Creditor rights and the corporate bond market

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Abstract

This study examines whether investor protection affects capital markets, specifically the development of corporate bond markets versus equity markets. Using a dataset of 42 countries, we show that countries with strong creditor rights have more developed corporate bond markets than equity markets. However, we find only weak evidence that countries with stronger shareholder protection have more developed equity markets than corporate bond markets. Additionally, we find that the effect of financial reforms on capital markets is strongly dependent on the strength of investor protection and associated information disclosure in a given country.

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1. Introduction

In their seminal paper, La Porta et al. (1998) document that legal origins influence a country's law regarding creditor and shareholder rights, its level of bank credit, and its stock market development. Their results indicated that equity markets are more likely to be established in countries with common law origins than those with civil law origins. Well-developed equity markets, in turn, facilitate securing financing for firms' investments (Rajan and Zingales, 1998).

Thus far, the literature has primarily concentrated on equity markets and the development of the structure of capital markets, even though corporate bond markets are an important aspect of capital markets. According to Tendulkar and Hancock (2014), corporate bond markets have almost tripled in size since 2000, reaching $49 trillion in 2013. Although growth slowed as banks began to deleverage their balance sheets following the 2008 financial crisis, the amount outstanding from non-financial firms has continued to expand. Indeed, according to the "spare tire view," a financial crisis can be mitigated if a country has the legal infrastructure that allows the capital market to provide alternative financing to firms when their banking systems cannot be used. Recently, Levine et al. (2016) showed that in countries with stronger shareholder protection laws, firms increase the volume of equity issuances in response to systematic banking crises. These findings are particularly strong for firms that depend heavily on external financing. Hence, shareholder protection ameliorates the adverse effects of banking crises by providing alternative financing through the equity market.

In response to a banking crisis, due to similar characteristics to bank loans, corporate bonds are more suitable than equity for firms in need of alternative financing (Boyd and

Smith, 1998). On average, the bond yield is lower than the bank interest rate for even the lowest-risk borrowers, but bond issuance is limited to firms with large sales revenues (Russ and Valderrama, 2012). The higher marginal cost of bank lending stems from the specialization of banks, which require significant resources to acquire information and monitor borrowers. In contrast, bonds are acquired by a dispersed pool of investors who cannot or choose not to monitor the activities of the issuers. This, therefore, is commonly also referred to as "unmonitored" lending (Russ and Valderrama, 2012). These differences may also explain why the corporate bond market is more resilient during recessions or times of financial distress than the banking sector. De Fiore and Uhlig (2015) showed, however, that during the financial crisis of 2008, the shift in corporate debt from bank finance to bonds was followed by an increased cost of debt securities relative to bank loans. More importantly, they documented that, unlike corporate bonds, bank loans generally behaved in a markedly procyclical manner during the financial crisis. De Fiore and Uhlig (2015) also showed that when firms have no access to the bond market, the negative effects on investment and causes for alarm that reduce bank profitability are amplified. Thus, developing the corporate bond market is important from a macroeconomic perspective because it reduces the adverse consequences on economic activity during periods of financial distress. However, it remains largely unknown why and how corporate bond markets develop across countries.

The following study investigates how laws and legal institutions affect the development of corporate bond markets relative to that of equity markets using a sample of 42 developed and developing countries over the period 1978 to 2011. In this study, we employ several different measures as proxies for creditor and shareholder protection. We

also control for other legal factors, such as country legal origins, debt contract enforcement, and bond contract covenants. Existing research indicates that these legal factors are correlated with financial system development, and this link remains robust after controlling for religious composition and other national characteristics (Beck et al., 2003). Lastly, we investigate the effects of financial crises on the relationship between law and capital market development (Allen et al., 2012).

Our initial empirical strategy is to run cross-country regressions to determine the effects of creditor and shareholder rights on the development of the corporate bond market relative to that of the equity market. We control for the macroeconomic country characteristics that are likely to affect capital market development. We also employ a natural experiment with a generalized difference-in-difference (diff-in-diff, henceforth) estimator to explore whether a country's financial reforms have had any effect on the association between law and the structural development of the capital market. This diff-in-diff strategy avoids the econometric concern that institutional factors, such as creditor or shareholder rights, are endogenous, and it presents an alternative to the instrumental variable techniques that have been criticized by Djankov et al. (2007).

Our results support the logic underlying the finance and law literature, which relate investor protection to the development and structure of financial systems. First, we find that countries with stronger creditor rights tend to have more developed corporate bond markets relative to the equity markets. Moreover, the results indicate that restrictive bond covenants, which serve as an alternative ex-post mechanism to protect bondholders, are primarily negatively associated with the development of the bond markets relative to the equity markets. Additionally, we demonstrate that countries with stronger debt contract

enforcement have more-developed corporate bond markets than stock markets, but information sharing is generally more beneficial for equity market development. Additionally, we find some evidence that shareholder protection predicts the development of the equity markets relative to the corporate bond markets.

Second, we find that financial reforms lead to greater development in corporate bond markets than equity markets in countries that have stronger creditor protection. In contrast, our results indicate that financial system reforms in countries with stronger shareholder protection enhance the development of the equity markets more than the corporate bond markets. This suggests that the effect of the financial reforms is strongly dependent on the country's legal system. In countries with stronger creditor protection, we find that financial reforms play a more important role to further corporate bond market development. Additionally, we document that greater information disclosure improves the effect of financial reforms on the development of capital markets.

Third, we determine that the relationship between law and the capital market structure is weaker during banking crises than in normal periods. We find that the corporate bond markets develop faster than the equity markets, but only in the short term, during systematic banking crises. Additionally, we do not find significant evidence that the corporate bond markets develop faster than the equity markets during crises in countries with stronger creditor rights. Consequently, the observed association between the legal system and the structure of the capital market is partly offset during a crisis. Indeed, our results are in line with the findings of Allen et al. (2012), who documented significant short-term reversals in the development of financial system structures during a financial crisis. However, they indicated that, after a crisis, the financial system reverts to its

previous structure. Thus, we also assume that after a financial crisis the legal system still largely determines the structure of the capital market.

Overall, our results document that legal factors are important in explaining the development of corporate bond markets versus equity markets across countries. We argue that in countries with stronger creditor rights, corporate bond markets are more developed than the stock markets during normal periods. Moreover, the effects of financial reforms on capital market development tend to depend on the legal system, particularly investor protection.

Our study contributes to filling the gap in the literature regarding the effect of laws on financial system development. First, in contrast to previous studies, we use the corporate bond market instead of private bank credit and, hence, provide new insights into capital market development across countries. We find a strong relationship between creditor protection and corporate bond market development. Our results are in contrast to those of Musacchio (2008), who employed data from Brazil from 1885 to 2003 and found no stable long-term relationship between creditor protection and bond market development. In our study, however, we use a large dataset of countries, and consequently, the results are more general. Second, Allen et al. (2012) demonstrated that the corporate bond market moves in the same direction as bank credit and experiences a short-term reversal with the equity market during a banking crisis. However, they concentrated only on the structure of the financial system, whereas we present the effects of banking crises on the structure of capital markets.

The remainder of the paper is organized as follows. In Section 2, we review the literature that indicates a link between legal origins and corporate bond market

development. In Section 3, we describe our data, and in Section 4, we present the methodology and the results. Finally, Section 5 offers our concluding remarks.

2. Motivation

In this section, we review several related strands of literature. To begin, we present a short review of the large body of empirical research on the effects of legal origins on financial system development. Next, we briefly discuss research that has connected financial reforms with financial system development. Finally, we review the empirical literature that has investigated the relationships between financial disclosure and financial system development.

La Porta et al. (1998) differentiated countries with corporate law derived from legal origins in England, France, Germany, and Scandinavia. They showed that countries with English common law and French civil law origins lie at the extremes of legal protection; that is, countries with an English origin (French origin) provide the strongest (weakest) legal protection to both shareholders and creditors. Using this distinction, La Porta et al. (1998) found a positive relationship between shareholder protection and stock market financing. In line with these results, Ergungor (2004) showed that legal tradition determines the structure of a financial system, whereas Demirgüç-Kunt and Levine (2004) found that countries with strong protection for shareholder rights tend to have a more market-based financial system. Djankov et al. (2008b) confirmed the previous findings, and associated shareholder protection with stock market development.

