negative equity, zero assets, and extreme values of the included variables were also dropped[4]. We excluded firms from those countries for which judicial efficiency statistics were not available. This left us with 40,734 firms from 69 countries with 303,706 valid firm-year observations. The number of observations may vary in different regressions because of missing values for included variables.

3.2 Country-level variables

We employ several proxies for measuring the efficiency of a country's judicial system to capture different aspects of judicial efficiency. These measures were originally constructed by Djankov et al. (2003) and are maintained and updated in the World Bank's Doing Business database. The proxies included are: (i) time in days spent in resolving a judicial case from the point of instituting the case until implementing the final decision by a court. To measure judicial efficiency, we take the inverse of time in days and denote it by *TID* (we use *TID* as our primary measure of judicial efficiency because we believe that slower courts are worse than speedy, but costly courts); (ii) costs of court trial that include court fees, enforcement costs and average attorney fees, as a percentage of the claim amount, as denoted by the symbol *COC*; and (iii) number of procedures followed to solve a case from the point of case initiation until the decision is implemented by the court; as denoted by *PNUM*.

For measuring creditor rights, we use Djankov et al.'s (2007) creditor rights index (*CR*). This index's values range from 0 to 4, where 4 stands for strongest creditor rights and 0 for the weakest. The creditor rights index was originally developed by La Porta et al. (1998); Djankov et al. (2007) updated this index. The creditor rights index has four components. These components read as "*No Automatic Stay, Secured Creditor Paid First, Restrictions on Reorganization, and No Management Stay*". Each of these components assumes a value of 1 if a country's bankruptcy code protects a creditor with regard to the given component, otherwise zero.

We also include the anti-self-dealing index (*ASLF*), developed by of Djankov et al. (2008), to control for agency cost effects in capital structure decisions. Higher index values indicate stronger investor protections. Previously, La Porta et al., (1997) had developed an anti-directors rights index (*OADI*) which has been used in many studies. However, the anti-self-dealing index (Djankov et al., 2008) is claimed to be more appropriate and relevant, because self-dealing is the core issue of corporate governance worldwide. As a robustness check, we use both the indices in separate regressions. We use the average score of these indices in years where the indices scores are not available[5].

Similarly to previous studies on leverage in cross-country settings, we include two country-level macro variables to control for availability of credit to the private sector and capital market development. The first variable is denoted by *DCPCF* and is measured as domestic credit to private sector by financial institution as percentage of country's GDP. The second variable is denoted by *MCAP* and is measured by stock market capitalization relative to GDP.

[4] Extreme values above 99th percentile and below 1st percentile of the included variables were removed. Alternatively, our results are robust to Winsorizing the data at the 1st and 99th percentile.

[5] The index values generally show high persistence levels over the time period (see, e.g., Djankov et al.,2008)

3.3 Firm level variables and descriptive statistics

3.3.1 Measures of leverage

We use two measures of leverage. The first measure is the long-term debt divided by total assets (*LT/TA*) and the second measure is the total debt divided by total assets (*TD/TA*).[6] Many studies that study corporate leverage in cross-country settings use both long-term and total debt (e.g, Rajan and Zingales 1995; Booth, et al, 2001; Fan et al. 2012; Cho et al. 2014). At the same time, the basic notion of leverage for many researchers is synonymous only with long-term debt[7]. These studies argue that short-term debt is a kind of spontaneous financing provided by raw material suppliers as a convenience, rather than as a source of finance. However, one explanation for using total debt as a measure of leverage is that many developing economies rely primarily on short-term loans, especially in bank-dominated economies. This is why we conduct a robustness check using the ratio of total debt to assets as a proxy for leverage in addition to our primary focus on the ratio of long-term debt to total assets.

3.3.2 Explanatory variables

Along with proxies for judicial efficiency and creditor rights, we use an extensive set of explanatory variables that have been identified in the extant literature as determinants of leverage[8]. These variables include firm size, the ratio of tangible assets, firm profitability, growth opportunities, liquidity, corporate realized average tax rate, research and development expenditures, and capital expenditures.[9] Firm size (*SZ*) is measured as the natural log of total assets. This variable is derived from the arguments of trade-off theory that implies that larger firms have lower probabilities of bankruptcy and can use higher leverage (Titman and Wessels 1988). The ratio of property, plant and equipment to total assets is used as a proxy for collateral (*COLAT*). The availability of collateral helps a firm to borrow against it at favorable terms (Magri 2006). Firm profitability (*PROF*) is measured as the ratio of earnings before interest and taxes to total assets. Pecking order theory suggests that internally generated funds have lower information asymmetry costs and transaction costs, which might be why profitable firms will use less leverage (Myers 1984). A firm's growth opportunities are measured by the ratio of capital expenditure to total assets of a firm (*CAPEX*). A growing firm is likely to have higher demands for funds compared to its internally generated funds. Pecking order theory suggests that once all the internally available funds are utilized, debt financing should be the preferred choice for financing growth opportunities as equity financing suffers more from information asymmetry problems. Volatility of net income (*VOL*) is measured as the standard deviation of *PROF* over a four year rolling window. It is expected that in the presence of higher volatility, the fear of bankruptcy would be greater

[6] Since the literature has not determined conclusively whether book or market leverage drives a firm's capital structure, we also ran all results using market leverage. The results are qualitatively similar.

[7] Studies that use only long-term debt as measure of leverage include Ferri and Jones (1979), Marsh (1982), Castanias (1983), Bradley et al. (1984) and Kim and Sorensen (1986).

[8] Few well-known studies on cross-country analysis of corporate capital structure include Park et al., (2013); Rajan and Zingales, (1995); Booth et al. (1999); Wald (1999); Cheng and Shiu (2007); Fan et al. (2012)

[9] Since realized taxes are endogenously determined by earnings, we also completed the analysis using statutory country-year tax rates provided by Faulkender and Smith (2015).

among firm managers and shareholders, preventing firms from employing more leverage. Average tax rate (*TAX*) is measured as the ratio of annual total tax paid divided by earnings before tax. Since the tax shield is considered a primary benefit of debt financing under the trade-off theory, this variable is expected to have a positive coefficient in leverage regressions. Liquidity (*LIQ*) is measured as the ratio of current assets divided by current liabilities. Finally, research and development (*RND*) is the ratio of research and development divided by total assets.

Descriptive statistics are provided in Table 1. Panel A of Table 1 presents mean values of the included variables by country between the year 1997 to 2012. Our final sample has a panel of 69 countries. There is considerable variation in the number of observations across countries. Of the total, four countries (USA, Japan, India, and China) have observations ranging from 24000 to 70000. There is also considerable variation in the included variables' values. For example, Panama, Iceland, and Portugal have *LDTA* ratios of 0.409, 0.251, and 0.239, respectively. In contrast, Uruguay, Zimbabwe, and Nigeria have *LDTA* ratios of 0.001, 0.037, and 0.053, respectively. The statistics reported in Table 1 show that there is generally an inverse relationship between long term leverage ratios and creditor rights scores or judicial efficiency. Panel B of Table 1 displays statistics for the entire sample.

