

How Well Do Institutional Theories Explain Firms' Perceptions of Property Rights?

Meghana Ayyagari

George Washington University

Asli Demirgüç-Kunt

World Bank

Vojislav Maksimovic

University of Maryland, Robert H. Smith School of Business, University of Maryland

We examine how well several institutional- and firm-level factors explain firms' perceptions of property rights protection. The institutional theories we investigate account for approximately 50% of the country-level variation, indicating that current research addresses first-order factors. Firm-level characteristics, such as legal organization and ownership structure, are comparable with institutional factors in explaining variations in property rights protection. A country's legal origin predicts property rights variation better than its religion, ethnic fractionalization, or natural endowments. However, these results are driven by the inclusion of former Socialist economies in the sample. When we exclude the former Socialist economies, legal origin explains considerably less than ethnic fractionalization does. (*JEL* D23, K4, C5)

In modern corporate finance, it is axiomatic that the firm is a “nexus of contracts” [Jensen and Meckling (1976)]. Many of the predictions of corporate theory depend at some level on how well protected property rights assigned by these contracts really are. People may be less willing to invest and more willing to engage in opportunistic behavior if property rights are insecure. Several theories have recently been advanced to explain the underlying determinants of property rights across countries. The law and finance theory [La Porta et al. (1998)] stresses the importance of legal traditions. Other influential work has taken a broader view, stressing culture [Stulz and Williamson (2003)], ethnic fractionalization [Easterly and Levine (1997), Alesina et al. (2003)], and endowments [Acemoglu, Johnson, and Robinson (2001)].

This research was supported by NSF Grant SES-0550573 (454). We thank Thorsten Beck, Murray Frank, Phillip Keefer, Leora Klapper, Gordon Phillips, Colm Kearney, Randall Morck, and seminar participants at Rutgers, George Washington University, University of Maryland, and NBER for their suggestions and comments. This article's findings, interpretations, and conclusions are entirely those of the authors and do not necessarily represent the views of the World Bank, its Executive Directors, or the countries they represent. Address correspondence to Vojislav Maksimovic, Robert H. Smith School of Business, 4417 Van Munching Hall, University of Maryland, College Park, MD 20742-1815. or e-mail: vmaksimovic@rhsmith.umd.edu.

In this article, we study how business people in different countries perceive how well protected their property rights are in practice. By matching these perceptions with country- and firm-level factors, we are able to assess the relative importance of the theories that explain the underlying determinants of property rights in various countries. Using a variance decomposition approach, we examine differences between countries as well as differences between different types of firms.

La Porta et al. (1998) classified countries on the basis of legal origin into Common law, French civil law, Scandinavian civil law, German civil law, and Socialist law countries. For our full sample, we find that differences in legal origin appear to do well in explaining firms' perceptions of property rights. However, this result depends critically on how we treat the former Socialist countries. If we pool them with the rest, then legal origin alone explains about 22% of the variation in firms' perceptions of property rights protection that is attributable to country-level effects.

The theories based on a country's endowments [Acemoglu, Johnson, and Robinson (2001)] and ethnic fractionalization [Easterly and Levine (1997), Alesina et al. (2003)], although not as strong as the law and finance theory, also do well.

If we argue that the former Socialist countries need to be handled separately, then the explanatory power of legal origin decreases dramatically. Legal origin explains only 13% of the variation in property rights protection at the country level. Instead, when entered individually, a country's ethnic fractionalization explains 28% of the variation in the reduced sample, which indicates support for the ethnic fractionalization view. Thus, we find that the strong performance of the law and finance view is not due to differences in the way common law and civil law treat investor rights but instead depends on the inclusion of countries with Socialist legal tradition in the sample.

However, the institutions in these countries have much more in common than legal tradition. Thus, including these countries in a sample testing the law and finance view gives too much weight to shared legal origin. We also note that the initial papers that put forward legal origin as a major determinant of financial development, La Porta et al. (1998, 1999b) do not include any countries with Socialist legal tradition.

As robustness checks, we also include theories that emphasize the role of how open a country is to trade and the quality of a country's political system. We consider that the explanatory variables suggested by these theories may be partially endogenous, because the variables themselves may be influenced by legal origin or endowments at the country level but may be exogenous at the firm level. Legal origin dominates in terms of explanatory power over most of these variables in the full sample. However, once we remove transition economies, all the partially endogenous

variables explain more of the variation in property rights protection than does legal origin.

The total overall variation in property rights that can be explained at the country level (by country dummies) is only 17.82%. However, we account for nearly 50% of this explainable variation at the country level when we enter all the institutional variables together at the same time. This high-explanatory power indicates that the current debate about which institutional factors affects property rights has identified important first-order effects that significantly influence firms' perceptions of property rights. In fact, in two reduced subsamples, one with 52 countries that do not include the former Socialist economies and another with 40 countries for which data on settler mortality is available, the various institutional theories together explain 52 and 62% of the variation at the country level, respectively.

We also find that firm-level characteristics have substantial explanatory power in our sample, in some cases even exceeding that of the individual country-level institutional factors. For the full sample, the ownership structure of the firm has the highest explanatory power, nearly 8.5% of that of the country dummies. Size and organizational form are the second and third highest. However, once we drop the former Socialist countries, organizational form becomes the most important firm-level explanatory variable. These results suggest that the effects of firm-level factors are significant and also depend on the sample of countries under study.

In comparing the different institutional theories, we exploit the World Business Environment Survey (WBES), a major cross-sectional survey conducted in developed and developing countries in 1999 and led by the World Bank. We use survey responses from 7760 firms in 80 countries to questions about property rights and firm characteristics. The survey contains data on both small and large firms and private corporations and partnerships as well as publicly traded firms.¹

To compare the different theories and to examine the relative influence of firm effects compared with country effects, we use variance decomposition analysis. This method is well established in corporate strategy studies in the context of decomposing profitability into corporate and industry effects [Schmalensee (1985), Rumelt (1991), McGahan and Porter (1997, 2002), Khanna and Rivkin (2001)].² By using this method, we can focus directly on the general importance of these effects in

¹ The WBES has been used by Love and Mylenko (2003), Djankov et al. (2003), Beck, Demirgüç-Kunt, and Maksimovic (2005), Beck, Demirgüç-Kunt, and Levine (2005), Beck et al. (2005) among others.

² The original application of this methodology was in quantitative genetics to decompose variation in traits into a genetic component and an environment component [Jinks and Fulker (1970)].

explaining property rights without any assumptions on causality or structural analysis.

This article is closely related to the recent work of Stulz, Karolyi, and Doidge (2004) who investigated variation in the ratings of governance in large firms in a large sample of countries. They found that most of the variation in governance ratings across firms is explained by country characteristics rather than by firm characteristics. They attributed this finding to the increased incentives of firms in better legal environments to adopt better governance structures.