On the other hand, Levine (1999) found that financial intermediaries develop more in countries with legal systems that assign a higher priority to creditor rights. More recently, Djankov et al. (2007), using data from 129 countries, showed that better creditor rights

are associated with a higher ratio of private credit to gross domestic product (GDP). Additionally, they reported that the ratio of private credit to GDP increases following improvements in creditor rights, but there is little convergence in the scores of creditor rights among legal origins over a 25-year period. In contrast, La Porta et al. (1997) show that creditor rights do not have a strong influence on corporate debt over gross national product (GNP) based on a cross-sectional regression of 49 countries. Moreover, Musacchio (2008) did not find a strong relationship between creditor protection and bond market development in Brazil. He argued that creditor rights are necessary for bond market development, but the market's further development is more influenced by international capital flows and macroeconomic stability than legal variables. Consequently, the existing empirical evidence on the relationship between creditor rights and bond markets is limited and ambiguous. Considering this gap in evidence and understanding, therefore, we developed the following hypothesis:

Hypothesis 1: *In countries with stronger creditor rights, corporate bond markets are more developed than equity markets.*

Abiad and Mody (2005) documented that financial reforms have advanced despite stops and reversals in the last quarter century. Moreover, they found that when initial reforms occurred, the financial sector became only partially repressed, and the likelihood of further reforms increased substantially. As the example of Japan shows, financial liberalization that aimed to develop the government bond market created demand for reduced restrictions on the corporate bond market. Consequently, the financial reforms in those years induced the development of the corporate bond market.

Financial reforms often involve removing the administrative controls that restrain

credit growth, which can result in a subsequent lending boom. Tornell and Westermann (2002) confirmed that financial liberalization is followed by a lending boom, but also reported that the boom can end with a simultaneous crisis in currency and banking. Notably, the lending boom usually ends with "a soft landing," whereby credit gradually decelerates. Moreover, the authors argued that the financial flows after financial liberalization do not occur through equity or bond markets, because of severe enforceability problems. Thus, the previous results of analyzing the effects of financial reforms on capital market development are ambiguous, allowing us to develop the following hypothesis:

Hypothesis 2: *Financial system reforms enhance corporate bond market development in countries with stronger creditor rights.*

In the pure adverse selection model developed by Pagano and Jappelli (1993), information sharing improves the pool of borrowers, decreases defaults, and reduces the average interest rate. Hence, information sharing can improve the functioning of the market and increase the volume of lending. Levine (1999) found a strong positive link between financial intermediary development and information disclosure, and an even stronger relationship between creditor rights and information disclosure. Jappelli and Pagano (2002) showed that bank lending is approximately twice as large in countries where lenders share information. Thus, previous results show that information disclosure is significant, and we assume that it may influence the effects of financial reforms. In line with our second hypothesis, we expect that in countries with stronger creditor rights and proper information disclosure, further institutional reforms in the securities market should significantly improve corporate bond market development. In formulating this hypothesis,

we assume that investor protection and information theories serve as substitution mechanisms for market development (Djankov et al., 2007); that is, both improved information sharing ex ante or ad interim and strong creditor rights or shareholder rights ex post can reduce market friction and develop corporate bond markets or equity markets. Thus, we developed the following hypothesis:

Hypothesis 3: *Improved information disclosure advances the effectiveness of institutional reforms on the securities markets.*

According to Greenspan (2000), the existence of legal infrastructure and multiple avenues of financial intermediation can buffer shocks from a financial crisis. In his opinion, the United States capital markets replaced bank access following the collapse in the value of real estate collateral in the 1990s. Conversely, in 1998, following the default of Russian financial institutions, commercial banks replaced the intermediation function of the capital markets. Therefore, Greenspan (2000) argued that a diversified financial system could maintain an adequate degree of financial intermediation even if the main source of intermediation, whether banks or capital markets, freezes during a financial crisis.

Allen et al. (2012) empirically confirmed that there are reversals in the structure of the financial system during a financial crisis. Moreover, their results indicated that, after a crisis, the financial system reverts to its previous structure. Consequently, their results confirmed that different financial intermediaries could substitute for each other during a crisis. Additionally, Levine et al. (2016) documented that the stock market may provide financing during a banking crisis. However, they also confirmed that the legal infrastructure must be in place so the equity market can substitute for the banking system

during a crisis. In line with these results, we assume that in countries with strong creditor rights, the corporate bond market mitigates the adverse impact of a banking crisis. Therefore, we developed the following hypothesis:

Hypothesis 4: *During a banking crisis, corporate bond markets expand in countries with strong creditor rights.*

3. Data and Descriptive Statistics

We constructed the indicators of corporate bond and equity market development using a revised financial structure dataset from Beck et al. (2000), Beck et al. (2009), Čihák et al. (2012), and the World Bank database. The legal origin variables and the variables to control for creditor rights and shareholder rights are based on La Porta et al. (1998), and we used various sources to collect them. We control for bond covenant, information disclosure, and debt contract enforcement using the data of Abiad and Mody (2005). We employ data for the set of control variables for financial reforms from Abiad et al. (2010). Lastly, we use data from Laeven and Valencia (2013) to control for systemic banking crises. Since there is limited overlap between the datasets, we collected a sample of 42 developed and developing countries over the period 1978 to 2011. All variables and sources are presented in Table A1 in the appendix.

3.1 Variable definitions

3.1.1 Corporate bond market and equity market development

The dependent variable *Corporate bond to stock* is the ratio of corporate bond market capitalization to equity market capitalization. Both corporate bond market and equity market capitalization variables measure the size of the market, and their relationship represents the structure of the capital market in a country. To measure robustness, we use

several alternative dependent variables: *Public bond to stock*, which is the ratio of the market value of the public bond market to the equity market; *Bond to stock*, which is the ratio of the market value of both the private and public bond market to the equity market; *Non-financial corporate bond to stock*, which is the ratio of the market value of the non-financial corporate bonds to the equity market; and *Number of the listed bonds to stocks*, which is the ratio of the number of the listed bonds to listed firms in the equity market.

Replicating the regressions using the alternative dependent variables, which measure the structure of capital market in different ways, yields only minor differences from our main results. Consequently, in the following sections, we discuss only some of the results of the robustness check, using the alternative dependent variables, for brevity.

3.1.2 Legal determinants

We assume that a country's level of creditor protection determines corporate bond market development. We use the *Creditor rights* index of Djankov et al. (2007) as a proxy for country-level bondholder protection. The index, which ranges from zero (weak) to four (strong), measures the laws and regulations that limit expropriation from secured creditors in a country. This index remains remarkably stable over time and relevant in explaining patterns in total capital market development (Miller and Reisel, 2012).

Creditor rights are an ex-post mechanism that protects bondholders during firm defaults. Therefore, we control additionally for restrictive covenants that limit the actions of managers prior to defaults and serve as ex-ante mechanisms to protect creditors. Miller and Reisel (2012) argued that bond contracts are more likely to include restrictive covenants in countries with weak creditor protection. Hence, both bond covenants and creditor rights contribute to investor protection and can be substitutes at the country level.

Following Miller and Reisel (2012), we proxy for *Bond covenants* using the average number of covenants attached to corporate bond contracts issued by non-U.S. firms. The proxy reflects covenants in three categories: restrictions on financing activities, restrictions on investment activities, and restrictions on payouts. The total possible number of covenants ranges between 0 and 13.

Djankov et al. (2008a) documented that the efficiency of debt enforcement is an economically and statistically significant predictor of the development of debt markets across countries. We control for this by employing the variable *Debt enforcement*, which measures the amount required to enforce a debt contract.

In contrast, shareholder protection may result in stock market development. We control for shareholder protection using three different proxies: anti-director rights, anti-self-dealing, and anti-takeover provisions. The anti-director rights index (*ADRI*) of La Porta et al. (1998) aggregates six dimensions of shareholder protection rules. Of the six components, three are concerned with shareholder voting, namely, voting by mail, voting without blocking shares, and calling an extraordinary meeting. The three others are concerned with minority protection, namely, proportional board representation, preemptive rights, and judicial remedies. Pagano and Volpin (2005), however, criticized the ADRI for its ad hoc nature and mistakes in coding. In response, Djankov et al. (2008b) provided a *Revised ADRI* for 72 countries, which is more theoretically grounded and reliably weighted. Consequently, the results indicate that the correlation between the original and *Revised ADRI* was only 0.60. Spamann (2010) further improved the index by employing leading local lawyers and provided a *Corrected ADRI* for 46 countries. The corrected ADRI differed substantially from the original ADRI (ρ=0.53) and the *Revised*

ADRI (ρ=0.67). Spamann (2010) demonstrated that many empirical results established using the original index might not be replicable with the *Corrected ADRI*. In particular, the corrected index failed to support the earlier findings that shareholder protection is stronger in common law countries than in civil law countries. Therefore, we use the *Revised ADRI* and the *Corrected ADRI* to control for the index's potential limitations.