Table 1: Descriptive Statistics

Countries	*LDTA*	*TDTA*	*CR*	*TID*	*DCPSF*	*MCAP*	*PROF*	*SZ*	*COLAT*	*RD*	*LIQ*	*TAX*	*CAPEX*
Argentina	0.136	0.243	1.000	0.169%	3.547	3.283	0.086	6.275	0.483	0.001	1.479	0.342	0.055
Australia	0.090	0.140	3.000	0.253	4.808	4.661	-0.074	3.820	0.388	0.010	4.088	0.146	0.101
Austria	0.136	0.232	3.000	0.252	4.859	3.148	0.042	5.971	0.304	0.014	2.089	0.278	0.066
Belgium	0.160	0.252	2.000	0.198	4.731	4.140	0.061	5.824	0.309	0.021	1.641	0.238	0.064
Bulgaria	0.152	0.289	2.000	0.177	3.997	2.879	0.082	5.604	0.477	0.001	1.681	0.126	0.063
Brazil	0.159	0.264	1.000	0.136	4.415	3.848	0.075	6.873	0.359	0.002	1.795	0.272	0.067
Canada	0.120	0.168	1.000	0.175	5.109	4.705	-0.051	4.744	0.482	0.019	3.527	0.203	0.113
Switzerland	0.146	0.209	1.000	0.241	5.161	5.408	0.057	6.411	0.308	0.024	2.149	0.231	0.050
Chile	0.162	0.253	2.000	0.208	4.471	4.614	0.072	10.793	0.491	0.000	1.965	0.184	0.063
China	0.061	0.222	2.000	0.246	4.900	3.985	0.062	7.189	0.344	0.001	1.911	0.195	0.072
Colombia	0.110	0.155	0.000	0.074	3.948	3.495	0.078	14.180	0.435	0.000	1.766	0.235	0.041
Czech Rep:	0.061	0.123	3.000	0.155	3.909	3.092	0.067	9.507	0.624	0.001	1.440	0.258	0.081
Germany	0.114	0.189	3.000	0.252	4.900	3.814	0.021	5.053	0.223	0.022	2.344	0.300	0.056
Denmark	0.150	0.256	3.000	0.260	5.061	4.113	0.030	6.881	0.322	0.024	1.897	0.292	0.066
Egypt	0.139	0.271	2.000	0.099	4.437	3.759	0.116	8.062	0.434	0.000	1.635	0.151	0.084
Spain	0.183	0.284	2.000	0.194	5.206	4.436	0.062	7.141	0.311	0.003	1.422	0.260	0.053
Finland	0.159	0.239	1.000	0.372	4.340	4.551	0.066	5.562	0.273	0.026	1.707	0.292	0.061
France	0.134	0.216	0.000	0.256	4.745	4.365	0.054	5.555	0.183	0.015	1.603	0.295	0.051
UK	0.108	0.162	4.000	0.248	5.071	4.895	0.018	4.218	0.277	0.018	2.223	0.232	0.060
Ghana	0.111	0.143	1.000	0.193	3.421	2.601	0.169	9.045	0.546	0.000	1.431	0.230	0.180
Greece	0.178	0.340	1.000	0.114	4.745	3.640	0.044	5.378	0.418	0.002	1.632	0.255	0.069
Hong Kong	0.075	0.184	4.000	0.426	5.013	5.958	0.023	6.870	0.271	0.005	2.496	0.205	0.051
Croatia	0.126	0.216	3.000	0.178	4.221	3.509	0.055	7.648	0.471	0.003	1.694	0.171	0.071
Hungary	0.110	0.177	1.000	0.289	4.167	3.189	0.067	10.638	0.490	0.005	2.202	0.257	0.090
Indonesia	0.151	0.301	2.039	0.201	3.816	3.355	0.077	13.410	0.399	0.000	2.134	0.289	0.066
India	0.179	0.299	2.000	0.070	4.119	4.058	0.077	7.314	0.357	0.004	2.291	0.207	0.078
Ireland	0.163	0.211	1.000	0.190	4.995	3.938	0.041	5.545	0.289	0.020	2.229	0.138	0.062
Iceland	0.251	0.408	.	0.247	5.085	3.792	0.051	7.627	0.217	0.016	1.240	0.189	0.055
Israel	0.142	0.244	3.000	0.112	4.379	4.265	0.022	5.370	0.213	0.049	2.240	0.211	0.043
Italy	0.154	0.276	2.000	0.079	4.829	3.431	0.052	6.823	0.257	0.006	1.477	0.373	0.046
Jamaica	0.061	0.099	2.000	0.166	3.994	4.163	0.128	8.490	0.406	0.000	2.189	0.348	0.061
Jordan	0.058	0.151	1.000	0.145	4.601	4.908	0.041	3.068	0.439	0.000	2.671	0.097	0.046
Japan	0.102	0.234	2.127	0.278	5.733	4.291	0.043	10.567	0.306	0.013	1.758	0.426	0.035
Kazakhstan	0.130	0.256	2.012	0.255	3.541	3.153	0.106	9.779	0.558	0.000	2.267	0.327	0.105
Kenya	0.095	0.178	4.000	0.215	3.751	3.476	0.113	8.901	0.459	0.000	1.727	0.318	0.082
North Korea	0.104	0.292	3.000	0.435	4.952	4.272	0.036	12.626	0.357	0.003	1.608	0.276	0.057
Sri Lanka	0.093	0.218	2.000	0.076	3.776	3.120	0.076	7.612	0.494	0.000	1.896	0.214	0.057
Lithuania	0.136	0.240	2.000	0.433	3.779	2.801	0.057	5.644	0.560	0.000	1.690	0.192	0.072
Luxembourg	0.175	0.231	.	0.312	4.991	5.063	0.066	6.739	0.363	0.004	2.022	0.270	0.073
Latvia	0.117	0.180	3.000	0.343	4.201	2.038	0.039	2.746	0.470	0.005	3.491	0.191	0.078
Morocco	0.081	0.175	1.000	0.196	4.497	4.041	0.115	7.327	0.315	0.001	1.880	0.269	0.072
Mexico	0.165	0.228	0.000	0.241	3.549	3.254	0.083	8.520	0.455	0.000	2.136	0.366	0.058
Malaysia	0.087	0.219	3.000	0.174	4.870	4.905	0.045	5.564	0.370	0.002	2.509	0.240	0.048
Nigeria	0.053	0.185	4.000	0.190	2.891	2.966	0.132	9.294	0.412	0.000	1.354	0.292	0.109
Netherlands	0.144	0.224	3.000	0.195	5.159	4.605	0.063	6.154	0.242	0.017	1.600	0.282	0.055
Norway	0.223	0.289	2.000	0.333	4.357	3.908	0.008	6.840	0.335	0.007	2.201	0.306	0.096
New Zealand	0.168	0.237	4.000	0.463	4.868	3.667	0.054	4.890	0.379	0.008	2.257	0.242	0.063
Pakistan	0.133	0.319	1.000	0.108	3.803	2.942	0.117	8.127	0.469	0.000	1.454	0.243	0.070
Panama	0.409	0.467	4.000	0.146	4.482	3.417	0.118	7.359	0.703	0.000	1.006	0.079	0.098
Peru	0.116	0.227	0.000	0.210	2.951	3.675	0.092	5.974	0.520	0.000	1.755	0.268	0.058
Philippines	0.111	0.214	1.000	0.117	3.972	3.882	0.038	8.064	0.398	0.003	2.799	0.259	0.059
Poland	0.075	0.163	1.000	0.114	3.906	3.320	0.057	5.115	0.338	0.001	1.908	0.223	0.073
Portugal	0.239	0.382	1.000	0.176	5.056	3.643	0.041	6.835	0.344	0.000	1.064	0.202	0.047
Romania	0.106	0.186	2.000	0.191	.	2.730	0.090	8.438	0.577	0.000	1.586	0.154	0.096
Russia	0.121	0.231	1.959	0.356	3.430	3.990	0.089	9.315	0.489	0.000	2.035	0.260	0.084
Singapore	0.083	0.205	3.000	0.762	4.352	5.117	0.047	5.070	0.308	0.003	2.047	0.237	0.059
Slovakia	0.072	0.157	2.000	0.174	3.985	1.699	0.072	8.342	0.451	0.005	2.563	0.284	0.058
Sweden	0.126	0.180	1.000	0.233	4.762	4.637	-0.013	6.224	0.194	0.024	2.055	0.276	0.048
Thailand	0.109	0.265	2.071	0.209	4.915	4.034	0.066	7.908	0.407	0.000	2.103	0.192	0.060
Tunisia	0.082	0.155	0.000	0.177	4.253	2.749	0.072	4.352	0.334	0.000	2.193	0.195	0.067
Turkey	0.104	0.238	2.000	0.238	3.770	3.145	0.106	17.920	0.345	0.005	1.635	0.390	0.087
Taiwan	0.080	0.216	2.000	0.196	.	.	0.042	8.223	0.317	0.024	2.201	0.226	0.053
Uganda	0.092	0.225	2.000	0.192	2.446	1.643	0.086	10.924	0.530	0.000	1.601	0.366	0.107
Ukraine	0.099	0.258	2.000	0.266	4.155	2.983	0.076	7.655	0.531	0.000	1.498	0.253	0.082
Uruguay	0.000	0.000	3.000	0.139	3.370	-0.945	-0.030	4.454	0.011	0.000	19.000	.	0.006
USA	0.188	0.233	1.000	0.331	5.334	4.842	0.020	5.605	0.303	0.034	2.416	0.272	0.061
Venezuela	0.063	0.137	3.000	0.195	3.035	1.340	0.046	7.984	0.422	0.000	2.024	0.284	0.044
South Africa	0.092	0.166	3.000	0.167	5.167	5.215	0.095	6.805	0.297	0.002	1.950	0.306	0.070
Zimbabwe	0.037	0.140	4.000	0.244	4.210	4.410	0.193	9.625	0.409	0.001	1.787	0.366	0.071
All	0.126	0.224	2.002	0.259	4.957	4.460	0.034	6.893	0.330	0.015	2.260	0.259	0.063
Panel B: Descriptive Statistics of the Full Sample													
Mean	0.126	0.224	2.002	0.259	4.957	4.460	0.034	6.893	0.330	0.015	2.260	0.259	0.063
Std. Dev.	0.151	0.187	0.994	0.117	0.558	0.656	0.167	2.900	0.236	0.051	2.611	0.279	0.080
Min	0.000	0.000	0.000	0.066	1.591	-0.945	-1.999	0.000	0.000	0.000	0.250	0.000	0.000
Max	0.992	0.996	4.000	0.833	5.847	6.407	4.223	22.806	1.000	0.994	19.000	3.000	1.000
Observation	30370	30421	30648	30683	28326	28891	30325	30421	30407	30665	30235	20203	28885
s	6	7	6	8	4	6	9	7	1	7	0	2	7