In their paper on the determinants of financial system and stock market development, Beck, Demirgüç-Kunt, and Levine (2003) also discussed property rights protection. Our methodology and findings differ from theirs in several respects. First, while we use firm-level data on property rights protection, they use a country-level index, compiled by the Heritage Foundation from several private and public sources, and cannot address the issue of whether firm characteristics affect property rights protection. Second, while we consider each institutional theory separately and treat all of them equally, Beck, Demirgüç-Kunt, and Levine (2003) focus on legal origin and settler mortality and use the proxies for other theories simply as control variables. Finally, their sample of 70 countries does not include any of the former Socialist countries that are in our sample. These factors are likely to explain why we find a clear difference in the explanatory power of the legal origin and endowment views for property rights protection and for several related variables, and their paper does not.

The article is organized as follows. In Section 1, we discuss the various institutional determinants of property rights. In Section 2, we present our empirical method and data. In Section 3, we present the results of the variance decomposition analysis. In Section 4, we present additional robustness tests. We conclude in Section 5.

1. Institutional Determinants of Property Rights Protection

To better understand the determinants of a firm's perceptions of property rights protection, we present a one-to-one comparison of four different institutional theories that current studies show are important predictors of property rights: Legal Origin, Endowments, Culture, and Ethnic Fractionalization.

La Porta et al. (1998) argued that countries' legal systems differ in how much they protect the rights of private investors vis-à-vis the state and minority shareholders. La Porta et al. (1998) maintained that legal systems that evolve from common law traditions tend to support private property rights. Other countries established civil law systems as acts of policy. Such systems tend to be designed for ease of state administration, are more predictable, and are less likely to favor individuals over the state

or to tailor decisions in ways that safeguard individual claimants in specific instances.

La Porta et al. (1998) focused on the differences between five influential legal traditions: British common law, French civil law, German civil law, Scandinavian civil law, and the Socialist law countries. To identify the legal origin of the country, we use five different dummy variables to capture each type of legal system using data from La Porta et al. (1998, 1999). We refer to the effect of legal origin on property rights as the Law and Finance view.³

Acemoglu, Johnson, and Robinson (2001) argued that many countries, especially former colonies, did not design their legal system to protect property rights. Instead, its purpose was to facilitate the extraction of resources from the indigenous population. Thus, two systems with the same legal origin may in practice offer very different protections. Acemoglu, Johnson, and Robinson (2001, 2002) and Engerman and Sokoloff (1997) contended that European colonization offers a natural experiment to test this hypothesis. Europeans set up extractive systems in colonies that were not attractive for colonial settlement, either because of high settler mortality due to natural causes at the time of colonization or because the indigenous population was relatively large. In colonies where settlement was feasible, countries set up the judicial systems to protect the property rights of the settlers. This theory emphasizes the role of geography (latitude and natural endowments) and disease environment (which affected the settler mortality) in shaping property rights. We refer to this theory as the Endowment view.

To measure geographical endowments, we use Latitude, which is the absolute value of the latitude of the country scaled between zero and one, from La Porta et al. (1999). Countries closer to the equator have a more tropical climate that is inhospitable to European settlers, and therefore these countries fostered “extractive” institutions. We use data on settler mortality from Acemoglu, Johnson, and Robinson (2001). We define Settler Mortality as a measure of the death rates for European settlers in former colonies and calculate it by the logarithm of annualized deaths per thousand Europeans. Because we have data on Settler Mortality for a smaller sample, we use Latitude for our main results and present the results on Settler Mortality as a robustness test.⁴

³ Although beyond the scope of this article, the study of the relation between law and finance is not limited to the considerations of origin. Other studies focus on the relation of firm-level outcomes to the efficiency of the legal system, irrespective of origin. See, for example, Demirgüç-Kunt and Maksimovic (1998, 1999).

⁴ Engerman and Sokoloff (1997) noted that a second channel through which geographical endowments shape initial institutions is through openness and competition. They showed that agriculture in southern North America and much of South America is conducive to large plantations. Thus, colonialists developed long-lasting institutions to protect the few landowners against the many peasants. By contrast, northern North America's agriculture is conducive to small farms, so that more egalitarian institutions emerged. We focus on the Acemoglu et al. (2001) measure of settler mortality and latitude and not on agricultural endowments because the data on settler mortality and latitude are available for a broader cross-section of countries.

Several researchers argue that the effect of the legal system per se on property rights is limited and that differences across countries in their enforcement depend on a broader range of cultural and social considerations. Thus, according to the Culture view, differences in culture, which researchers define as a system of beliefs, can help explain the differences in investor protection. Both Stulz and Williamson (2003) and La Porta et al. (1999) use religion as a proxy for culture.

We use four categories of classification for the religion variable: Catholic, Protestant, Muslim, and Other Religions. We obtain the data on religious composition from La Porta et al. (1999) to create four corresponding dummy variables, each of which takes the value of 1 if the religion it represents is the dominant religious group (highest percentage of practicing population) in the country and 0 otherwise. We note that because we need a categorical variable to do variance decomposition, we use dominant religion dummies. We calculate these dummies from the percentage of the population of each religion within each country rather than using the percentages directly.

Easterly and Levine (1997) showed that Ethnic Fractionalization is also an important determinant of rent-seeking and social polarization that affects property rights and social institutions. We refer to this theory as the Ethnic Fractionalization view. Empirically, to capture these broader Ethnic Fractionalization effects, we use a measure of ethnic fractionalization of the country compiled by Alesina et al. (2003). Unlike measures used in earlier papers, this measure captures important aspects of ethnicity like racial origin and skin color.

The explanatory power of the different variables may be affected by nonlinearities arising from the way we construct these variables. Unlike Legal Origin, the other theories posit determinants of property rights that we cannot directly observe. Thus, as proxies for these determinants, we use variables that have been scaled independently for other purposes. Conventionally, we would then enter these proxies linearly in an equation that predicts a variable of interest. However, there is no reason to believe that the scales are designed to detect the material effects of the determinant on the variable of interest, or that, if material, the effect is likely to be linear over the range of the scale.⁵ We discuss these scaling issues in Section 4.2.

To level the playing field, we first construct a five-point scale for both Latitude and Ethnic Fractionalization based on their quintiles. By doing so, we insure the same number of categories as Legal Origin. We then

⁵ There is a direct parallel with issues that arise in the testing of asset pricing models such as the Capital Asset Pricing Model (CAPM). In those tests, theoretically derived constructs such as beta are usually entered directly. However, when considering variables such as firm price/earnings ratios, for which there is no direct theoretical justification and no presumption of linearity, it is customary to form portfolios of firms with similar values of price/earnings ratios (often deciles) and use dummies or to analyze the deciles separately.

perform variance component analysis using this five-point scale. In the regression, we enter dummies for each unique value of the rescaled variables.

Implicit in several of these theories is the prediction that certain classes of firms will have their property rights protected better than will other types of firms in certain countries. Thus, for example, we would expect that in oligarchic societies, large incumbent firms would have a greater degree of property rights protection than would smaller firms. By contrast, the Legal Origin view and the Culture and Ethnic Fractionalization views do not imply that the amount of property rights protection should depend more on firm size differences in certain countries than in other countries. By considering property rights protection at the firm level, we can provide evidence on the likely size of these interactive effects.