Djankov et al. (2008b) introduced a new measure of legal protection of minority shareholders against expropriation by corporate insiders, called the *Anti-self-dealing* index. The index covers both ex-ante and ex-post mechanisms that can limit anti-self-dealing transactions, including disclosure and approval by minority shareholders, independent review, and standing to sue. Although both the *ADRI* and the *Anti-self-dealing* index capture the strength of shareholder rights, they are significantly different. Djankov et al. (2008b) indicated that anti-director rights, not self-dealing, are the central problem of corporate governance in many countries. Thus, they suggested that generally, anti-self-dealing is preferable to the *ADRI* in cross-county studies. Additionally, the empirical evidence indicates that the *Anti-self-dealing* index is a more robust predictor of stock market development than the *ADRI*.

We also use the *Anti-takeover* index developed by Nenova (2006), which captures the set of rules and regulations concerned with changes in corporate control, takeovers, tender offers, and general acquisition activity across countries. Nenova (2006) showed that effective takeover laws positively affect the number of listed companies, market capitalization, and value traded on stock exchanges, controlling for the general level of national economic growth.

Empirical literature also suggests that legal origin is a concern for creditor rights and

shareholder protection (La Porta et al., 1998). Therefore, we control for the legal origin and employ the dummy variable *L_English*, which equals one if the country has an English common law legal origin and zero otherwise. Dummy variables for countries with French (*L_French*) and German civil law origins (*L_German*) are constructed identically. The few countries with Scandinavian civil law origins (*L_Scandinavian*) are captured in the regressions by the constant.

Bae and Goyal (2009) showed that property rights might affect the development of the capital market. They documented that, in a debt contract, property rights protection affects a lender's incentives to monitor and ability to re-contract. They showed that re-contracting is costly even in countries with high creditor rights when they are poorly enforced. Therefore, we employ an index for *Rule of law*, which captures the quality of contract enforcement, property rights, and the courts.

3.1.3 Other governance indicators

We included three additional country-level governance factors that may influence the development of bond markets relative to equity markets. First, we employ a variable to control for corruption as this may distort the economic and financial environment. Bae and Goyal (2009) considered the impact of corruption when examining the relationship between creditor rights and bank loans. They found that corruption negatively determines the loan spreads, implying that laws and their enforcement have a substantial effect on borrowers' cost of loans. In our study, the variable *Corruption* is from the World Bank database that measures the severity of corruption in a country by the extent to which the public power is exercised for private gain. The variable ranges from zero to 100, with higher scores representing less severe corruption problems.

Second, we control for the influence of *Regulatory quality* on capital market development. Allen et al. (2012) suggested that financial regulation affects the structure of financial systems during both normal and crisis periods. We use an index for *Regulatory quality*, which captures perceptions of the ability of the government to formulate and implement sound policies and regulations that promote private sector development. The index is from World Bank database and ranges from zero to 100.

Third, we employ an index for *Voice and accountability*, which reflects the extent to which a country's citizens are able to participate in selecting their government, as well as their freedom of association and media, among others. Rajan and Zingales (2003) propose a political economy view to understand the patterns of financial development. Similarly, Braun and Raddatz (2008) presented that the level of governance can affect financial system development through political factors. The index for *Voice and accountability* is from the World Bank database and ranges from zero to 100.

3.1.4 Information disclosure and financial reforms

Improved information disclosure contributes to credit market development (Jappelli and Pagano, 2002). La Porta et al. (2006) documented that the development of stock markets is strongly associated with extensive disclosure requirements. The Center for Financial Analysis and Research (CIFAR) created an index by rating the annual reports on the inclusion or omission of 90 items, which we employ to control for the level of *Information disclosure* across countries.

The data on financial reforms come from the dataset of Abiad et al. (2010), which contains several indices related to specific financial reforms plus an aggregated index. The financial reform index is the sum of seven different dimensions: credit controls and

reserve requirements, interest rate controls, entry barriers, state ownership in the banking sector, capital account restrictions, prudential regulations and supervision of the banking sector, and securities market policy. For each dimension, a country is graded from zero (high repression) to three (full liberalization); thus, the index calculates values between 0 and 21. We employ a dummy variable, *Financial reforms*, which equals one if the first difference of the index is greater than zero, and zero otherwise. The dummy variable controls for years when there were policy changes in a country, whereas the values of the index are stable in most normal years.

3.1.5 Banking crisis

In a systemic banking crisis, non-performing loans increase dramatically, and much of the aggregate banking system capital is soon exhausted. As a result, a systematic banking crisis always leads to output losses in the economy. We use the starting dates of systemic banking crises provided by Laeven and Valencia (2013), focusing on the fact that the crises could lead to significant capital market development. Using this criterion, we identified 144 systemic banking crises across countries.

3.2 Descriptive statistics

In Table 1, Panel A, we present the descriptive statistics, which show a noticeable variation in the capital market measures across countries. The variable *Corporate bond to stock* exhibits high cross-sectional variability, ranging from 0.00 to 5.68 with a mean of 0.58. The results indicate that, compared to stock market development, there are significant differences in the development of the corporate bond market across countries. The alternative variable *Bond to stock,* which additionally considers the public bond market, exhibits even higher variation, ranging from 0.00 to 9.52 with a mean of 1.44.

The alternative variables *Non-financial corporate bond to stock* ranges from 0.00 to 0.72 with a mean of 0.05, and *Number of listed bonds to stocks* from 0.00 to 2.21 with a mean of 1.05.

The variable *Corporate bond to stock* identifies Iceland, Ireland, Denmark, Austria, and Italy as having, on average, the highest corporate bond market capitalization relative to the equity market in the period 2007 to 2011. Conversely, Hong Kong, the Philippines, Luxembourg, Columbia, and Turkey have the lowest ratio of corporate bond market capitalization to stock market capitalization during this period. When we include the public bond market, the highest average ratios of bond market capitalization to stock market capitalization are observed in Italy, the Slovak Republic, Iceland, Austria, and Ireland, and the lowest in Chile, Switzerland, South Africa, Hong Kong, and Luxembourg during the years 2007 to 2011.

The independent variables exhibit high cross-sectional variation, whereas the variable *Creditor rights* ranges from 0.00 to 4.00, with an average of 1.80. This indicates that the countries in our sample provide, on average, low protection to creditors. The results are strengthened by the *Revised ADRI* and *Corrected ADRI,* with average values of 3.37 and 3.74, respectively. The *Anti-self-dealing* and *Anti-takeover* indexes average at 0.44 and 0.46, respectively.

[Table 1]

Table 1, Panel B, presents a matrix of the correlation between the financial structure variables and the proxy variables for investor protection. As expected, the four regressors that proxy for capital market structure in terms of the relative development of the corporate bond market to stock market are highly correlated. We find that the variable

Public bond to stock is only weakly correlated with *Non-financial corporate bond to stock* and *Number of listed bonds to stocks*. On the one hand, the variable *Creditor rights* is significantly and positively related to the variables *Corporate bond to stock* and *Non-financial corporate bond to stock.* On the other hand, it is insignificantly related to *Public bond to stock, Bond to stock,* and *Number of listed bond to stock.* Hence, the results indicate that overall creditor protection is important for the development of corporate bond markets. In contrast, we assume that public bond market development is driven more by the fiscal and monetary policy of the government. In line with our expectations, the variables for shareholder protection are significantly and negatively correlated with the variable *Corporate bond to stock* and *Bond to stock.* However, the correlations are mixed between the variables for shareholder protection and *Non-financial corporate bond to stock* and the *Number of listed bonds to stock*. The results of the descriptive statistics are consistent with our hypothesis that stronger creditor rights are positively associated with higher development of the corporate bond market relative to the equity market, whereas stronger shareholder protection has a negative effect on the development of the corporate bond market relative to the stock market.

We examined the correlation between investor protection and other legal factors, but do not report the results for brevity. The correlation between creditor rights and shareholder rights is positive; typically, countries with well-developed legal systems and institutions provide similar protection to shareholders and creditors. Indeed, we find that an English legal origin is significantly and positively associated with both creditor rights and shareholder rights, whereas a French legal origin exhibits opposite correlations. A German legal origin indicates significantly positive correlations with creditor rights, but

mixed associations with shareholder rights. These results are in line with those of La Porta et al. (1998), who showed that all legal origins provide roughly the same protection to creditors and shareholders. Our results also confirm that countries with an English legal origin provide both shareholders and creditors the strongest protection and French civil law countries the weakest. The only exception is German civil law countries, which are more protective of creditors than shareholders.

The variables *Bond covenant* and *Enforcement* exhibit significantly negative correlations with creditor rights. Hence, the results confirm that corporate bond contracts are more likely to include covenants in countries with weak creditor rights, which we assume would negatively affect the bond market development. Moreover, debt enforcement shows a positive relationship with shareholder and creditor protection.