3.4 Baseline Regression Model

We have panel data where multiple (time-series) observations are used for each cross-sectional unit. While using panel data, a choice has to be made between pooled OLS, random effects models, and fixed effects models. For choosing a preferred regression model for analysis, we used the Hausman (1978) specification test. The test results favor the use of an industry and year fixed effects regression model. The functional form of our model is:

$$LEV_{it} = \alpha_{kt} + \beta_1(TID_{jt}) + \beta_2(CR_{jt}) + \sum_{m=3}^{n} \beta_m (Z_{it}) + \epsilon_{it} \dots\dots\dots\dots [Eq.1]$$

where LEV_{it} is the leverage ratio of firm *i* at time *t;* α_{kt} is the intercept of industry k at time *t*; TID_{jt} is a proxy for judicial efficiency in country *j* at time *t*; CR_{jt} is the creditor rights index in country *j* at time *t*; $\sum_{m=3}^{n} \beta_m (Z_{it})$ is the vector of all other control variables with slope coefficients from β_3 up to β_n; and ϵ_{it} is the error term of firm *i* at time *t*.

4. Regression Results

4.1 Baseline Results

Table 2 and Table 3 report results from our main regression analysis. In Table 2, we report results of regressions where the dependent variable is the ratio of long-term debt to total assets (*LDTA*); in Table 3 we report results of regressions where the dependent variable is the ratio of total debt to assets (*TDTA*). These tables display results from eight different regressions models under column headings numbered (1) to (8). All regression models include industry and year dummies, except the Fama and McBeth (1973) regression, which is estimated without year dummies. For each explanatory variable, its coefficient and standard error is reported (standard errors are reported in parentheses). Since results from both *LDTA* and *TDTA* regressions are virtually identical in terms of statistical significance and coefficient signs, we discuss only results reported in Table 2 for the sake of parsimony.

We start by regressing long-term debt to total assets ratio (*LDTA*) on the creditor rights index in the first regression. The results are reported in the column with the heading (1) *CR*. Similarly, in a separate regression, the impact of judicial efficiency is evaluated on *LDTA*; the results are reported under the column heading (2) *TID* in Table 2. These initial tests indicate that strengthening creditor rights and improvements in judicial efficiency lead to a decrease in leverage ratio. The coefficients for *CR* and *TID* are significant at a 1% level. In Model (3), both creditor rights and judicial efficiency are included in one regression. Both the variables maintain their signs and statistical significance. In Model (4), we add two macro-level determinants of leverage to the regression, i.e. stock market capitalization to GDP ratio (*MCAP*) and ratio of private credit from financial institutions

divided by GDP (*DCPSF*). These variables do not change the impact of creditor rights and judicial effeminacy on leverage.

In Model (5) we combine judicial efficiency and creditor rights with firm-level determinants of leverage. We also included a measure of shareholders' protection (*ASLF*) in this model as literature provides evidence that shareholder protections can affect leverage ratio (Cheng and Shiu 2007; La Porta et al. 1996). We included *ASLF* only in Model (5) because it could not be combined with the two macro-level variables as it shows high multicollinearity with the macro variables. By including firm-level determinants of leverage in the regression, the coefficients of the *CR* and *TID* decreased marginally, yet both of these variables maintain their negative signs and strong statistical significance. Like previous studies, firm size (*SZ*), ratio of tangible assets (*COLAT*) and capital expenditures (*CAPEX*) have positive and statistically significant impacts on leverage, while firm profitability (*PROF*), tax rate (*TAX*), and research and development (*RND*) have negative effects on leverage. The coefficient of the proxy for investors' protection is positive and significant.[10] This finding extends support to the view that managers try to employ sub-optimal leverage ratios in order to reduce their undiversifiable human capital risk (Amihud and Lev 1981). However, when shareholders enjoy more protection, they can force managers to use more leverage. This finding also has implications for the negative effect of judicial efficiency and creditor rights on leverage. Stronger creditor rights and efficient judicial systems increases fear of bankruptcy among managers who in turn try to employ sub-optimal leverage levels. In this manner, stronger creditor rights and judicial systems increase the agency cost of debt, while stronger shareholders' protection reduce this cost. In Model (6), we combine country-level and firm-level variables, while Model (7) adds volatility (*VOL*) of *PROF* as an additional variable. Separate treatment of *VOL* was required due to loss of observations in constructing this measure. Results reported in column (6) and (7) show that all the explanatory variables maintain their signs and statistical significance. Economic significance is demonstrated using column (7). For instance, a one standard deviation increase in *TID*, results in an 7.32% reduction in leverage as a percent of total assets. As expected, firms with volatile cash flows employ less leverage due to fear of bankruptcy.

Table 2: Regression Results of Long-Term Leverage

VARIABLES	(1) CR	(2) TID	(3) CR + TID	(4) CR+ TID + Macro	(5) CR+TID + Firm	(6) CR+TID+ Firm	(7) All Variables	(8) Fama McBeth
CR	−0.021***		−0.021***	−0.022***	−0.019***	−0.023***	−0.023***	−0.026***
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
TID		−3.481***	−0.830***	−5.002***	−1.982***	−7.342***	−7.350***	−9.433***
		(0.224)	(0.224)	(0.257)	(0.262)	(0.285)	(0.328)	(1.110)
PROF					−0.010***	−0.018***	−0.028***	−0.034***

[10] Although several studies document the negative relationship between taxes and leverage, this result is exactly the opposite of what traditional trade-off theory predicts. Faulkender and Smith (2015) address this as a miscalculation of the true marginal tax rates faced by multinational firms. When using their statutory (not marginal) rates, our tax measure's sign does indeed reverse. All other values are qualitatively similar.