In considering the interactions between country effects and firm effects, we examine several firm-level characteristics that are associated with different perceptions of property rights. Recent studies show that the effect on firms of different financial and legal systems varies according to the distribution of Firm Size. Some studies also find differences in the effect of institutions across different types of firms. Beck, Demirgüç-Kunt, and Maksimovic (2005, 2006) found that small firms grow more slowly in countries with weak financial institutions and that firms are larger in countries with well-developed institutions. Kumar, Rajan, and Zingales (2002) found that more efficient legal systems are associated with larger firm sizes across countries in western Europe, an effect especially pronounced in industries that are characterized by low levels of capital intensity. In a study focused on Mexico, Laeven and Woodruff (2004) found that states with more effective legal institutions have larger firms.

Demirgüç-Kunt, Love, and Maksimovic (2006) show that incorporated firms grow comparatively faster in countries with strong financial and legal institutions than in countries with weak institutions. Beck, Demirgüç-Kunt, and Levine (2005), using the same WBES database, found that incorporated and family-owned firms face the highest financing obstacles. Hence, we also examine whether firms' perceptions of property rights are affected by their Organizational Form and whether there are interactions between organizational forms and the institutional variables.

Many studies find a link between ownership structure and the institutional environment. La Porta et al. (1997, 1998, 1999a, 2000, Johnson et al. 2000), and Burkart, Panunzi, and Shleifer (2003) showed that the legal protection of minority shareholders varies across countries and that this variation determines the level of ownership concentration, the existence of family firms worldwide, the patterns of separation between ownership and management, and the degree of expropriation by corporate insiders. The recent spate of privatizations in Latin America and the transition economies has also brought the comparison of the performance

of state-owned enterprises to other companies into focus. Using the case of Mexican privatizations, La Porta and Lopez-de-Silanes (1999) showed that privately owned firms outperform state-owned enterprises. Hence, we also investigate to what extent Ownership Structure influences firms' perceptions of how well property rights are protected.

Beck and Levine (2002) showed that differences in legal and financial systems affect the availability of external finance and the growth of different industries in the manufacturing sector. We expect these differences to matter as much or more when we look across different sectors. Hence, we also examine if belonging to a particular Industrial Sector impacts how firms perceive their property rights to be protected.

2. Empirical Method and Data

In principle, institutional effects can be nonlinear in complex ways, some of which we discuss below. However, comparative finance studies on institutions rely on linear models, and such models are the starting point for our analysis, which relies on the following reduced-form model of property rights protection.

Let y_{ijk} denote the perceived response of a firm k , belonging to a firm category j and located in country i :

$$y_{ijk} = \mu + \alpha_i + \beta_j + \gamma_{ij} + \varepsilon_{ijk}, \quad (1)$$

where μ is the average response across all firms and countries, α_i represents country effects ($i = 1, \dots, I_\alpha$), β_j is firm category effects ($j = 1, \dots, I_\beta$), γ_{ij} is country–firm interaction effects (I_γ distinct ij combinations), and the ε_{ijk} is random disturbances.

We look at four different categories at the firm level: firm size, ownership, legal organization, and industry sector. At the country level, apart from the base regression that uses country dummies, we use four other institutional variables to capture the various theories discussed in Section 1. Therefore, we are actually looking at 16 different models (four times four) that are different combinations of the firm and country factors. Our premise in each estimation is that the model we are estimating is the true one.

The model takes as given the classification of firms into firm categories and countries and is essentially descriptive. In particular, although it posits the existence of differences in responses across firms and countries, it offers no causal or structural explanation for these differences. Thus, for example, if we find that Ethnic Fractionalization explains the variation better than does Legal Origin, then it leaves open the possibility that ethnic fractionalization itself is partially explained by legal origin. [However, we note that the ultimate cause of Ethnic Fractionalization may not be directly relevant to firm-level analysis, because it would be taken as

exogenous in such studies. We address causality issues in Ayyagari, Demirgüç-Kunt, and Maksimovic (2005).]

2.1 Simultaneous analysis of variance

We analyze this model using a regression-based, simultaneous analysis of variance (ANOVA) approach that uses the standard assumptions of OLS. Equation (1) is a linear additive model in which the various sets of effects may be highly correlated. To deal with this collinearity, our estimation approach reports the incremental explanatory power of each set of effects.

We begin by estimating a restricted version of Equation (1). In this version, we exclude all effects other than the constant and the institutional variable. The *R*-square of this regression provides an estimate of the proportion of the variation in firms' perceived property rights protection explained by the institutional variable alone. That is, it provides an upper bound for the amount that can be explained by that variable directly and by other variables that the institutional variable predicts.

For example, if we assume that large firms report that their property rights are better protected than small firms and that the institutional variable under investigation is Legal Origin, then a regression of property rights protection on Legal Origin will pick up the direct effects of Legal Origin on firms' property rights. However, if firms in countries that have, say, a French legal origin are disproportionately small, then the regression will also pick up an indirect effect that arises from the association of French legal origin and the size of firms.

In each case, we next add the firm-level characteristic and compute the *R*-square to obtain an estimate of the proportion of the variation in property rights that is explained by both the institutional variable and the firm characteristic together. We note that the difference in the *R*-square between the new regression and the restricted regression does not provide an estimate of the variation explained by the firm-specific variable by itself. Instead, it estimates the marginal increment of explanatory power that we gain by adding the firm-specific variable. Thus, if Legal Origin predicts firm size well, then the marginal increase in *R*-square will be small, even if firm size and property rights protection are highly correlated.

Finally, we add an interaction term to provide for the possibility that the firm characteristics may affect property rights for some values of the institutional variable but not for other values.

Our measure of property rights protection has six discrete outcomes, so a linear model may not be entirely appropriate. However, as pointed out by Wooldridge (2003), the discreteness of the dependent variable does not in itself mean that linear models are inappropriate. Menard (1995) suggested that a linear regression (OLS) is appropriate with ordinal

dependent variables that have a large number of categories if we treat the variables as though they were measured on an interval scale.⁶ Because the choice of a nonlinear form would be arbitrary, we continue to use OLS for our estimation. However, we do perform robustness tests using a nonlinear model specification and find our results to be unchanged.

2.2 Data

We combine firm-level data from the WBES and country-level variables from many different sources. The WBES surveyed firm owners and managers on their perception of the business environment in the country. The survey used questions on judiciary, corruption, regulation, taxation, competition, and access to financing. The WBES was conducted in 1999–2000 and covered more than 10,000 firms in 80 countries.

The WBES has a broad scope in examining more than 200 questions in total. The survey has a reliable sampling method, administering the survey on a parallel basis in all the countries using a uniform method and parallel parameters for sample composition. To insure uniform representation, WBES stratified the sample of firms surveyed on the basis of several variables such as sector, size, ownership, exporters, and location with the constraint that at least 15% of the firms are in each of the subcategories of these variables.