4. Methodology and Results

4.1 Baseline model

We begin our analysis by exploring the influence of creditor rights and shareholder rights on the structure of the capital market by employing random effects estimates using generalized least squares.

$$Corporate\ bond\ to\ stock_{i,t} = \alpha_i + \beta_t + \gamma \cdot Creditor\ rights_{i,t} + \delta \cdot Shareholder\ rights_{i,t} + \theta \cdot X_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $Corporate\ bond\ to\ stock_{i,t}$ is the market value of the corporate bond market to the stock market, $Creditor\ rights_{i,t}$ and $Shareholder\ rights_{i,t}$denote the set of proxy variables for creditor and shareholder protection, respectively, $X_{i,t}$ denotes a vector of conditioning information that controls for legal factors, governance factors, and other variables of the macroeconomic environment, such as the log of GDP, the log of GDP per capita, inflation, and the ratio of gross fixed capital formation to GDP. Variables α_i and

β_t are country and year fixed effects, $\varepsilon_{i,t}$ is the error term, and *i* and *t* denote country and time period, respectively.

Random-effects estimates are more efficient than pooled ordinary least squares (OLS) estimates and assume that country effects are uncorrelated with regressors, whereas fixed-effects models allow country effects to be correlated with regressors. Therefore, we employ both estimation methods to establish the effect of creditor rights on corporate bond market development. Although the variables of interest, such as creditor and shareholder protection, change over time, they are characterized by variations that are not sizable to be significant. Fixed-effects estimation requires significant within-group variations in the independent variable to generate a consistent and efficient estimator (Wooldridge, 2002). Thus, the fixed-effects estimator is prone to yielding imprecise coefficients for variables representing creditor and shareholder rights. Moreover, fixed effects can aggravate the problem of multicollinearity (Baltagi, 2005). Therefore, we report primarily the results of the random-effects method and the fixed-effects method as robustly as possible[2]. In the baseline-setting regressions, when the proxy for the development of corporate bond market versus equity market are used as the dependent variable, the independent variable of creditor rights is jointly significant at levels below 1%. Thus, we do not comment further on these aspects.

4.2 Baseline results

Table 2 presents the results of the random-effects estimations. In specifications (1) through (4), we regress the explanatory variable *Corporate bond to stock* on the variable *Creditor rights* and then progressively change the extensive set of variables controlling

[2] For brevity, we do not report all the results for the fixed-effects estimations, but they are available upon request. The results based on fixed-effects estimators are similar to those obtained using the random-effects estimators.

for shareholder protection. To check the robustness of the results in specifications (5) through (8), we repeat the estimation using the regressor *Public bond to stock*, which captures the relative development of the public bond market to the stock market. For specifications (9) through (12) we employ the regressor *Bond to stock*, which includes both the public bond market and private bond market. In all regressions, we include macroeconomic control variables, such as the log of the GDP, the log of the GDP per capita, and inflation, as the exogenous macroeconomic situations of the country may determine the growth of the corporate bond market and stock market. In the regression, following Rajan and Zingales (2003), we control also for the ratio of the gross fixed capital formation to GDP (*GFCF*). Nini et al. (2009) document that creditors are more likely to impose a capital expenditure restriction, which can reduce firm investments. We assume that bond financing is likely to have similar characteristics as private debt. As a result, in countries with higher levels of gross fixed capital formation, firms may have lower bond financing relative to equity financing. Thus, the corporate bond market might be less developed than the stock market at the macro level.

The regressions reveal that creditor rights are positively correlated to the corporate bond market development, and the coefficient is statistically significant at the 1% level in all specifications. However, the coefficient for creditor rights is insignificant when we use the relative development of the public bond market to the stock market as the dependent variable. Thus, the results confirm that the level of creditor protection in a country is not relevant to the development of the public bond market.

Adding proxies for shareholder protection does not significantly change the coefficient for the variable *Creditor rights*. In terms of economic magnitude,

specification (1) implies that an increase in the creditor rights index by one point results in an increase in the market capitalization of the corporate bond market relative to the equity market by 0.36%. This result implies that in countries where creditor rights are protected, represented by the higher value of the index, corporate bond markets are more developed. This finding is in accordance with Hypothesis 1.

In Table 2, the coefficients for the different variables reflecting shareholder rights are negative and statistically significant in most of the specifications. These results imply that enhanced shareholder protection results in the development of the equity market relative to the corporate bond market. When the results are examined in more detail, the differences between the various shareholder rights indices are confirmed, including the two anti-director rights indexes. We find that the anti-takeover provisions are weak predictors of the development of the equity market because the coefficient for the variable *Anti-takeover* is statistically significant at only the 10% level and only in specification (4). Hence, the *Corrected ADRI* and *Revised ADRI* are better predictors of the development of the equity market relative to the bond market. However, only the coefficient for the *Anti-self-dealing* index is statistically significant at the 1% level in specifications (3) and (11). Therefore, this variable is the best predictor of equity market development. These results support the findings of Djankov et al. (2008b), who too reported that the *Anti-self-dealing* index is a more robust predictor than the *Anti-director rights* index. As a robustness check, we repeated the regressions using all the variables for shareholder protection as independent variables. The results show only very small changes in the coefficients and in significance. Hence, the results remain robust, but are not reported for brevity.

Most of the control variables included in the regressions have the expected signs but are insignificant. Only the coefficient for the variable *GFCF* is negative and significant in all the specifications. These results support the findings of Rajan and Zingales (1998) showing that the equity markets facilitate the growth of firms dependent on external finance. Adding control variables does not significantly change the coefficients of *Creditor rights* or the proxies for shareholder protection.

There are slight differences in the number of observations in all the reported regressions as the *Corrected ADRI* and the *Anti-takeover* index is available for fewer countries compared to the other two indexes on shareholder rights. In addition, the alternative dependent variables are available for fewer as well as different countries compared to the dependent variable *Corporate bond to stock*. Consequently, the number of observations differs across our estimations, but does not appear to bias the results.

[Table 2]

We examined the robustness of the results by employing the alternative dependent variables *Number of listed bonds to stocks* and *Non-financial corporate bond to stock.* The former variable provides a measure that is not affected by fluctuations in stock and bond market valuations but is affected by the process of consolidation and by the fragmentation of the industrial structure. However, any single indicator of financial system development has its weaknesses (Rajan and Zingales, 2003). Therefore, the indicators should be considered cumulatively for a better understanding of the country's capital market structure.

Table 3 shows that our results are not determined by the alternative dependent variable. The coefficient for *Creditors rights* remains positive and significant in all

specifications. Similarly, the sign and significance of the coefficients of the shareholder rights variables remain stable. The significance of the coefficients for the investor protection variables decreases when we employ the alternative dependent variable.

[Table 3]

To further probe the robustness of the results, we employed fixed-effect estimations with different capital market structure indicators as the dependent variable. We use the variables *Creditor rights* and *Corrected ADRI* as independent variables as they are the only time-varying variables that proxy investor protection in a country.

The fixed-effect model yields the same main results as our study. As shown in Table 4, the coefficient for *Creditor rights* is positive and significant at the 1% level in all specifications. The coefficient of the proxy for shareholder protection remains negative but is statistically significant in only three of the six specifications. We further altered our model and employed the variable *Stock market development* as an additional control variable in columns (5) and (6) of Table 4. This variable does not affect the significance level or the sign of the estimated coefficients. These results confirm that creditor rights are an effective predictor of the development of the corporate bond market relative to the equity market, and even more effective when we control for the country fixed effects and stock market development.

[Table 4]

In Table 5, we present the results and control for the legal origins and other factors that may determine corporate bond market development. In columns (1) through (4), we control for the legal origins. Adding new control variables does not change the coefficient for *Creditor rights*, which remains statistically significant at the 1% level. In contrast, the

coefficients of the proxies for shareholder protection have the expected sign but lose statistical significance. Only the coefficient for the *Anti-self-dealing* index is statistically significant at the 5% level.

All coefficients for legal origins are negative but statistically significant only for the English common law, in almost all specifications. In contrast, the coefficients for German or French civil law are almost never significant or significant only at the 10% level. On one hand, these results confirm the finding of La Porta et al. (1998) that, although investor protection varies systematically across legal origins, it is higher in common law than in civil law countries. However, the negative coefficients for all legal origin dummies suggest that all legal origins protect shareholders more than creditors. These results are in line with Djankov et al. (2008b), who did not find a significant influence for legal origin on private credit.

Next, we added control variables for the restrictive bond covenant, information disclosure, and days of debt contract enforcement. The results are presented in Table 5, columns (5) through (8). Surprisingly, none of the control variables are significantly related to corporate bond market development. However, the coefficient for *Creditor rights* barely changes after the new control variables are added, indicating that the additional variables do not contain information that affects corporate bond market development. In contrast, all proxies for shareholder protection lose significance. We thus conclude that creditor rights are more robust predictors of corporate bond market development than is shareholder protection for equity markets. In Table 5, columns (9) and (10), we employ a fixed-effect model for robustness check. The results show that creditor rights remain positive and statistically significant at the 1% level.