					(0.002)	(0.002)	(0.003)	(0.008)
SZ					0.005***	0.006***	0.005***	0.007***
					(0.000)	(0.000)	(0.000)	(0.001)
COLAT					0.120***	0.128***	0.115***	0.119***
					(0.002)	(0.002)	(0.002)	(0.006)
RD					−0.057***	−0.064***	−0.035***	−0.064***
					(0.007)	(0.008)	(0.011)	(0.017)
LIQ					−0.005***	−0.006***	−0.007***	−0.007***
					(0.000)	(0.000)	(0.000)	(0.000)
TAX					−0.035***	−0.038***	−0.036***	−0.037***
					(0.001)	(0.001)	(0.001)	(0.002)
CAPEX					0.050***	0.036***	0.090***	0.073**
					(0.004)	(0.005)	(0.006)	(0.026)
DCPSF				−0.001		−0.009***	−0.008***	−0.017**
				(0.001)		(0.001)	(0.001)	(0.006)
MCAP				0.017***		0.028***	0.031***	0.041***
				(0.001)		(0.001)	(0.001)	(0.006)
VOL							−0.086***	−0.087***
							(0.006)	(0.010)
ASLF					0.011***			
					(0.002)			
Constant	0.169***	0.122***	0.171***	0.098***	0.125***	0.080***	0.075***	0.061**
	(0.013)	(0.013)	(0.013)	(0.013)	(0.015)	(0.016)	(0.017)	(0.021)
Observations	303,270	303,618	303,270	280,286	190,259	174,492	127,776	127,776
R−squared	0.129	0.112	0.129	0.131	0.200	0.208	0.211	0.232
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES
Year Dummy	YES	YES	YES	YES	YES	YES	YES	NO

Results significant at 1%, 5%, and 10% are indicated by ***, **, and *, respectively. Figures in parentheses show standard errors of the coefficients.

And finally, to exploit cross-sectional variations in leverage ratios and the explanatory variables, we also use the Fama and McBeth (1973) regression method. A majority of the variables related to content of law, enforcement of law, and investors' protection show little variation across time, making cross-sectional regressions a good candidate for analysis. Fama and McBeth (1973) regression provides an excellent mechanism to do so where parameters are estimated in two steps. In the first step, cross-sectional regressions are estimated in each period. In the second step, intercept and slope coefficients are averaged from the cross-sectional regressions. The standard errors are corrected for cross-sectional correlations. Results of the Fama and McBeth regressions are reported in Column (8) of Table 2. Overall, the insight that emerges from the results reported in Table 2 show that the agency cost of debt better explains the negative link between judicial efficiency/creditor right protection and leverage. In the next section, we check the results' sensitivity to sample reconstruction and to using alternative proxies of the main variables.

Table 3: Regression Results of the Total Leverage

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	CR	TID	CR + TID	CR+ TID + Macro	CR+TID + Firm	CR+TID+ Firm	All Variables	Fama McBeth

CR	−0.010***		−0.009***	−0.008***	−0.010***	−0.010***	−0.011***	−0.013***
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
TID		−6.319***	−5.136***	−2.147***	−6.309***	−4.697***	−6.548***	−6.863***
		(0.279)	(0.282)	(0.321)	(0.320)	(0.344)	(0.399)	(0.631)
PROF					−0.095***	−0.099***	−0.151***	−0.151***
					(0.003)	(0.003)	(0.004)	(0.009)
SZ					0.009***	0.009***	0.008***	0.009***
					(0.000)	(0.000)	(0.000)	(0.001)
COLAT					0.114***	0.123***	0.111***	0.110***
					(0.002)	(0.002)	(0.003)	(0.003)
RD					−0.305***	−0.273***	−0.286***	−0.298***
					(0.009)	(0.010)	(0.013)	(0.018)
LIQ					−0.020***	−0.020***	−0.027***	−0.028***
					(0.000)	(0.000)	(0.000)	(0.001)
TAX					−0.064***	−0.065***	−0.060***	−0.061***
					(0.001)	(0.001)	(0.002)	(0.003)
CAPEX					0.017***	0.002	0.047***	0.014
					(0.005)	(0.006)	(0.007)	(0.031)
DCPSF				0.003***		−0.017***	−0.019***	−0.019***
				(0.001)		(0.001)	(0.001)	(0.002)
MCAP				−0.017***		0.004***	0.011***	0.013***
				(0.001)		(0.001)	(0.001)	(0.002)
VOL							−0.124***	−0.121***
							(0.008)	(0.012)
ASLF					0.014***			
					(0.002)			
Constant	0.187***	0.177***	0.199***	0.257***	0.183***	0.280***	0.312***	0.289***
	(0.016)	(0.016)	(0.016)	(0.017)	(0.019)	(0.019)	(0.021)	(0.021)
Observations	303,780	304,128	303,780	280,590	190,493	174,606	127,846	127,846
R−squared	0.107	0.105	0.108	0.108	0.255	0.252	0.256	0.265
Industry Dummy	YES	YES	YES	YES	YES	YES	YES	YES
Year Dummy	YES	YES	YES	YES	YES	YES	YES	YES

Results significant at 1%, 5%, and 10% are indicated by ***, **, and *, respectively. Figures in parentheses show standard errors of the coefficients.

4.2 Robustness of the results

4.2.1 Sample reconstruction

In this section, we check for robustness to alternative definitions of variables and sample reconstruction. It is important to know whether our baseline results are just an artifact of the selected definitions of variables or the sample. As a matter of fact, four countries among 69 account for 48.23% of the total number of observations in our sample. For example, out of 303,706 observations for the *LDTA* variable, 59,474 observations (19.58%) belong to the USA, 38,016 (12.52%) belong to Japan, 24,948 (8.21%) belong to China, and 24,042 (7.92%) belong to India. Such a higher density of observation in four countries has the potential to drive the main conclusion. These concerns are tackled by excluding the four mentioned countries one by one in separate regressions and also excluding all of them at the same time. For these robustness checks, Model (7) of Table 2 is estimated. Results of these regressions are reported in Table 4.

Table 4: Regression Results for Leverage excluding Big Countries

	(1)	(2)	(3)	(4)	(5)

VARIABLES	Excluding USA	Excluding China	Excluding India	Excluding Japan	Excluding All Four
CR	−0.003***	−0.022***	−0.023***	−0.021***	−0.011***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TID	−12.615***	−6.019***	0.759**	−8.342***	−1.413***
	(0.274)	(0.294)	(0.316)	(0.296)	(0.334)
DCPSF	−0.022***	−0.002***	0.007***	0.016***	0.033***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
MCAP	0.015***	0.018***	0.021***	0.020***	−0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
PROF	−0.040***	−0.012***	−0.004*	−0.022***	−0.009***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.003)
SZ	0.007***	0.005***	0.005***	0.009***	0.007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
COLAT	0.126***	0.121***	0.114***	0.124***	0.091***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
RND	0.007	−0.120***	−0.065***	−0.055***	−0.022*
	(0.009)	(0.008)	(0.008)	(0.008)	(0.011)
LIQ	−0.005***	−0.006***	−0.006***	−0.005***	−0.005***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TAX	−0.026***	−0.048***	−0.034***	−0.033***	−0.024***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)
CAPEX	0.062***	0.054***	−0.011**	0.026***	0.008
	(0.004)	(0.005)	(0.005)	(0.005)	(0.006)
Constant	0.144***	0.101***	0.030*	−0.025	−0.037**
	(0.015)	(0.016)	(0.015)	(0.019)	(0.018)
Observations	146,199	155,025	155,920	150,300	83,968
R−squared	0.206	0.210	0.215	0.211	0.197
Year Dummies	YES	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES	YES

Results significant at 1%, 5%, and 10% are indicated by ***, **, and *, respectively. Figures in parentheses show standard errors of the coefficients.