Although there is a great amount of general information available on the firms, the identity of the firms and the interviewees is confidential information to encourage correct responses from the firms. This confidentiality agreement between the World Bank and the surveyed firms prevents us from validating the financial information provided by the firms from public records. However, the WBES has been widely used and most recently for its firm-level variation by Beck, Demirgüç-Kunt, and Maksimovic (2005). It has also been used by Transparency International in computing its Corruption Perceptions Index for 2002.⁷

The WBES original database consists of 10,032 observations in 81 countries. We lose 2243 observations because of missing data for the dependent variable and the four firm-level variables of size, ownership structure, organizational form, and industry sector. When we remove observations with missing institutional variables, we lose one country (West Bank/Gaza), which has 29 firms. After eliminating observations

⁶ In the sociology and marketing literature, where use of ordinal variables from survey data is ubiquitous, it is common practice to treat ordinal variables as being continuous and to use OLS estimation when the number of outcomes for the categorical dependent variable is greater than four. The assumption behind this is that when the number of cutoff points is greater than four, they may be considered to be approximately the same distance from each other.

⁷ According to Transparency International (TI), “International surveys on perceptions serve as the most credible means of compiling a ranking of nations.” See Batra, Kaufmann, and Stone (2003) for a detailed analysis of the sampling methodology and findings of the survey.

with missing key data, our sample includes 7760 firms in 80 developed and developing countries.

We measure property rights protection by survey responses to the question "I am confident that the judicial system will enforce my contractual and property rights in business disputes." WBES asked firms to respond on a six-point scale, with one denoting the highest level of confidence. This property rights question was not meant to capture disputes between the state and the individual.

We also obtain the four firm-level variables of size, ownership, organization, and sector from the WBES survey. The sample includes firms of all sizes: small firms (between 5 and 50 employees) represent 39% of the sample, medium firms (51–500 employees) represent 40% of the sample, and large firms represent the remaining 20% of the sample (more than 500 employees). Employment is typically the most reliable figure in developing countries. Hence, many full-time workers is used as a measure of firm size by the World Bank Group and other international survey teams including Regional Program on Enterprise Development (RPED) and the Oxford Centre for the Study of African Economies and is the measure of firm size in our article as well.

We classify the firms' ownership structures into nine different categories: individual, family, conglomerate group, bank, board of directors, managers, employees, government, and other. We also obtain information on the organization of the company, whether it is organized as a single proprietorship, partnership, cooperative, privately held corporation, corporation listed on a stock exchange, or other. The firms surveyed belong to five different sectors: agriculture, manufacturing, services, construction, and other.

Figure 1 shows that there are differences in the perceptions of property rights across firms with different characteristics. Overall, small-sized firms perceive their property rights as less secure when compared with large and medium firms, as shown in Figure 1. When we probe deeper, we find that there is significant variation across sizes even within the same country if we hold all legal and political institutions constant. For instance, medium-sized firms in both Namibia and Nigeria respond worst to the property rights question when compared with the small and large firms. This finding is consistent with recent work that shows that middle-sized firms in African countries are more severely affected than are small and large firms [Sleuwaegen and Goedhuys (2002)].

Figure 2 shows the distribution of perceived property rights across firms with different types of owners. Firms owned by workers, followed by sole proprietor firms, have the least confidence that their property rights are going to be protected. Government-owned firms respond most positively.

Figure 3 shows that at the industry level, firms in agriculture and construction sectors have the weakest perception of property rights. In

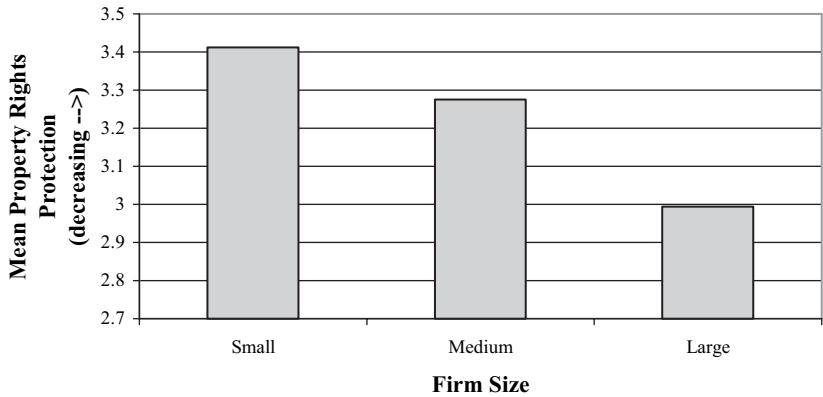


Figure 1
Distribution of property rights across firm sizes

This figure plots the mean value of firms' responses to the property rights question for different firm size categories. The property rights question is "I am confident that the judicial system will enforce my contractual and property rights in business disputes." We score the responses on a scale of one to six (low-high). We categorize firms as small (5-50 employees), medium (51-500 employees), or large firms (>500 employees).

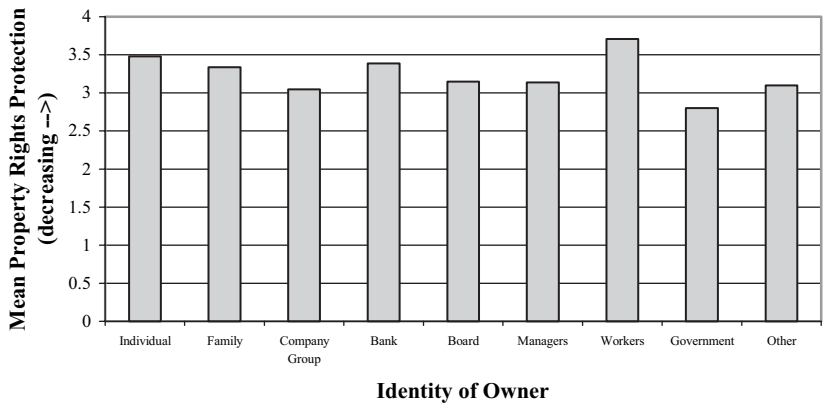


Figure 2
Distribution of property rights across ownership types

This figure plots the mean value of firms' responses to the property rights question for different firm ownership structures. The property rights question is "I am confident that the judicial system will enforce my contractual and property rights in business disputes." We score the responses on a scale of one to six (low-high). We classify the firms' ownership structures into nine different categories: individual, family, conglomerate group, bank, board of directors, managers, employees, government, and other.

Figure 4, when we look at the effect of legal status of the firm on mean property rights perception across the 80 countries, we find that in general, incorporated firms perceive property rights protection to be better than do those firms organized as sole proprietorships and cooperatives, and more so if they are listed on a stock exchange.