[Table 5]

For sensitivity analysis, we consider the potential impact from other governance factors, including corruption, rule of law, regulatory quality and voice, and accountability. Table 6 shows the results where we control for these additional factors and employ the fixed-effect model. We use *Corporate bond to stock* as the dependent variable in columns (1) through (4), and *Non-financial corporate bond to stock* in columns (5) through (8). Our results do not change with the additional variables, and the coefficient for the variable *Creditor rights* remains positive and significant. Conversely, the other governance indicators are negative but not significant. Overall, we find strong support for Hypothesis 1, which states that in countries with stronger creditor rights, corporate bond markets are more developed than equity markets.

[Table 6]

4.2 Financial reforms and corporate bond market development

As Abiad and Mody (2005) documented, policy changes, especially those in emerging economies, tend to be episodic and embedded in a long process, leading to liberalization and, occasionally, reversals. It is difficult to identify the causal effect of reforms on financial development, due to its endogenous nature since the expected changes in financial development may cause its inclusion in reform policies, leading to a reverse causality concern. Therefore, we control for financial reforms by using an index that covers dimensions such as credit controls, reserve requirement, interest rate controls, entry barriers, state ownership in the banking sector, capital account restrictions, prudential regulations, supervision of the banking sector, and securities market policy. It is likely that the development of the bond market or stock market affects financial

policies, whereas we assume that the structure of the capital market is less likely to influence the financial policies on those dimensions. Therefore, we use a natural experiment using a diff-in-diff estimator to investigate the effect of financial reforms on the relationship between legal determinants and capital market structure. This methodology compares the effect of an event (a financial policy change) on groups that are more affected by policy changes (the treated group) with those that are less affected by the changes (the control group). We assume that financial reforms have a stronger effect on the development of corporate bond markets than equity markets in countries with higher creditor protection (Hypothesis 2). Therefore, we classify countries based on the pre-treatment level of creditor rights relative to shareholder rights. Countries are classified as treated groups when, according to the ratio, they are in the top third of the sample, and as control groups when they are in the bottom third of the sample. Using this methodology, we employ the following specification:

$$Structure_{i,t} = \alpha_i + \beta_t + \sigma \cdot Treated * Post\ reform_{i,t} + \gamma \cdot Creditor\ rights_{i,t} + \delta \cdot Shareholder\ rights_{i,t} + \theta \cdot X_{i,t} + \varepsilon_{i,t} \quad (2)$$

where *Treated* equals one if the country is in a treated group and zero otherwise; *Post reform* is a dummy variable that equals one in the first year after a financial reform and zero otherwise; and the diff-in-diff effect is captured by σ.

Table 7 presents the effects of financial reform on the association between investor protection and corporate bond market development. We find that adding a diff-in-diff estimator does not change the main results as presented in Table 2. The relationship between creditor rights and capital market structure remains statistically significant, and the signs of the coefficients do not change.

In all specifications, the coefficient for the interaction term *Treated*Post reform* is

positively related to corporate bond market development and is statistically significant at the 1% level, which indicates that in countries with stronger creditor protection than shareholder protection, financial reforms improve the development of the corporate bond market more than that of the equity market. Consequently, we find support for Hypothesis 2, which states that financial reforms promote corporate bond market development if the countries have stronger creditor rights.

We tested the sensitivity of our results by introducing an interaction term between information disclosure and financial reform. The coefficient for the interaction term is positive and significant at the 5% level, which indicates that in countries with improved information disclosure, the effects of financial reforms are more significant for corporate bond market development, supporting Hypothesis 3.

[Table 7]

In Table 8, we further analyze the robustness of our results by adding an interaction term between the legal variables and the *Post reform* dummy. In columns (1) through (3), we interact the *Post reform* dummy with the proxies for investor protection. The coefficient for the interaction term with *Creditor rights* is positive and significant in all specifications. In contrast, the coefficient for the interaction term with the proxies for shareholder rights is negative but significant only for the variable *Anti-self-dealing*. Overall, the results show that the relationships between legal determinants and capital market development do not change after financial reforms. Stronger creditor protection is a predictor of corporate bond market development, whereas stronger shareholder protection is a predictor of equity market development. However, once again, the results show that among the proxies for shareholder protection, the variable *Anti-self-dealing* is

the best predictor of equity market development.

In Table 8, columns (4) through (6), we add a triple interaction, including investor protection, a post reform dummy, and information disclosure. We assume that cross-sectional heterogeneity may exist among countries, such as information disclosure systems or other related regulatory and supervisory factors. We therefore expect that in countries with better information disclosure, the effects of financial reform may be more significant, as stated in Hypothesis 3. The coefficients for the interaction terms that include *Creditor rights* are positive and significant in all specifications, confirming Hypothesis 3. Conversely, the coefficients for the interaction terms that include the proxies for shareholder protection are negative and statistically significant only for the variables *Revised ADRI* and *Anti-self-dealing*. On the one hand, the results indicate that financial reforms are more effective in countries with better information sharing. On the other hand, the results also show that information sharing is important only in countries characterized by high investor protection because the coefficient for *Information disclosure* is insignificant, as shown in Table 5.

Lastly, in all specifications, the coefficient of creditor protection remains positively related to corporate bond market development and is statistically significant at the 1% level. Similarly, the coefficients of the proxies for shareholder protection are negative and statistically significant. Consequently, the results confirm that investor protection is important for capital market development.

[Table 8]

4.3 Development of the corporate bond market during a banking crisis

According to the spare tire view, the capital market may provide financing during a

banking crisis. We therefore assume in Hypothesis 4 that in countries with higher creditor protection, corporate bond markets are more likely to develop during a banking crisis and act as a "spare tire." Gormley et al. (2006) showed that the severe currency crisis in South Korea in 1997 triggered a freeze in newly increased bank lending and, consequently, stimulated the corporate bond market. One year later, the Korean bond market provided almost all funds raised by companies, whereas the surge in new issues was financed by household savings and the drawing of bank deposits. Levine et al. (2016) documented that stronger shareholder protection facilitates equity financing during a banking crisis. These findings indicate that stronger investor protection may predict capital market development following a systemic banking crisis.

In Table 9, we evaluate the spare tire view and include the dummy variable *Banking crisis*. The coefficient for the dummy variable is positive and significant in all specifications. Hence, the results suggest that corporate bond markets develop during a banking crisis. However, the key explanatory variable is the interaction term between the crisis dummy and the measure of the strength of investor protection. In Table 9, the coefficient for the interaction term between the *Banking crisis* and *Creditor rights* is positive but insignificant. Consequently, we do not find evidence that corporate bond markets develop faster in countries with pre-crisis creditor protection during a systematic banking crisis, supporting Hypothesis 4. Similarly, in Table 9, columns (2) and (4), the coefficients for the interaction terms that include the *Revised* and *Corrected* ADRI are insignificant. In all specifications that include shareholder protection, only the interaction term that includes the variable *Anti-self-dealing* has a negative and statistically significant sign at the 10% level. We thus find only weak evidence that pre-crisis anti-self-dealing

protection is positively related to equity market development during a systematic banking crisis. These findings are consistent with those of Levine et al. (2016), who too employed the anti-self-dealing index.

[Table 9]

To examine the sensitivity of our results, we control for the economic development of the countries or regions. The results are shown in Table 10. For instance, in columns (1)-(2), we introduce the dummy variable *Advanced*, which takes the value of 1 if a country has a GDP per capita of more than 10,000 USD. We employ this dummy because there were more systematic banking crises in emerging markets than in developed countries from 1978 to 2011. Moreover, we assume that the capital markets may behave differently in advanced economies, compared to emerging countries, during a systematic banking crisis.

Next, we interact the dummy variable with the variable *Banking crisis* and the proxies for investor protection. In column (1), the coefficient for the interaction term *Region*Banking crisis* is significant and positive, whereas in column (2), it loses significance. Hence, we find only weak evidence that corporate bond markets develop faster in advanced economies than in emerging markets during a banking crisis. We also employ a triple interaction term that includes proxies for investor protection. Only the coefficient for the interaction term that includes the variable *Revised ADRI* is statistically significant and negative in specification (1). The results indicate that pre-crisis shareholder protection proxied by the revised ADRI may predict equity market development during a systematic banking crisis.