Results reported in Table 4 show that the results are consistent with our earlier findings even after excluding countries that had higher density of observations. Both the creditor rights and judicial efficiency still carry negative coefficients and statistical significance at a 1% level. Also, even after excluding all four countries from the regression *TID* is still economically significant as one standard deviation change in *TID* will reduce corporate leverage ratios by 1.92%. This confirms that the negative effect of stronger creditor rights and efficiency of judicial system on corporate leverage is not unique to countries that have a higher number of firm-year observations. The results also show robustness whether we exclude the four big countries individually or collectively from the leverage regressions. The other determinants of leverage consistently affect leverage across big and small countries. Comparing results in Table 4 and Table 2, we can see that almost all explanatory variables have similar coefficient signs and statistical significance in both the tables, even after dropping countries with higher density of firm-year observations.

4.2.2 Alternative measures of judicial efficiency and shareholders' protection

To check whether our results are sensitive to alternative definitions/proxies of judicial efficiency and shareholders' protection, we use several alternative proxies for these variables. Specifically, we replace *TID* with *COC* and *PNUM* for measuring enforcement of law in a country. *COC* is the cost of contract enforcement as percentage of claim and *PNUM* is the number of procedures involved in initiating a trial until implementation of the decision by courts. Both *PNUM* and *COC* are derived from the World Bank's Doing Business database. We also use two alternative measures of shareholders' protection. These measures include old anti-directors index (*OADI*) developed by La Porta et al. (1997) and the strength of investors protection index (*SIP*), from the World Bank's Doing Business database. *SIP* is the average of three indices which are the extent of disclosure index, the extent of director liability index, and the ease of shareholders suit index.

Results of regression analysis using these alternative measures of judicial efficiency and shareholders' protection are reported in Table 5. The column headings refer to regression results with previously-used measures of judicial efficiency and shareholders' protection were replaced with these alternative measures. The results in Table 5 further support our main findings in Table 2. The *COC* coefficient is positive and statistically significant, implying that a costly judicial process encourages borrowers to use more debt financing. The positive coefficient of *PNUM* indicates that a lengthy judicial process has a similar effect on borrower behavior. Both these alternative measures of judicial efficiency are also economically significant. For example, one standard deviation increase in *COC* will increase corporate leverage ratios by 4.98% while one standard deviation increase in *PNUM* will increase leverage ratios by 2.52%. These findings are in keeping with the negative coefficient of *TID* (in Table 2) which indicates that improving judicial efficiency discourages borrowers from using more debt. These findings indicate that even if improving judicial efficiency increases lenders' confidence, leading to charging lower interest rates (Laeven et al. 2005) and increasing the supply of funds (the supply side view), the overall effect is dominated by the demand side.

Results reported in Panel B of Table 5 show consistency with earlier findings related to shareholders' protection (*ASLF*, in Table 2 and 3). Both of the alternative proxies for shareholders' protection (i.e. *OADI* and *SIP*) show positive impacts on leverage ratios. This again suggests that agency costs of debt play a significant role in cross-country leverage ratios. In the absence of adequate shareholders' protection, self-interested managers try to hedge their undiversifiable human capital risk by employing lower levels of leverage. This suggests that as the shareholders' protection increases, shareholders force managers to use more debt financing.

Table 5: Regression Results using Alternative Measures for Judicial Efficiency and Shareholders' Protection

	Panel A		Panel B	
	Alternative Measures of Judicial Efficiency		Alternative Measures of Shareholders' Protection	
	(1)	(2)	(3)	(4)
VARIABLES	*COC*	*PNUM*	*OADI*	*SIP*
CR	−0.021***	−0.019***	−0.020***	−0.021***
	(0.000)	(0.000)	(0.000)	(0.000)
TID			−2.715***	−8.010***
			(0.280)	(0.279)

DCPSF	0.002***	0.000	−0.007***	−0.010***
	(0.001)	(0.001)	(0.001)	(0.001)
PROF	−0.010***	−0.012***	−0.009***	−0.022***
	(0.002)	(0.002)	(0.002)	(0.002)
SZ	0.004***	0.005***	0.004***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)
COLAT	0.127***	0.126***	0.124***	0.120***
	(0.002)	(0.002)	(0.002)	(0.002)
RD	−0.059***	−0.049***	−0.119***	−0.094***
	(0.008)	(0.008)	(0.008)	(0.008)
LIQ	−0.006***	−0.006***	−0.006***	−0.006***
	(0.000)	(0.000)	(0.000)	(0.000)
TAX	−0.039***	−0.038***	−0.049***	−0.041***
	(0.001)	(0.001)	(0.001)	(0.001)
CAPEX	0.045***	0.042***	0.048***	0.054***
	(0.005)	(0.005)	(0.005)	(0.005)
ASLF	0.003	0.005***		
	(0.002)	(0.002)		
OADI			0.011***	
			(0.000)	
SIP				0.015***
				(0.000)
COC	0.0001***			
	(0.000)			
PNUM		0.0001***		
		(0.000)		
Constant	0.118***	0.117***	0.147***	0.095***
	(0.016)	(0.016)	(0.016)	(0.015)
Observations	173,941	173,941	148,884	174,502
R−squared	0.200	0.199	0.221	0.216
Year Dummies	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES

Results significant at 1%, 5%, and 10% are indicated by ***, **, and *, respectively. Figures in parentheses show standard errors of the coefficients.

4.3 Judicial Efficiency, Creditor Rights and Leverage Levels

Cho et al. (2014) argue that fear of bankruptcy among managers and shareholders will be different at different levels of leverage. If their argument is true, then increases in judicial system efficiency and strengthening creditor rights will matter more for firms that already have higher levels of leverage compared to firms that have lower levels of leverage. To explore this possibility, we employ a quantile regression approach. Quantile regression is a popular method for investigating a phenomenon at different levels of its distributions[11]. We estimate the coefficients at five quantiles, namely 20^{th}, 40^{th}, 50^{th}, 60^{th}, and 80^{th} quantiles, using the same list of variables as in most of the previous regressions.

[11] A growing literature in empirical finance uses the quantile regression approach. For example, Taylor (1999), Engle and Manganelli (2004) and Chernozhukov and Umantsev (2001) use quantile regression in value at risk models. Others have used it in index models for investment styles (see, e.g, Bassett and Chen 2002). For a review on the use of quantile regression see Koenker and Hallock (2001).

Table 6: Results of the Quantile Regressions (using *LDTA* as dependent variable)

VARIABLES	(1) 20th Quant	(2) 40th Quant	(3) 50th Quant	(4) 60th Quant	(5) 80th Quant
CR	−0.002***	−0.012***	−0.016***	−0.020***	−0.028***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
TID	−0.724***	−3.781***	−5.438***	−7.385***	−11.022***
	(0.057)	(0.170)	(0.277)	(0.253)	(0.443)
DCPSF	−0.002***	−0.007***	−0.009***	−0.011***	−0.017***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
MCAP	0.004***	0.017***	0.022***	0.025***	0.032***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)
PROF	−0.003***	−0.012***	−0.015***	−0.018***	−0.032***
	(0.000)	(0.001)	(0.002)	(0.002)	(0.006)
SZ	0.001***	0.005***	0.006***	0.007***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
COLAT	0.023***	0.108***	0.138***	0.156***	0.176***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.004)
RND	−0.000	−0.010**	−0.019**	−0.036***	−0.094***
	(0.001)	(0.004)	(0.008)	(0.006)	(0.022)
LIQ	−0.001***	−0.004***	−0.005***	−0.005***	−0.007***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TAX	−0.003***	−0.014***	−0.021***	−0.027***	−0.042***
	(0.000)	(0.001)	(0.001)	(0.001)	(0.002)
CAPEX	−0.002**	0.019***	0.030***	0.043***	0.058***
	(0.001)	(0.005)	(0.004)	(0.007)	(0.008)
Constant	0.007	0.041***	0.068***	0.122***	0.226***
	(0.008)	(0.015)	(0.015)	(0.012)	(0.009)
Observations	174,492	174,492	174,492	174,492	174,492
R^2	0.135	0.191	.202	0.203	0.201
Year Dummies	YES	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES	YES

Results significant at 1%, 5%, and 10% are indicated by ***, **, and *, respectively. Figures in parentheses show standard errors of the coefficients.