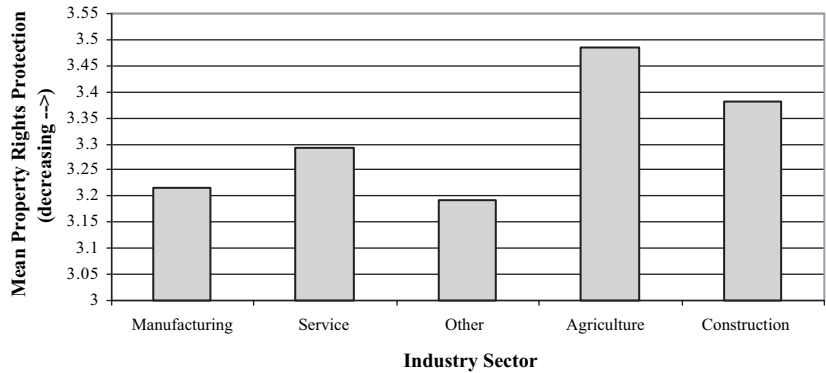


Figure 3
Distribution of property rights across industry sectors
This figure plots the mean value of firms' responses to the property rights question across different industry sectors. The property rights question is "I am confident that the judicial system will enforce my contractual and property rights in business disputes." We score the responses on a scale of one to six (low–high). The firms surveyed belong to five different sectors: agriculture, manufacturing, services, construction, and other.

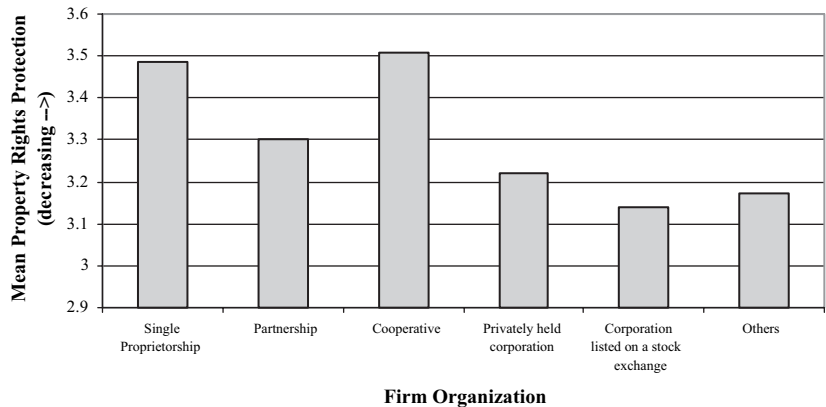


Figure 4
Distribution of property rights across organization structures
This figure plots the mean value of firms' responses to the property rights question across different organization structures. The property rights question is "I am confident that the judicial system will enforce my contractual and property rights in business disputes." We score the responses on a scale of one to six (low–high). We classify organization structures into six kinds: single proprietorship, partnership, cooperative, privately held corporation, corporation listed on a stock exchange, and other.

Table 1 lists the institutional indicators for the 80 countries in our sample. Table 2 provides descriptive statistics, and Tables 3 and 4 examine correlations between the variables. Table 3 presents that the correlations between property rights and Legal Origin, Religion, Ethnic Fractionalization, and Latitude are all significant at the 1% level. The

Table 1
Summary statistics

Nation	Legal Origin	Religion	Ethnic Fractionalization	Latitude
Albania	5	4	0.22	0.46
Argentina	2	1	0.26	0.38
Armenia	5	4	0.13	0.44
Azerbaijan	5	3	0.20	0.45
Bangladesh	1	3	0.05	0.27
Belarus	5	4	0.32	0.59
Belize	1	1	0.70	0.19
Bolivia	2	1	0.74	0.19
Bosnia and Herzegovina	5	4	0.63	0.49
Botswana	1	4	0.41	0.24
Brazil	2	1	0.54	0.11
Bulgaria	5	4	0.40	0.48
Cambodia	5	4	0.21	0.14
Cameroon	2	1	0.86	0.07
Canada	1	1	0.71	0.67
Chile	2	1	0.19	0.33
China	5	4	0.15	0.39
Colombia	2	1	0.60	0.04
Costa Rica	2	1	0.24	0.11
Cote d'Ivoire	2	4	0.82	0.09
Croatia	5	1	0.37	0.50
Czech Republic	5	4	0.32	0.55
Dominican Republic	2	1	0.43	0.21
Ecuador	2	1	0.66	0.02
Egypt	2	3	0.18	0.30
El Salvador	2	1	0.20	0.15
Estonia	5	2	0.51	0.66
Ethiopia	1	4	0.72	0.09
France	2	1	0.10	0.51
Georgia	5	4	0.49	0.47
Germany	3	2	0.17	0.57
Ghana	1	4	0.67	0.09
Guatemala	2	1	0.51	0.17
Haiti	2	1	0.10	0.21
Honduras	2	1	0.19	0.17
Hungary	5	1	0.15	0.52
India	1	4	0.42	0.22
Indonesia	2	4	0.74	0.06
Italy	2	1	0.11	0.47
Kazakhstan	5	4	0.62	0.53
Kenya	1	4	0.86	0.01
Kyrgyzstan	5	3	0.68	0.46
Lithuania	5	1	0.32	0.62
Madagascar	2	4	0.88	0.22
Malawi	1	2	0.67	0.15
Malaysia	1	3	0.59	0.03
Mexico	2	1	0.54	0.26
Moldova	5	4	0.55	0.52
Namibia	1	2	0.63	0.24
Nicaragua	2	1	0.48	0.14
Nigeria	1	4	0.85	0.11
Pakistan	1	3	0.71	0.33
Panama	2	1	0.55	0.10
Peru	2	1	0.66	0.11
Philippines	2	1	0.24	0.14
Poland	5	1	0.12	0.58
Portugal	2	1	0.05	0.44
Romania	5	4	0.31	0.51
Russian Federation	5	4	0.25	0.67
Senegal	2	3	0.69	0.16
Singapore	1	4	0.39	0.01

Slovak Republic	5	1	0.25	0.54
Slovenia	5	1	0.22	0.51
South Africa	1	4	0.75	0.32
Spain	2	1	0.42	0.44
Sweden	4	2	0.06	0.69
Tanzania	1	3	0.74	0.07
Thailand	1	4	0.63	0.17
Trinidad and Tobago	1	4	0.65	0.12
Tunisia	2	3	0.04	0.38
Turkey	2	3	0.32	0.43
Uganda	1	1	0.93	0.01
Ukraine	5	4	0.47	0.54
United Kingdom	1	4	0.12	0.60
United States	1	2	0.49	0.42
Uruguay	2	1	0.25	0.37
Uzbekistan	5	3	0.41	0.46
Venezuela	2	1	0.50	0.09
Zambia	1	4	0.78	0.17
Zimbabwe	1	4	0.39	0.22

The variables are described as follows: Legal Origin takes the value one if Common law, two if French civil law, three if German civil law, four if Scandinavian law, and five if Socialist law countries. Religion takes one of four different values depending on whether the dominant religious group in the country is Catholic, Protestant, Muslim, or Other. Ethnic Fractionalization is the probability that two randomly selected individuals in a country are not from the same ethnic group. Latitude is the absolute value of the latitude of the country scaled between zero and one. The Appendix provides detailed variable definitions and sources.