Next, we evaluate whether there are differences in the results depending on the

region of the crisis and its frequency. In columns (3)-(4), the variable *Region* controls for the Asian crisis of 1997[3], whereas in columns (5)-(6), the variable *Region* controls for the frequent systematic banking crises in Latin America from 1978 to 2011[4]. In contrast to our expectations, we find that the coefficient for the interaction term between the variables *Region* and *Banking crisis* as well the coefficients for the triple interaction term including the proxies for investor protection are insignificant in all specifications. Thus, the results indicate that in neither of the regions are creditor or shareholder rights determined by capital market development during a banking crisis. The results support the findings of Gormley et al. (2006), who showed that in Korea, the corporate bond market was growing during the Asian crisis, but not as determined by the prevailing institutions. As a result, they showed that the allocation of the newly issued bonds was highly concentrated and credit screening was poor during the crisis in Korea.

[Table 10]

Figure 1 graphically presents the development of the corporate bond market relative to that of the equity market for all sample countries, the advanced economies, and the two regions. We can see that, on average, the corporate bond market starts to grow one year prior to the systematic banking crisis in the years 1970–2011. The corporate bond market expands during the crisis but starts to decline relative to the equity market after the crisis. The results are consistent with those of Allen et al. (2012), who showed that structural changes in the financial system following a crisis are only short-term effects. In our sample, only the corporate bond market in Latin American countries grows steadily

[3] The dummy variable controls for Indonesia, Malaysia, Philippines, South Korea, Thailand, Hong Kong, and Singapore, which experienced a severe crisis from 1997 to 1998.
[4] The dummy variable controls for systematic banking crises in Argentina, Brazil, Columbia, Mexico, and Peru from 1970 to 2011.

relative to the equity market, whereas the crisis does not seem to affect its development.

[Figure 1]

5. Conclusions

We examine whether investor protection determines the development of the corporate bond market relative to that of the equity market. The results indicate that a country's level of creditor rights predicts corporate bond market development. However, the results also show that shareholder rights positively affect equity market development.

Moreover, the results show that financial reforms may predict corporate bond market development in countries with stronger creditor protection. Additionally, we find that the corporate bond market develops in response to systemic banking crises, although this is not determined by the level of pre-crisis creditor rights. The growth is, however, short-term in character, which may explain the missing legal framework. In our opinion, these results indicate how investor protection affects capital market development and explains why some countries have a more developed corporate bond market than equity market.

Our study fills the gap in the current literature by presenting the relationship between law and corporate bond market development. However, this study is not without limitations, which provide opportunities for future research. We do not discuss the tradeoff between the improvement of creditor rights and shareholder rights. It would be interesting to investigate the optimal structure of a country's capital markets in relation to long-term economic growth.

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Appendix

Table A1 Definitions of the main variables

Variable	Definition	Source
Financial Structure		
Corporate bond to stock	The ratio of private bond market capitalization to stock market capitalization	Beck et al. (2000, 2009); Čihák et al. (2012); World Bank
Public bond to stock	The ratio of public bond market capitalization to stock market capitalization	
Bond to stock	The ratio of bond market capitalization to stock market capitalization	
Non-financial corporate bond to stock	The ratio of the market capitalization of non-financial corporate bonds to stocks	
No. of listed bonds to stocks	The ratio of the number of listed bonds to the number of listed stocks	
Law		
Creditor rights	An index aggregating creditor rights. The index ranges from 0 (weakest creditor rights) to 4 (strongest creditor rights)	Djankov et al. (2007)
Revised ADRI	A revised index of the original anti-director rights index, which aggregates shareholder protection in over 100 articles, including shareholder voting and minority protection	La Porta et al. (1998) Djankov et al. (2008b)
Corrected ADRI	A corrected index of the original anti-director rights index, with improved data collection, coding and documentation	Spamann (2010)
Anti-self-dealing	An index summarizing the strength of minority shareholders in limiting expropriation by corporate insiders	Djankov et al. (2008a)
Anti-takeover provisions	An index measuring the extent of anti-takeover regulations across countries	Nenova (2006)

Bond covenant	An index aggregating heterogeneous rights attached to bonds	Miller and Reisel (2012)
Information disclosure	An index created by examining and rating companies' annual reports on their inclusion or omission on 90 items, with a higher number indicating more disclosure	International Accounting and Auditing Trends, Center for Financial Analysis and Research
Debt enforcement	Equals the logarithm of the number of days to resolve a payment dispute through courts	Djankov et al. (2008a)
Rule of Law	An index for rule of law, which captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence, ranging from 0 to 100	World Bank
Governance		
Corruption	An index for corruption, which captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests, ranging from 0 to 100.	World Bank
Regulatory quality	An index for regulatory quality, which captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development, ranging from 0 to 100.	World Bank
Voice and accountability	An index for voice and accountability, which captures perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as	World Bank

	freedom of expression, freedom of association, and a free media, ranging from 0 to 100.	
Financial Reforms		
Financial reforms	An index of financial reforms, normalized to be between 0 and 1	
Reform	Dummy=1 if the 1st difference term of financial reform index is higher than 0	Abiad et al. (2008)
Crises		
Banking crises	A dummy variable that equals 1 during a severe systematic banking crisis and zero otherwise.	Laeven and Valencia (2012)
Macroeconomic control variables		
GDP	Logarithm of gross national product (current US dollars)	
GDP per capita	Logarithm of gross national product per capita	
Inflation	Annual growth rate of consumer price index	World Development Indicators
GFCF	The ratio of gross fixed capital formation to GDP	

Table 1 Descriptive statistics and correlations

	Corporate bond to stock	Public bond to stock	Bond to stock	Non-financial corporate bond to stock	No. of listed bonds to stocks	Creditor rights	Revised ADRI	Corrected ADRI	Anti-self-dealing	Anti-takeover
Panel A: Descriptive Statistics										
Mean	0.58	1.16	1.44	0.05	1.05	1.8	3.37	3.74	0.44	0.46
Min.	0	0	0.01	0	0	0	1	2	0.08	0.04
Max.	5.68	176	9.52	0.72	2.21	4	5	6	1	0.97
Std. Dev.	0.75	5.76	1.45	0.09	0.37	1.18	1.13	0.95	0.23	0.24
Obs.	856	987	856	273	701	4,080	3,692	2,340	3,692	2,496
Panel B: Correlations										
Corporate bond to stock	1									
Public bond to stock	0.41* (0.00)	1								
Bond to stock	0.79* (0.00)	0.88* (0.00)	1							
Non-financial corporate bond to stock	0.46* (0.00)	0.10 (0.11)	0.36* (0.00)	1						
No. of listed bonds to stocks	0.54* (0.00)	0.08* (0.04)	0.35* (0.00)	0.21* (0.01)	1					
Creditor rights	0.15* (0.00)	-0.05 (0.10)	0.01 (0.77)	0.32* (0.00)	0.04 (0.30)	1				
Revised ADRI	-0.08* (0.03)	-0.11* (0.00)	-0.29* (0.00)	0.28* (0.00)	-0.13* (0.00)	0.20* (0.00)	1			
Corrected ADRI	-0.08* (0.03)	-0.19* (0.00)	-0.22* (0.00)	0.15* (0.02)	0.01 (0.82)	0.17* (0.00)	0.69* (0.00)	1		
Anti-self-dealing	-0.24* (0.00)	-0.09* (0.00)	-0.33* (0.00)	-0.07 (0.27)	-0.22* (0.00)	0.30* (0.00)	0.56* (0.00)	0.35* (0.00)	1	
Anti-takeover	0.06 (0.13)	-0.02 (0.57)	-0.07 (0.07)	0.12 (0.08)	-0.08 (0.07)	0.34* (0.00)	0.49* (0.00)	0.37* (0.00)	0.51* (0.00)	1

Standard errors are reported in parentheses. ***, ** and * imply significance at the 99%, 95% and 90% levels, respectively.