Table 6 reports results of the quantile regressions using long-term debt to total assets as a dependent variable. The quantile regression standard errors were estimated using the percentile method with 1001 bootstrap replications. Effects of the explanatory variables on leverage ratios at different quantiles is visible only in the size of the coefficients, while coefficients' significance and signs are uniform throughout different quantiles. The two variables of interest (*CR* and *TID*) enter different quantiles of the leverage ratio with consistent negative effects. However, as expected, firms in the higher quantile of leverage show more sensitivity to improvement in creditor rights and efficiency of judicial system. The increase in coefficient size of the two variables is gradual and systematic as we move from the 20th quantile of leverage to the 80th quantile. Firm-specific financial variables generally tell the same story. For example, firm size, profitability and ratio of tangible assets enter the low quantile regression with expected signs and statistical significance. With the movement from lower quantiles of leverage to higher ones, these variables' coefficients increase in magnitude while maintaining their statistical significance. If firm size and

collateral availability are taken as proxies for the trade-off theory, then they add additional support to the demand side view of leverage determinants. For example, in higher quantiles of leverage, one would expect that availability of additional funds will be greater only for larger firms and firms with a higher ratio of collateral. Overall, this additional analysis further confirms that borrowers' fear of bankruptcy induced by stronger content and enforcement of law plays a dominant role in explaining the link between law and finance, as opposed to the supply side view.

4.4 Differential Effect of Judicial Efficiency and Creditor Rights on Leverage

In the previous section, we observed that judicial efficiency and creditor rights had different effects on leverage in different quantiles of its distribution. This motivates us to explore how judicial efficiency and creditor rights affect firms with different sizes, profitability ratios, tangible assets ratios and growth opportunities. Several previous studies have shown that firms with different attributes respond differently to institutional constraints. For example, Shah (2011) showed that larger firms and firms with more tangible assets were affected less by worsening judicial efficiency compared to smaller firms and firms with less tangible assets. Similarly, De Jong et al. (2008) document that macro factors and other institutional factors in a given country will affect firms with different attributes quite differently in their capital structure decisions. Fabbri and Padula (2004) examined the differential effects of judicial efficiency on credit decisions by Italian households and found that there is a 'composition effect' in the allocation of credit to household. They define this composition effect as the availability of more credit to households with more wealth and collateral in an inefficient judicial province and less to households with less wealth and collateral.

To conduct the above analysis, we interact the creditor rights dummy (*CD*) and the judicial efficiency dummy (*JD*) with the four most-frequently used financial variables as determinants of leverage. These variables are firm size (*SZ*), ratio of property plant and equipment to total assets (*COLAT*), firm profitability (*PROF*) and growth (*CAPEX*). *CD* assumes a value of one if a given firm faces a creditor rights value greater than the median value of creditor rights, otherwise zero. Similarly, *JD* assumes a value of one if a given firm faces a judicial efficiency value greater than the median value of judicial efficiency, otherwise zero. The interaction terms between *JD*, *CD*, and firm-specific variables are included in separate regressions to avoid potential multicollinearity. All the regressions include the full set of year dummies, industry dummies and other control variables that have been used in previous regression tests. Specifically, Equation 2 is estimated for the interaction of judicial efficiency dummy with firm specific variables whereas Equation 3 is estimated for the interaction of creditor rights dummy with firm specific variables.

$$LEV_{it} = \alpha_{kt} + \beta_1(TID_{jt}) + \beta_2(CR_{jt}) + \beta_3(JD \times X_{it}) + \sum_{m=4}^{n} \beta_m (Z_{it}) + \epsilon_{it} \qquad [Eq.2]$$

$$LEV_{it} = \alpha_{kt} + \beta_1(TID_{jt}) + \beta_2(CR_{jt}) + \beta_3(CD \times X_{it}) + \sum_{m=4}^{n} \beta_m (Z_{it}) + \epsilon_{it} \qquad [Eq.3]$$

where LEV_{it} is the leverage ratio of firm *i* at time *t;* α_{kt} is the intercept of industry *k* at time *t*; TID_{jt} is a proxy for judicial efficiency in country *j* at time *t*; CR_{jt} is the creditor rights index in country *j* at time *t*; $JD \times X_{it}$ is the interaction term between judicial efficiency dummy and selected firm-specific variables that include firms size, profitability, ratio of fixed assets and capital expenditures; $\sum_{m=3}^{n} \beta_m (Z_{it})$ is the vector of all other control variables with slope coefficients from β_4 up to β_n; and ϵ_{it} is the error term of firm *i* at time *t.*

The results are reported in Table 7 where the column headings show regression outputs of a given interaction term.

Table 7: Interaction of Firm-Specific Variables with *CR* and *TID Dummies*

VARIABLES	(1) *SZ×JD*	(2) *PROF×JD*	(3) *COLAT×JD*	(4) *CAPEX×JD*	(5) *SZ×CD*	(6) *PROF×CD*	(7) *COLAT×CD*	(8) *CAPEX×CD*
TID	-11.561***	-9.007***	-11.647***	-8.560***	-9.173***	-7.609***	-7.236***	-7.255***
	(0.339)	(0.292)	(0.323)	(0.305)	(0.299)	(0.286)	(0.291)	(0.289)
CR	-0.021***	-0.022***	-0.021***	-0.022***	-0.029***	-0.023***	-0.022***	-0.022***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
DCPSF	-0.016***	-0.011***	-0.014***	-0.010***	-0.006***	-0.009***	-0.009***	-0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
MCAP	0.028***	0.028***	0.028***	0.028***	0.027***	0.028***	0.028***	0.028***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
PROF	-0.016***	-0.086***	-0.015***	-0.017***	-0.019***	-0.040***	-0.018***	-0.018***
	(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
SZ	0.004***	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***	0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
COLAT	0.127***	0.127***	0.101***	0.127***	0.128***	0.127***	0.129***	0.128***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
RND	-0.069***	-0.057***	-0.065***	-0.065***	-0.069***	-0.073***	-0.064***	-0.064***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
LIQ	-0.006***	-0.006***	-0.006***	-0.006***	-0.005***	-0.005***	-0.006***	-0.006***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
TAX	-0.039***	-0.038***	-0.039***	-0.038***	-0.038***	-0.038***	-0.038***	-0.038***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
CAPEX	0.040***	0.042***	0.039***	0.003	0.038***	0.039***	0.036***	0.042***
	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
SZ×JD	0.003***							
	(0.000)							
PROF×JD		0.107***						
		(0.004)						
COLAT×JD			0.056***					
			(0.002)					
CAPEX×JD				0.079***				
				(0.007)				
SZ×CD					0.003***			
					(0.000)			
PROF×CD						0.049***		
						(0.004)		
COLAT×CD							-0.004*	
							(0.002)	
CAPX×CD								-0.016**
								(0.008)
Constant	0.133***	0.099***	0.118***	0.088***	0.093***	0.085***	0.079***	0.079***
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Observations	174,492	174,492	174,492	174,492	174,492	174,492	174,492	174,492
R-squared	0.210	0.211	0.211	0.208	0.209	0.208	0.208	0.208

Year Dummies	YES	YES	YES	YES	YES	YES	YES	YES
Industry Dummies	YES	YES	YES	YES	YES	YES	YES	YES

Results significant at 1%, 5%, and 10% are indicated by ***, **, and *, respectively. Figures in parentheses show standard errors of the coefficients.