Table 2
Summary statistics

Variable	<i>N</i>	Mean	Standard deviation	Minimum	Maximum
Dependent variables					
Property Rights	7760	3.28	1.42	1.00	6.00
Firm variables					
Size	7760	1.75	0.74	1.00	3.00
Ownership	7760	3.37	2.18	1.00	9.00
Legal Organization	7760	3.39	1.72	1.00	6.00
Industry	7760	2.11	1.24	1.00	5.00
Institutional variables					
Legal Origin	7760	3.01	1.72	1.00	5.00
Religion	7760	2.68	1.37	1.00	4.00
Ethnic Fractionalization	7760	0.42	0.23	0.04	0.93
Latitude	7760	0.34	0.21	0.01	0.69

We define the variables as follows: Property Rights is the response of firms to the question “I am confident that the judicial system will enforce my contractual and property rights in business disputes,” scored on a scale of one to six (low–high). Firm Size takes a value of one to three for small, medium, and large firms, respectively, Industrial Sector could be agriculture, manufacturing, services, construction, or other, Legal Organization is one of six values that we use to reflect whether the firm is organized as a single proprietorship, partnership, cooperative, privately held corporation, corporation listed on a stock exchange, or another alternative form, and Ownership shows whether the owner of the firm is an individual, a family, conglomerate group, bank, board of directors, managers, employees, government, or other. Legal Origin takes the value one if Common law, two if French civil law, three if German civil law, four if Scandinavian law, and five if Socialist law countries. Religion takes one of four different values depending on whether the dominant religious group in the country is Catholic, Protestant, Muslim, or Other. Ethnic Fractionalization is the probability that two randomly selected individuals in a country are not from the same ethnic group. Latitude is the absolute value of the latitude of the country scaled between zero and one. The Appendix provides detailed variable definitions and sources.

Table 3
Correlations-property rights

	Property Rights	Legal Origin	Religion	Ethnic Fractionalization
Legal Origin	0.18***			
Religion	0.06***	0.18***		
Ethnic Fractionalization	0.05***	-0.44***	0.14***	
Latitude	0.10***	0.66***	0.06***	-0.49***

We define the variables as follows: Property Rights is the response of firms to the question “I am confident that the judicial system will enforce my contractual and property rights in business disputes,” scored on a scale of one to six (low–high). Legal Origin takes the value one if Common law, two if French civil law, three if German civil law, four if Scandinavian law, and five if Socialist law countries. Religion takes one of four different values depending on whether the dominant religious group in the country is Catholic, Protestant, Muslim, or Other. Ethnic Fractionalization is the probability that two randomly selected individuals in a country are not from the same ethnic group. Latitude is the absolute value of the latitude of the country scaled between zero and one. The Appendix provides detailed variable definitions and sources. *, **, and *** represent significance at the 10, 5, and 1% levels, respectively.

Table 4
Correlations-firm level variables

	Property Rights	Firm Size	Industry Sector	Legal Organization
Firm Size	-0.10***			
Industry Sector	0.04***	-0.09***		
Legal Organization	-0.08***	0.38***	-0.04***	
Ownership Structure	-0.09***	0.36***	-0.02**	0.39***

We define the variables as follows: Property Rights is the response of firms to the question “I am confident that the judicial system will enforce my contractual and property rights in business disputes,” scored on a scale of one to six (low–high). Firm Size takes a value of one to three for small, medium, and large firms, respectively. Industrial Sector could be agriculture, manufacturing, services, construction, or other. Legal Organization is one of six values that we use to reflect whether the firm is organized as a single proprietorship, partnership, cooperative, privately held corporation, corporation listed on a stock exchange, or another alternative form, and Ownership shows whether the owner of the firm is an individual, a family, conglomerate group, bank, board of directors, managers, employees, government, or other. The Appendix provides detailed variable definitions and sources. *, **, and *** represent significance at the 10, 5, and 1% levels, respectively.

correlations between all the firm-level variables and property rights in Table 4 are also highly significant at the 1% level, indicating that firms of different sizes, industries, ownership structures, and organizational forms perceive their property rights protection differently. The correlations suggest that larger firms and listed corporations perceive their property rights to be protected, but firms in agriculture and construction industries perceive poor property rights protection.

3. Empirical Results

Tables 5 and 6 presents the results of our ANOVA on Equation (1). We begin with a benchmark specification in which we use country dummies to model institutional variation at the country level. This specification provides us with the upper bound for the variation in firm-level

Table 5**Determinants of firms' perception of property rights protection—contribution to adjusted *R*-square**

	Property Rights
Institutional variables	
Country dummies	17.82
Legal Origin dummies	3.89
Religion dummies	1.15
Ethnic Fractionalization	1.95
Latitude	2.24
All institutional theories together	8.88
Firm variables	
Size dummies	1.07
Industry dummies	0.23
Legal Organization dummies	0.7
Ownership dummies	1.5
All firm variables together	2

The table documents how firm level variables and the rescaled country level variables contribute to the adjusted *R*-square of the regression model when they are entered one at a time. Firm Size takes a value of one to three for small, medium, and large firms, respectively, Industrial Sector could be agriculture, manufacturing, services, construction, or other, Legal Organization is one of six values that we use to reflect whether the firm is organized as a single proprietorship, partnership, cooperative, privately held corporation, corporation listed on a stock exchange, or another alternative form, and Ownership shows whether the owner of the firm is an individual, a family, conglomerate group, bank, board of directors, managers, employees, government, or other. In each regression, we capture the country effect by using one of the following variables at the country level: Country dummies, Legal Origin, Religion, Ethnic Fractionalization, or Latitude. We define the variables as follows: Legal Origin takes the value one if Common law, two if French civil law, three if German civil law, four if Scandinavian law, and five if Socialist law countries. Religion takes one of four different values depending on whether the dominant religious group in the country is Catholic, Protestant, Muslim, or Other. Ethnic Fractionalization is the probability that two randomly selected individuals in a country are not from the same ethnic group. Latitude is the absolute value of the latitude of the country scaled between zero and one. We rescale Ethnic Fractionalization and Latitude on a five-point scale. We use dummy variables for all the country and firm variables. The Appendix provides detailed variable definitions and sources.

responses that can be explained at the country level. In alternate specifications, we replace the country dummy with an institutional variable. In each case, we calculate the increment to adjusted *R*-square with effects introduced in the following order: country, firm, and country–firm interactions.

Table 5 presents the contribution to the adjusted *R*-square when we enter each of the institutional variables one at a time. In our sample of 80 countries, country dummies explain 17.82% of the variation in firms' perceptions of how well property rights are protected. Tables 5 and 6 presents that the Law and Finance view holds the dominant position in terms of explaining the variation in property rights (3.89%).⁸ Latitude explains 2.24%, followed by Ethnic Fractionalization

⁸ Alternative characterizations of legal origin all yield similar results. We experimented with using only four dummies: Common law, French civil law, German and Scandinavian civil law, and Socialist law. We also tried using only three dummies: Common law, Civil law, and Socialist law. In the former case, the Legal Origin dummies explain 3.77%, and in the latter case, they explain 3.7%, thus confirming our result that the Law and Finance view explains the most variation in property rights.