Table 2
Creditor rights, shareholder rights and bond vs stock market development

This table reports results for the random-effects regression for 42 countries over the period 1978–2011. The dependent variables are, in specifications (1)-(4), corporate bond market capitalization, in (5)-(8) the ratios of public bond market and, in (5)-(8), the ratios of total bond market capitalization to stock market capitalization. The independent variables proxy for creditor and shareholder protection, which are defined in Table A1. The macroeconomic control variables are log of GDP, log of GDP per capita, inflation and gross fixed capital formation to GDP. In all regressions, constant and time dummies are included but are not reported for brevity. Standard errors are reported in parentheses. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

	Corporate bond market				**Public bond market**				**Total bond market**			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Creditor rights	0.36***	0.34***	0.37***	0.34***	0.20	0.02	0.13	-0.08	0.42***	0.36***	044***	0.36***
	(0.06)	(0.06)	(0.06)	(0.05)	(0.26)	(0.08)	(0.28)	(0.38)	(0.12)	(0.12)	(0.12)	(0.12)
Revised ADRI	-0.22***				-0.84***				-0.65**			
	(0.08)				(0.26)				(0.17)			
Corrected ADRI		-0.07*				-0.15**				-0.22**		
		(0.04)				(0.07)				(0.10)		
Anti-self-dealing			-1.18***				-2.23*				-2.77***	
			(0.36)				(1.26)				(0.76)	
Anti-takeover				-0.76*				1.77				-0.86
				(0.41)				(2.25)				(0.99)
GDP	-0.05	-0.05	-0.04	-0.09*	-0.20	-0.10	-0.23	-0.27	-0.25**	-0.16	-0.21**	-0.22*
	(0.06)	(0.07)	(0.06)	(0.05)	(0.20)	(0.09)	(0.22)	(0.34)	(0.12)	(0.14)	(0.11)	(0.13)
GDP per capita	0.10*	0.11	0.08	0.09	-0.32	-0.16	-0.33	-0.37	0.05	-0.04	-0.00	0.02
	(0.06)	(0.08)	(0.06)	(0.06)	(0.22)	(0.10)	(0.24)	(0.35)	(0.13)	(0.16)	(0.13)	(0.15)
Inflation	0.00	0.00	-0.00	-0.00	0.00	-0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)

GFGF	-0.02***	-0.02***	-0.02***	-0.01**	-0.13***	-0.04***	-0.11**	-0.14**	-0.06***	-0.06***	-0.06***	-0.05***
	(0.005)	(0.00)	(0.00)	(0.00)	(0.05)	(0.01)	(0.05)	(0.06)	(0.01)	(0.01)	(0.01)	(0.01)
Obs.	772	698	772	631	867	731	867	648	772	698	772	631
R^2	0.15	0.09	0.19	0.08	0.21	0.01	0.10	0.03	0.21	0.07	0.19	0.07

Table 3
Investor protections and alternative measures of corporate bond market development

This table reports the results for the random-effects regression for 42 countries over the period 1978–2011. The dependent variables are in specifications (1)-(4) the ratio of number of listed bonds to stocks, in (5)- (8) the ratio of non-financial corporate bond market capitalization to stock market capitalization. The independent variables proxy for creditor and shareholder protection, which are defined in Table A1. All regressions include macroeconomic control variables as specified in Table 2. Year dummies and constants are also not shown for brevity. Standard errors are reported in parentheses. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

	No. of listed bonds				Non-financial corporate bond market			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Creditor rights	0.04*	0.05**	0.04*	0.04*	0.02*	0.04***	0.03*	0.03**
	(0.02)	(0.03)	(0.02)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)
Revised ADRI	-0.08*				0.02			
	(0.05)				(0.02)			
Corrected ADRI		-0.10***				-0.09***		
		(0.02)				(0.01)		
Anti-self-dealing			-0.32*				-0.03	
			(0.19)				(0.10)	
Anti-takeover				-0.09				-0.11
				(0.20)				(0.10)
Obs.	633	583	633	509	255	237	255	223
R^2	0.124	0.154	0.124	0.112	0.197	0.502	0.203	0.213

Table 4
Fixed effects estimation of investor protection and corporate bond market development

This table reports the results for the fixed-effects regression for 42 countries over the period 1978–2011. The dependent variables are in specifications (1) Total bond market capitalization to stock market capitalization, (2) Private bond market capitalization to stock market capitalization, (3) Non-financial corporate bond market capitalization to stock market capitalization, (4) Number of listed corporate bonds to number of listed stock, (5) Private bond market capitalization to GDP, (6) Non-financial corporate bond market capitalization to GDP. The independent variables proxy for creditor and shareholder protection, which are defined in Table A1. The macroeconomic control variables are log of GDP, log of GDP per capita, inflation, gross fixed capital formation to GDP and in specification (5) and (6) stock market capitalization to GDP. In all regressions, constant and time dummies are included but are not reported for brevity. Standard errors are reported in parentheses. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

	Total bond market.	Private bond market	Non-financial corp. bond market	No. of listed bonds	Private bond market	Non-financial corp. bond market
	(1)	(2)	(3)	(4)	(5)	(6)
Creditor rights	0.002***	0.56***	0.05***	0.09***	6.28***	0.05***
	(0.52)	(0.08)	(0.02)	(0.03)	(2.32)	(0.01)
Corrected ADRI	-0.07	-0.03	-0.10***	-0.10***	1.45	-0.10***
	(0.12)	(0.06)	(0.01)	(0.02)	(1.61)	(0.01)
Stock market					-0.03**	-0.00***
					(0.01)	(0.00)
GDP	1.59**	0.84**	0.36***	0.62***	29.46***	0.42***
	(0.80)	(0.40)	(0.07)	(0.17)	(11.20)	(0.07)
GDP per capita	-0.22**	-0.94**	-0.41***	-0.56***	-15.71	-0.47***
	(0.93)	(0.47)	(0.08)	(0.19)	(13.03)	(0.08)
Inflation	-0.00	0.00	0.00	0.00	0.00	0.00*
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
GFCF	-0.05***	-0.02***	0.00	0.00	-0.26	0.00
	(0.01)	(0.00)	(0.00)	(0.00)	(0.16)	(0.00)
Obs.	698	698	237	548	698	237
R^2	0.08	0.07	0.49	0.11	0.23	0.55

Table 5

Legal origins, bond covenants and information disclosure, and corporate bond market development

This table reports the results for the random-effects and fixed-effects regressions for 42 countries over the period 1978–2011. The dependent variable is the ratio of corporate bond market capitalization to stock market capitalization. The independent variables proxy for creditor and shareholder protection, and we additionally control for countries' legal origin, bond covenant, information disclosure and days of debt contract enforcement. All variables are defined in Table A1. All regressions include macroeconomic control variables as specified in Table 2. Year dummies and constants are also not shown for brevity. Standard errors are reported in parentheses. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Creditor rights	0.32***	0.32***	0.33***	0.34***	0.34***	0.35***	0.36***	0.34***	0.49***	0.51***
	(0.06)	(0.06)	(0.06)	(0.05)	(0.07)	(0.07)	(0.07)	(0.06)	(0.08)	(0.09)
Revised ADRI	-0.13*				-0.08					
	(0.06)				(0.17)					
Corrected ADRI		-0.08*				-0.07			-0.02	-0.04
		(0.04)				(0.06)			(0.06)	(0.07)
Anti-self-dealing			-1.08**				-0.81			
			(0.05)				(0.82)			
Anti-takeover				0.31				1.10		
				(0.56)				(0.71)		
English origin	-0.86***	-1.05***	-0.59	-1.00***	-0.2**	-0.89**	-0.53	-1.17***	-	-
	(0.33)	(0.35)	(0.38)	(0.37)	(0.38)	(0.37)	(0.52)	(0.37)	-	-
French origin	-0.54*	-0.53	-0.54*	-0.21	-0.46	-0.44	-0.38	-0.16	-	-
	(0.31)	(0.34)	(0.31)	(0.35)	(0.40)	(0.39)	(0.38)	(0.36)	-	-
German origin	-0.59*	-0.33	-0.59*	-0.23	-0.47	-0.48	-0.47	-0.13	-	-

	(0.33)	(0.38)	(0.32)	(0.35)	(0.43)	(0.43)	(0.43)	(0.44)	-	-
Restrictive bond covenant					-0.08	-0.08	-0.08	-0.05		-
					(0.06)	(0.06)	(0.06)	(0.06)		-
Information disclosure					-0.02	-0.02	-0.-2	-0.02		-
					(0.02)	(0.02)	(0.02)	(0.02)		-
Enforcement					0.09	0.10	0.10	0.18		-
					(0.16)	(0.16)	(0.16)	(0.13)		-
Country FE	N	N	N	N	N	N	N	N	Y	Y
Obs.	772	698	772	631	576	576	576	494	698	576
R^2	0.23	0.28	0.25	0.24	0.44	0.44	0.46	0.52	0.09	0.10

Table 6 Other governance factors and corporate bond market development

This table reports the results for the fixed-effects regression for 42 countries over the period 1978–2011. The dependent variable is the ratio of corporate bond market capitalization to stock market capitalization. The independent variables proxy for creditor and shareholder protection, and we additionally control for countries' governance factors in terms of corruption, rule of law, regulatory quality and voice and accountability. All variables are defined in Table A1. All regressions include macroeconomic control variables as specified in Table 2. Year dummies and constants are also not shown for brevity. Standard errors are reported in parentheses. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