Results reported in Table 7 indicate that the interaction terms between judicial efficiency dummy *(JD)* and firm-specific variables have expected and statistically significant coefficients. In line with our previous findings, the proxy for judicial efficiency (*TID*) is negative and significant. The interaction term *SZ×JD* shows that at higher levels of judicial efficiency, increases in firm size encourage managers to use more debt. This is in line with the trade-off theory and agency cost of debt explanations. Larger size helps the firm in mitigating the fear of bankruptcy that is induced by fast and efficient judicial systems. Similarly, the positive coefficients of the interaction terms *PROF×JD* and *COLAT×JD* suggest that more profitable firms and firms with more collateral are less susceptible to the negative effects of judicial efficiency in their leverage decisions. As far as the interaction terms between the creditor rights dummy and firm specific variable are concerned, firm size and profitability show similar results as discussed above. However, the interaction between the creditor rights dummy and the ratio of tangible assets and capital expenditures show negative signs. This shows that firms with more tangible assets use less leverage when they face stronger creditor rights. This might be due to the fact that borrowers fear that they will lose more if they have more tangible assets and creditors get control of the firm in bankruptcy.

Overall, the conclusion that we draw from the analyses reported in Table 7 is that judicial efficiency and creditor rights do not uniformly affect firms in their leverage decisions. Firms take on more debt when they have larger size and higher profitability ratios, even when they face highly efficient judicial systems and stronger creditor rights. On the other hand, smaller firms and less profitable firms have more fear of bankruptcy, which is exacerbated by the presence of efficient judicial systems and stronger creditor rights. These firms employ less leverage.

4.5 Judicial Efficiency, Creditor Rights and Financial Crisis

It is a well-established fact that leverage is pro-cyclical, i.e. it is high in normal periods and low in uncertain or financial crisis periods (Fostel and Geanakoplos 2012)[12]. Fostel and Geanakoplos (2012) show that decreasing leverage in crisis periods is associated with increases in fear, which is measured by the VIX index (the Chicago Board Options Exchange Volatility Index). We derive motivation from the arguments of Fostel and Geanakoplos (2012) to associate demand side factors of leverage with content and enforcement of law during crisis periods. Our data set provides us an opportunity to see how judicial efficiency and creditor rights might have played roles in affecting observed corporate leverage ratios during the financial crisis of 2008. We argue that since fear increases during uncertain and turbulent times, the existence of stronger creditor rights and judicial efficiency should further

12 The pro-cyclical nature of leverage has attracted attention among theoretical and empirical researchers examining the effects of the recent financial crisis of 2008; see e.g. Geanakoplos (2009, 2010); Adrian and Shin (2010); and Gorton and Metrick (2012).

intensify this fear among borrowers. Thus, during a financial crisis, there should be a systematic decrease in leverage ratios of firms operating in countries that have stronger creditor rights and efficient judicial systems compared to firms operating in countries that have poor creditor rights and/or judicial systems. To test this hypothesis, we create a financial crisis dummy (*FC*) that assumes a value of one between year 2005 and 2009 (both years inclusive), otherwise zero. Though the crisis period is usually believed to be from year 2007 to 2009, its signs generally appeared from 2004 onward. Given that, we included year 2005 and onward in the crisis period to allow borrowers to form expectations about the crisis and adjust leverage ratios accordingly. The *FC* dummy is interacted with creditor rights (*CR*) and judicial efficiency (*TID*) to see whether stronger creditor rights and efficient judicial system further increase the fear of bankruptcy among borrowers during financial crisis. If true, the interaction terms should bear negative and statistically significant coefficients in the leverage regressions. We estimate separate regressions for each interaction term with the full set of explanatory variables and industry dummies, but excluding year dummies. These regressions are estimated for both long-term leverage (*LDTA*) and total leverage (*TDTA*). Equation 4 is estimated for this purpose.

$$LEV_{it} = \alpha_{kn} + \beta_1(TID_{jt}) + \beta_2(CR_{jt}) + \beta_3(FC) + \beta_4(FC \times TID_{jt}) + \sum_{m=5}^{n} \beta_m (Z_{it}) + \epsilon_{it} \qquad [Eq.4]$$

where LEV_{it} is the leverage ratio of firm *i* at time *t;* α_{kn} is the intercept of industry *k* in the non-crisis period; TID_{jt} is a proxy for judicial efficiency in country *j* at time *t*; CR_{jt} is the creditor rights index in country *j* at time *t*; $FC \times TID_{jt}$ is the interaction term between financial crisis dummy and judicial efficiency of country *j* at time *t*; $\sum_{m=5}^{n} \beta_m (Z_{it})$ is the vector of all other control variables with slope coefficients from β_5 up to β_n; and ϵ_{it} is the error term of firm *i* at time *t*. These regressions are estimated for both long-term leverage (*LDTA*) and total leverage (*TDTA*). The results are reported in Table 8.

Table 8: Evidence from the Financial Crisis of 2008

VARIABLES	(1) Long-term Debt *FC ×TID*	(2) Total Debt *FC × TID*	(3) Long-term Debt *FC ×CR*	(4) Total Debt *FC ×CR*
CR	-0.020***	-0.012***	-0.019***	-0.009***
	(0.000)	(0.001)	(0.000)	(0.001)
DCPSF	-0.004***	-0.018***		
	(0.001)	(0.001)		
ASLF	0.011***	0.023***	0.011***	0.017***
	(0.002)	(0.003)	(0.002)	(0.003)
TID	-2.503***	-3.984***	-2.586***	-5.870***
	(0.441)	(0.529)	(0.299)	(0.361)
PROF	-0.014***	-0.098***	-0.015***	-0.099***
	(0.003)	(0.003)	(0.002)	(0.003)
SZ	0.005***	0.009***	0.005***	0.008***
	(0.000)	(0.000)	(0.000)	(0.000)

COLAT	0.128***	0.117***	0.126***	0.117***
	(0.002)	(0.003)	(0.002)	(0.002)
RND	-0.051***	-0.276***	-0.066***	-0.318***
	(0.009)	(0.011)	(0.009)	(0.011)
LIQ	-0.005***	-0.020***	-0.005***	-0.021***
	(0.000)	(0.000)	(0.000)	(0.000)
TAX	-0.038***	-0.066***	-0.036***	-0.066***
	(0.001)	(0.002)	(0.001)	(0.002)
CAPEX	0.044***	0.010	0.056***	0.025***
	(0.005)	(0.006)	(0.005)	(0.006)
FC	-0.004***	-0.007***		
	(0.002)	(0.002)		
TID×FC	-1.157**	-1.145*		
	(0.556)	(0.668)		
CR×FC			-0.002***	-0.003***
			(0.000)	(0.000)
Constant	0.151***	0.302***	0.128***	0.217***
	(0.018)	(0.021)	(0.017)	(0.021)
Observations	134,535	134,607	142,764	142,836
R-squared	0.194	0.249	0.193	0.246
Year Dummies	NO	NO	NO	NO
Industry Dummies	YES	YES	YES	YES

Results significant at 1%, 5%, and 10% are indicated by ***, **, and *, respectively. Figures in parentheses show standard errors of the coefficients.

Results reported in Table 8 show that the dummy variable (*FC*) for capturing the financial crisis' effect is negative and significant at the 1% level. This supports the view that leverage is pro-cyclical, declining during crisis periods and increasing during normal periods. Further, the interaction terms *TID×FC* and *CR×FC* are negative and significant. These interaction terms show that leverage ratios of firms operating in countries with efficient judicial systems and stronger creditor rights decrease further in crises compared to normal periods. These findings are line with the view that fear of bankruptcy driven by judicial efficiency associated with debt financing play a dominant role in explaining the link between observed leverage and enforcement and content of law. Since the fear of bankruptcy further intensifies in crisis periods, the interactions of the crisis dummy with law variables yield negative coefficients. All other explanatory variables are similar in sign and significance to our previous results.