Table 6
Country, firm, and interaction effects

	Benchmark	Law and Finance	Culture	Ethnic Fractionalization	Endowments	
	Country dummy	Legal Origin dummies	Religion	Ethnic Fractionalization	Latitude	All institutional theories together
Firm Size						
Country	17.82	3.89	1.15	1.95	2.24	8.88
Size	0.33	0.45	0.98	1.04	0.72	0.49
Interactions	1.06	0.08	0.52	0.74	0.48	1.06
Total	19.21	4.42	2.65	3.73	3.44	10.43
Industry						
Country	17.82	3.89	1.15	1.95	2.24	8.88
Industrial Sector	0.1	0.19	0.22	0.24	0.13	0.04
Interactions	0.9	-0.04	0.22	0.23	0.08	0.33
Total	18.82	4.04	1.59	2.42	2.45	9.25
Organizational form						
Country	17.82	3.89	1.15	1.95	2.24	8.88
Legal Organization	0.33	0.12	0.75	0.66	0.55	0.1
Interactions	1.33	0.21	0.19	1.19	0.73	1.72
Total	19.48	4.22	2.09	3.8	3.52	10.7
Ownership						
Country	17.82	3.89	1.15	1.95	2.24	8.88
Ownership	0.32	0.45	1.38	1.47	1.1	0.5
Interactions	0.67	0.43	0.93	0.77	0.44	1.33
Total	18.81	4.77	3.46	4.19	3.78	10.71

The table presents the variance component analysis by including country, firm, and interaction effects. The regression model we estimate in this table is $\text{Property Rights}_{ij} = \text{Country Effect}_i + \text{Firm Size}_j$ (or Industry Sector_j) (or $\text{Legal Organization}_j$) (or Ownership_j) + $\text{Country Effect}_i \times \text{Firm Size}_j$ (or Industry Sector_j) (or $\text{Legal Organization}_j$) (or Ownership_j). Firm Size takes a value of one to three for small, medium, and large firms, respectively, Industrial Sector could be agriculture, manufacturing, services, construction, or other, Legal Organization is one of six values that we use to reflect whether the firm is organized as a single proprietorship, partnership, cooperative, privately held corporation, corporation listed on a stock exchange, or another alternative form, and Ownership shows whether the owner of the firm is an individual, a family, conglomerate group, bank, board of directors, managers, employees, government, or other. In each regression, we capture the country effect by using one of the following variables at the country level: Country dummies, Legal Origin, Religion, Ethnic Fractionalization, or Latitude. We define the variables as follows: Legal Origin takes the value one if Common law, two if French civil law, three if German civil law, four if Scandinavian law, and five if Socialist law countries. Religion takes one of four different values depending on whether the dominant religious group in the country is Catholic, Protestant, Muslim, or Other. Ethnic Fractionalization is the probability that two randomly selected individuals in a country are not from the same ethnic group. Latitude is the absolute value of the latitude of the country scaled between zero and one. We rescale Ethnic Fractionalization and Latitude on a five-point scale. We use dummy variables for all the country and firm variables. The Appendix provides detailed variable definitions and sources.

(1.95%) and Religion (1.15%). Legal Origin, Latitude, and Ethnic Fractionalization each explain more than does any other firm-level characteristic. When entered together, the institutional variables explain about 50% of the total explainable variation at the country level (8.88/17.82).

At the firm level, firm size by itself explains 1.07%, ownership structure explains 1.5%, legal organization explains 0.7%, and industry sector explains 0.23%, showing that the ownership structure of the company explains the most variation. These numbers indicate that in many cases, firm-level characteristics are comparable with the country-level factors in their explanatory power and sometimes explain more than the institutional factors themselves. For instance, the ownership structure of the company explains more than does Religion and explains nearly 39% as much as Legal Origin and 77% as much as the Ethnic Fractionalization variable.

Table 6 presents the main results of the variance component analysis of Equation (1) using ANOVA. The four subpanels of Table 6 correspond to the four different firm effects we investigate: firm size, industry sector in which the firm operates, legal organization of the company, and ownership structure of the company. The country effects introduced depend on the model being tested. When we compare the firm-level effects in each column across panels, we find that ownership structure has the highest marginal contribution to adjusted *R*-square, which confirms that ownership structure has the greatest explanatory power compared with other firm-level variables. For instance, when we look at column 4 (Ethnic Fractionalization) Table 6, ownership structure has the highest marginal contribution to explanatory power (1.47%) compared with any of the other firm characteristics.

For a detailed comparison of the country-firm interactions, we focus on the most significant institutional factor, Legal Origin. To begin, Table 5 presents that firm size by itself explains 1.07% of the variation in property rights. But when we include firm size in a model after Legal Origin as in Table 6, the marginal contribution of firm size to adjusted *R*-square is only 0.45%. Hence, we conclude that 58% $[(1.07-0.45)/1.07]$ of firm size effect is subsumed by Legal Origin, because the size distribution of firms differs across countries with different legal origins. Thus, an important indirect channel through which Legal Origin might work is to change the size distribution of firms. Legal Origin also subsumes 17% of the industry effect, 83% of legal organization, and 70% of the effect because of different ownership structures. So Legal Origin not only has a direct impact on firms' perceptions of property rights but also has an indirect impact through its effect on the distribution of different types of firms in different countries.

When we look at the joint effect of country and firm characteristics, we are surprised to find that the country-firm interactions are largely

nonsignificant and that most come in below 1%. Therefore, although Legal Origin subsumes a large part of the size effect, there is little evidence that dissimilar legal systems affect the property rights perceptions of disparate firms differently.

On the contrary, several other institutional factors have a moderating effect on the firms. For instance, Ethnic Fractionalization subsumes only 2% of the ownership effect and 6% of the firm organization effect. However, the interactive effects of Ethnic Fractionalization and ownership (0.77%) and Ethnic Fractionalization and legal organization (1.19%) are not entirely negligible. In fact, the largest interactive effect across all the models is that of 1.19%, implying that a country's extent of Ethnic Fractionalization affects differently the perceptions of firms with dissimilar types of legal organization structures. In fact, further investigation shows that firms that are organized as cooperatives in those countries with high Ethnic Fractionalization scores are the ones that complain most about property rights protection. In contrast, incorporated firms in these countries respond most favorably.

4. Robustness Tests

4.1 Varying the sample size

Here, we investigate how robust the Law and Finance view is when we exclude different samples of countries. We do so because our sample contains a large number of former Socialist economies.⁹ La Porta et al.'s (1999) Legal Origin view classifies these economies as having a Socialist legal tradition. However, these countries differ from the rest of the countries in our sample by the fact that they are still undergoing shocks of transition and the wholesale restructuring of property rights. To the extent that the Socialist legal tradition is also a proxy for common transition shocks, the explanatory power of the Legal Origin view might be overstated in our tests. We also investigate the robustness of our results to the exclusion of several outlier countries, including the African and low-income countries.