	Corporate bond market					Non-financial corporate bond market				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Creditor rights	0.16***	0.17***	0.11***	0.18***	0.12**	0.10***	0.10***	0.07***	0.10***	0.08***
	(0.04)	(0.05)	(0.04)	(0.05)	(0.06)	(0.00)	(0.00)	(0.01)	(0.00)	90.01）
Corrected ADRI	-0.08	-0.08	-0.07	-0.07	-0.07	-0.12***	-0.11**	-0.11**	-0.11**	-0.12***
	(0.12)	(0.13)	(0.12)	(0.13)	(0.13)	(0.04)	(0.04)	(0.04)	(0.44)	(0.04)
Corruption	-0.29				-0.15	-0.10**				-0.11**
	(0.27)				(0.32)	(0.04)				(0.04)
Rule of law		-0.19			0.11		-0.03			0.00
		(0.17)			(0.22)		(0.03)			(0.05)
Regulatory quality			-0.39		-0.39			-0.17***		-0.11**
			(0.28)		(0.29)			(0.04)		(0.05)
Voice and accountability				-0.15	-0.11				-0.00	0.06
				(0.19)	(0.22)				(0.06)	(0.04)
Country FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Obs.	436	436	436	436	436	182	182	182	182	182

R^2	0.04	0.03	0.04	0.03	0.04	0.54	0.49	0.53	0.49	0.56

Table 7 Effects of financial reform on corporate bond market development

This table reports the results for the random-effects regression for 42 countries over the period 19782011. The dependent variable is the ratio pf corporate bond market capitalization to stock market capitalization. The independent variables proxy for creditor and shareholder protection and information disclosure. All variables are defined in Table A1. The dummy variable Treated equals 1 if the unit is in the treated group and 0 otherwise. The dummy variable Post_reform equals 1 if year t is the next year after financial reform and 0 otherwise. All regressions include macroeconomic control variables as specified in Table 2. Constant and year dummies are also not shown. Standard errors are reported in parentheses. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Creditor rights	0.21***	0.21***	0.21***	0.20***	0.23***	0.22***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.05)	(0.06)
Revised ADR	-0.13	-0.16				
	(0.09)	(0.11)				
Corrected ADR			-0.10	-0.12*		
			(0.07)	(0.07)		
Anti-self-dealing					-1.01**	-1.00**
					(0.39)	(0.45)
Treated	0.25***	0.47***	0.35***	0.48***	0.25***	0.47***
*Post-reform	(0.09)	(0.11)	(0.10)	(0.11)	(0.08)	(0.12)
Information disclosure		0.01**		0.01**		0.01**
* Post-reform		(0.00)		(0.00)		(0.00)
Post-reform	0.08**	-0.68*	0.08*	-0.67*	0.07*	-0.70*
	(0.03)	(0.36)	(0.04)	(0.36)	(0.04)	(0.37)
Obs.	581	487	534	487	581	487
R^2	0.27	0.30	0.27	0.30	0.27	0.30

Table 8 Financial reform, creditor rights, and corporate bond market development

This table reports the results of the random-effects regression for 42 countries over the period 1978–2011. The dependent variable is the ratio of corporate bond market capitalization to stock market capitalization. The independent variables proxy for creditor and shareholder protection and information disclosure. The dummy variable Treated equals 1 if the unit is in the treated group and 0 otherwise. The dummy Post_reform equals 1 if year t is the next year after financial reform and 0 otherwise. All variables are defined in Table A1. All regressions include macroeconomic control variables as specified in Table 2. Year dummies and constants are also not shown for brevity. Standard errors are reported in parentheses. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Creditor rights	0.33***	0.33***	0.33***	0.36***	0.36***	0.35***
	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)	(0.06)
Revised ADR	-0.20**			-0.30**		
	(0.09)			(0.12)		
Corrected ADR		-0.15**			-0.18**	
		(0.07)			(0.08)	
Anti-self-dealing			-1.12***			-1.45***
			(0.37)			(0.46)
Post-reform	0.13	0.08	0.26***	0.25*	0.03	0.22**
	(0.13)	(0.19)	(0.10)	(0.15)	(0.18)	(0.11)
Information disclosure				0.01	0.00	0.02
				(0.01)	(0.01)	(0.01)
Creditor rights *Post-reform	0.07*	0.06*	0.12***			
	(0.04)	(0.03)	(0.04)			
Revised ADRI *Post-reform	-0.03					
	(0.04)					
Corrected ADRI *Post-reform		-0.01				
		(0.05)				
Anti-self-dealing *Post-reform			-0.69***			
			(0.18)			
Creditor rights *Post-reform *Information disclosure				0.00**	0.00*	0.00***
				(0.00)	(0.00)	(0.00)
Revised ADRI * Post-reform *Information disclosure				-0.00*		
				(0.00)		
Corrected ADR *Post-reform *Information disclosure					0.000	
					(0.00)	
Anti-self-dealing *Post-reform *Information disclosure						-0.01***
						(0.00)
Obs.	564	517	564	470	470	470
R^2	0.07	0.07	0.15	0.19	0.09	0.25

Table 9 Systematic banking crises and corporate bond market development

This table reports the results of the random-effects regression for 42 countries over the period 1978–2011. The dependent variable is the ratio of corporate bond market capitalization to stock market capitalization. The independent variables proxy for creditor and shareholder protection. The dummy variable Banking crisis equals 1 in the year of a systematic banking crisis and 0 otherwise. All variables are defined in Table A1. All regressions include macroeconomic control variables as specified in Table 2. Year dummies and constants are also not shown for brevity. Standard errors are reported in parentheses. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Creditor rights	0.34***	0.34***	0.37***	0.37***	0.37**	0.36***
	(0.06)	(0.06)	(0.06)	(0.05)	(0.00)	(0.06)
Revised ADRI	-0.13*	-0.13*				
	(0.06)	(0.06)				
Corrected ADRI			-0.07	-0.08		
			(0.06)	(0.06)		
Anti-self-dealing					-0.86*	-0.85**
					(0.49)	(0.43)
Banking crisis	0.36***	0.34*	0.41***	0.40*	0.36***	0.22*
	(0.05)	(0.19)	(0.06)	(0.21)	(0.05)	(0.12)
Creditor rights * Banking crisis		0.00		0.05		0.02
		(0.05)		(0.12)		(0.05)
Revised ADRI * Banking crisis		0.00				
		(0.05)				
Corrected ADRI * Banking crisis				0.03		
				(0.06)		
Anti-self-dealing * Banking crisis						-0.39*
						(0.23)
Obs.	663	663	589	589	663	663
R^2	0.16	0.16	0.12	0.12	0.12	0.12

Table 10 Banking crises and corporate bond market development

This table reports the results of the random-effects regression for 42 countries over the period 1978–2011. The dependent variable is the ratio of corporate bond market capitalization to stock market capitalization. The independent variables proxy for creditor and shareholder protection. The dummy variable Banking crisis equals 1 in the year of a systematic banking crisis and 0 otherwise. The dummy variable Region equals 1 if the country is an advanced economy in specifications (1)-(2), for the Asian crisis of 1997 in (3)-(4) and for the Latin American crisis in (5)-(6) and 0 otherwise. All variables are defined in Table A1. All regressions include macroeconomic control variables as specified in Table 2. Year dummies and constants are also not shown for brevity. Standard errors are reported in parentheses. *, **, and *** represent 10%, 5%, and 1% significance levels, respectively.

	Advanced		East Asian		Latin American	
	(1)	(2)	(3)	(4)	(5)	(6)
Creditor rights	0.37***	0.42***	0.41***	0.42***	0.42***	0.42***
	(0.07)	(0.07)	(0.06)	(0.06)	(0.06)	(0.06)
Revised ADRI	-0.10*		-0.11		-0.11*	
	(0.05)		(0.09)		(0.06)	
Anti-self-dealing		-0.80*		-0.82*		-0.80*
		(0.39)		(0.49)		(0.43)
Region *Banking crisis	2.22**	-0.01	0.12	0.07	-0.33	-0.31
	(0.93)	(0.71)	(0.35)	(0.25)	(0.34)	(0.36)
Region*Creditor rights *Banking crisis	0.21	0.01	0.42	0.05	0.14	0.18
	(0.16)	(0.15)	(0.14)	(0.19)	(0.23)	(0.23)
Region*Revised ADRI *Banking crisis	-0.55**		-0.02		0.06	
	(0.28)		(0.11)		(0.10)	
Region*Anti-self-dealing *Banking crisis		1.22		-0.05		0.48
		(1.72)		(0.56)		(0.86)
Obs.	663	663	663	663	663	663
R^2	0.21	0.22	0.18	0.21	0.20	0.22

Figure 1 Relative capitalization of the corporate market to stock market during systemic banking crises

The Y-axis represents the average ratio of private bond market capitalization to stock market capitalization; the X-axis represents the years before, during and after banking crises. We assume that banking crises occur at year 0; thus, year = -2 represents two years before banking crises, and so forth. The crisis period is covered by the shadow boxes. Advanced economies are economies with a GDP per capita over 10,000 USD; East Asian economies include seven economies that experienced severe crises from 1997–98. Latin American economies include Argentina, Brazil, Colombia, Mexico and Peru.