4.6 Indirect Effects of Judicial Efficiency and Creditor Rights on Each Other

La Porta et al. (1998) argue that efficient judicial systems should substitute for weak legal rules since an active judiciary can step in to protect investors from the abuse of self-interested managers. We further explore this hypothesis by interacting judicial efficiency and creditor rights to see how higher (lower) values of one moderates the effect of the other on leverage ratios. There are three expected outcomes of this analysis. First, the results might indicate that the content and enforcement of the law have a substitutive nature. The second outcome might be that these two are complementary in nature. The third outcome might be that the two have nothing in common in affecting leverage decisions. A conventional method to test such

hypotheses would be to create dummy variables for one of these and interact it with the other. However, we found that the dummy variables were highly collinear with the interaction terms, thereby blurring the true relationship. We, thus, split the sample on the basis of the 50th percentile of the given variables. Specifically, when the sample is split into two groups on the basis of 50th percentile of *TID* and a separate regression is estimated for each of these groups, our interest lies in comparing the coefficients of *CR* in the two groups. Similarly, when the sample is split into two groups on the basis of 50th percentile of *CR* and a separate regression is estimated for each of these groups, our interest lies in comparing the coefficients of *TID* in the two groups. The differences in coefficients of the two groups of regressions are tested for statistical significance using the z-score calculated as:

$$z - score = {(\beta 1 - \beta 2)}\Big/{\sqrt{(\varepsilon_1^2 + \varepsilon_2^2)}} \qquad Eq.[5]$$

Where $\beta 1$ and $\beta 2$ refer to the coefficients of a given variable in the two groups of regressions; $\varepsilon_1$and ε_2 are the standard errors of $\beta 1$ and $\beta 2$, respectively. For convenience in interpretation, we make $\beta 1$ the coefficient from the regression that is estimated for firms in the above 50th percentile of *CR* and *TID* while $\beta 2$ represents the coefficient for the second group. The differences in $\beta 1$ and $\beta 2$ are reported in Table 8, column headings "Marginal Effects*"*. The z-score values are reported in parentheses below the differential coefficients. Results in Table 8 show an interesting relationship between creditor rights and judicial efficiency. Panel A of Table 8 shows that creditor rights are effective only when enforcement of the rights is sufficient enough. The creditor rights coefficient is statistically significant only in Model (1) i.e., in firms that are in countries above the 50th percentile of judicial efficiency. The creditor rights coefficient turns insignificant in countries where judicial efficiency is below its median value. The marginal effect is -.037, which is statistically significant. These finding indicate that corporate leverage is more sensitive to creditor rights in countries that have higher judicial efficiency compared to countries that have lower judicial efficiency. The results imply that stronger creditor rights alone cannot be effective unless efficient enforcement of these rights is available.

Table 8: Regression Results of the Indirect Effect of Judicial Efficiency and Creditor Rights on Each Other

	Panel A: Splitting Sample on 50th percentile of *TID*			Panel B: Splitting Sample on 50th percentile of *CR*		
VARIABLES	(1) Above median *TID*	(2) Below median *TID*	(1)-(2) Marginal Effects	(3) Above median *CR*	(4) Below median *CR*	(3)-(4) Marginal Effects
CR	-0.036***	0.001	-0.037***			
	(0.000)	(0.001)	(-50.433)			
TID				-3.903***	-3.888***	-0.014
				(0.369)	(0.615)	(-0.021)
DCPSF	-0.017***	-0.026***	0.01***	0.010***	-0.025***	0.035***
	(0.001)	(0.001)	(6.148)	(0.002)	(0.001)	(18.351)
MCAP	0.015***	0.022***	-0.007***	-0.015***	0.060***	-0.075***
	(0.001)	(0.001)	(-5.573)	(0.001)	(0.001)	(-62.197)
PROF	0.005	-0.076***	0.08***	0.008**	-0.037***	0.045***
	(0.003)	(0.004)	(17.413)	(0.003)	(0.003)	(10.447)
SZ	0.004***	0.011***	-0.007***	0.005***	0.007***	-0.001***

	(0.000)	(0.000)	(-26.421)	(0.000)	(0.000)	(-5.349)
COLAT	0.128***	0.137***	-0.008*	0.090***	0.149***	-0.059***
	(0.003)	(0.003)	(-2.267)	(0.003)	(0.002)	(-16.401)
RND	-0.185***	0.031**	-0.216***	-0.047***	-0.089***	0.041**
	(0.010)	(0.012)	(-13.542)	(0.014)	(0.009)	(2.478)
LIQ	-0.006***	-0.004***	-0.002***	-0.005***	-0.006***	0.001**
	(0.000)	(0.000)	(-6.847)	(0.000)	(0.000)	(5.281)
TAX	-0.046***	-0.033***	-0.012***	-0.021***	-0.042***	0.020***
	(0.002)	(0.002)	(-5.516)	(0.002)	(0.001)	(8.804)
CAPEX	-0.025***	0.090***	-0.115***	-0.003	0.041***	-0.044***
	(0.007)	(0.006)	(-12.66)	(0.007)	(0.006)	(-4.928)
Constant	0.231***	0.056***		0.086***	-0.011	
	(0.023)	(0.021)		(0.020)	(0.023)	
Observations	87,513	86,979		50,272	124,394	
R-squared	0.253	0.208		0.185	0.217	
Industry Dummies	YES	YES		YES	YES	
Year Dummies	YES	YES		YES	YES	

Results significant at 1%, 5%, and 10% are indicated by ***, **, and *, respectively. Figures in parentheses show standard errors of the coefficients.

Panel B of Table 8 shows that the *TID* coefficient is -3.903 in countries that are in the higher percentile of creditor rights whereas it is -3.888 in the lower percentile group. However, the marginal effects (-0.014) are statistically insignificant. This indicates that judicial efficiency has a persistent negative effect on leverage, irrespective of whether creditor rights are stronger or weaker, suggesting that creditor rights are not the main source of causation. Although we cannot control completely for this potential endogeneity, we do demonstrate that judicial efficiency is persistent without regard to creditor rights. Based on the analyses presented in this section, we can conclude that creditor rights are dependent upon judicial efficiency to influence leverage decisions. However, the opposite is unlikely to be true, i.e., judicial efficiency is not dependent on creditor rights to influence leverage decisions.

5. Conclusion

This study sought to answer several questions related to the link between cross-country corporate leverage, judicial efficiency, creditor rights, and shareholders' protection. Using a sample of 40,734 firms from 69 countries between 1997 and 2012, we find that efficient judicial systems and stronger creditor rights are associated with lower corporate leverage ratios. Our findings support the dominance of a demand side view in establishing a link between law and external finance. These results suggest that managers consider higher levels of leverage in the presence of efficient judicial systems as a serious threat to their continuation of jobs or private benefits. This perhaps leads managers to employ sub-optimal leverage ratios when they face higher judicial efficiency and stronger creditor rights. Consistent with this conclusion, we find that improving shareholders' protection leads to an increase in leverage ratios. As additional support to our main conclusion, we find that the negative effect of judicial efficiency on corporate leverage further increases in uncertain or crisis periods. Furthermore, the negative effect of judicial efficiency is not uniform on all firms. These two aspects of law have greater effect on firms that are presumably more risky

such as small firms and firms with low profitability. We also test for the possibility that firms in different quantiles of leverage ratios face different degrees of bankruptcy risk, and hence judicial efficiency and creditor rights should affect them differently. Our results provide strong support to this hypothesis. Firms in the higher quantile of leverage distribution show higher sensitivity to judicial efficiency than firms in the lower quantile. And finally we explore whether judicial efficiency and creditor rights are dependent on each other in their influence on leverage ratios. The results indicate that stronger creditor rights alone cannot be effective unless efficient enforcement of these rights is available. However, we note that the effect of judicial efficiency on leverage is strong and pervasive irrespective of whether creditor rights are stronger or weaker. We have used several checks for robustness of the results, such as dropping countries that have high density of observations, using alternative measures for judicial efficiency and shareholders' protections, using different estimation techniques and using two different definitions for leverage. None of these robustness checks change our main conclusions.

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