4.1.1 Without former socialist economies. To investigate whether the dominance of the Law and Finance view holds when we exclude the former Socialist economies, in Table 7, we repeat the analysis in Tables 5

⁹ The transitional economies in our sample are Albania, Armenia, Azerbaijan, Belarus, Bulgaria, Bosnia and Herzegovina, Croatia, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Lithuania, Moldova, Poland, Romania, Russian Federation, Slovak Republic, Slovenia, Uzbekistan, and Ukraine. China and Cambodia are also classified as socialist legal tradition, and hence we drop them from the smaller sample.

Table 7
Determinants of firms' perception of property rights protection—without former socialist economies

	Benchmark	Law and Finance	Culture	Ethnic Fractionalization	Endowments	
	Country dummy	Legal Origin dummies	Religion	Ethnic Fractionalization	Latitude	All institutional theories together
Firm Size						
Country	16.15	2.16	0.92	4.57	2.16	8.41
Size	0.14	0.41	0.35	0.38	0.21	0.34
Interactions	1.11	0.04	0.18	0.58	0.55	1.4
Total	17.4	2.61	1.45	5.53	2.92	10.15
Industry						
Country	16.15	2.16	0.92	4.57	2.16	8.41
Industrial Sector	0.08	0.1	0.1	0.05	−0.04	−0.01
Interactions	0.45	−0.07	0.13	0.03	0.06	0.2
Total	16.68	2.19	1.15	4.65	2.18	8.6
Organizational Form						
Country	16.15	2.16	0.92	4.57	2.16	8.41
Legal Organization	0.09	0.5	0.71	0.83	0.79	0.25
Interactions	1.32	−0.14	0.5	0.59	0.93	1.27
Total	17.56	2.52	2.13	5.99	3.88	9.93
Ownership						
Country	16.15	2.16	0.92	4.57	2.16	8.41
Ownership	0.2	0.24	0.32	0.63	0.4	0.25
Interactions	0.64	0.27	0.32	0.26	0.45	0.88
Total	16.99	2.67	1.56	5.46	3.01	9.54

This table documents how each effect contributes to the adjusted R -square of the regression model. The regression model we estimate in this table is $\text{Property Rights}_{ij} = \text{Country Effect}_i + \text{Firm Size}_j \text{ (or Industry Sector}_j \text{) (or Legal Organization}_j \text{) (or Ownership}_j \text{) + Country Effect}_i \times \text{Firm Size}_j \text{ (or Industry Sector}_j \text{) (or Legal Organization}_j \text{) (or Ownership}_j \text{)}$. Firm Size takes a value of one to three for small, medium, and large firms, respectively, Industrial Sector could be agriculture, manufacturing, services, construction, or other, Legal Organization is one of six values that we use to reflect whether the firm is organized as a single proprietorship, partnership, cooperative, privately held corporation, corporation listed on a stock exchange, or another alternative form, and Ownership shows whether the owner of the firm is an individual, a family, conglomerate group, bank, board of directors, managers, employees, government, or other. In each regression, we capture the country effect by using one of the following variables at the country level: Country dummies, Legal Origin, Religion, Ethnic Fractionalization, or Latitude. We define the variables as follows: Legal Origin takes the value one if Common law, two if French civil law, three if German civil law, four if Scandinavian law, and five if Socialist law countries. Religion takes one of four different values depending on whether the dominant religious group in the country is Catholic, Protestant, Muslim, or Other. Ethnic Fractionalization is the probability that two randomly selected individuals in a country are not from the same ethnic group. Latitude is the absolute value of the latitude of the country scaled between zero and one. We rescale Ethnic Fractionalization and Latitude on a five-point scale. We use dummy variables for all the country and firm variables. The Appendix provides detailed variable definitions and sources.

and 6 for a smaller sample of 56 non-Socialist economies (and 4588 observations). Country dummies now explain only 16.15% of the variation in property rights compared with 17.82% previously. The institutional factor that shows the most variation is Ethnic Fractionalization (4.57%), which explains about 28% ($4.57/16.15$) of the cross-country variation. Both Legal Origin and Latitude explain 2.16% of the total variation in firms' responses, which amount to about 13% of the cross-country variation. However, Legal Origin has a more significant drop in explanatory power when compared with the full sample of 80 countries (-44%) than does Latitude (-3.6%).

Taken together, the institutional factors explain approximately 52% of the cross-country variation in this reduced subsample, which is similar to the 50% of the cross-country variation that they explain in the full sample that includes the former Socialist countries.

At the firm level (not shown in the table), the legal organization of the firm explains 0.94%, which is more than ownership structure (0.44%). We note that legal organization is still the dominant firm-level variable in smaller subsamples if we collapse the legal organization variable into the four categories of sole proprietorships, partnerships, corporations, and others instead of the usual six categories of sole proprietorships, partnerships, cooperatives, unlisted corporations, listed corporations, and other.

Size explains 0.28%. Furthermore, the industry sector in which the firm operates (-0.03%) explains very little variation.

When we look at the marginal contribution of the firm effects in Table 7 (the second row in each panel), the variable with the maximum explanatory power across models is Legal Organization. The strongest country–firm interactive effect is that of Latitude–Legal Organization (0.93%). The regression coefficients show that firms organized as sole proprietorships in those countries that are close to the Equator are more likely to perceive property rights protection as poor. Incorporated firms in countries in the fourth quantile (when countries are ranked on their distance from the Equator) respond most favorably to the question on the extent of property rights protection.

4.1.2 Using settler mortality. Given the strong performance of the latitude variable, we use another measure of geographical endowments, Settler Mortality, as in Acemoglu, Johnson, and Robinson (2001). Table 8 presents the results for a subset of countries for which data on settler mortality are available. The sample is now restricted to 40 countries with 3222 observations. This sample of countries is similar to the sample of non-Socialist economies in Table 7.

We construct the table by applying the five-point categorization to settler mortality. The results of Table 8 dramatically change the order

Table 8
Determinants of firms' perception of property rights protection—40 countries

	Benchmark case	Law and Finance view	Culture	Ethnic Fractionalization	Endowments		
	Country dummy	Legal Origin dummies	Religion	Ethnic Fractionalization	Settler Mortality	Latitude	All institutional theories together
Firm Size							
Country	18.27	2.18	1.34	3.25	5.78	2.08	11.35
Size	0.09	0.64	0.62	0.46	0.35	0.38	0.36
Interactions	1.15	0.09	0.13	0.64	0.21	1.11	0.95
Total	19.51	2.91	2.09	4.35	6.34	3.57	12.66
Industry							
Country	18.27	2.18	1.34	3.25	5.78	2.08	11.35
Industrial	0.05	0.14	0.22	0.04	0.05	0	0.09
Sector							
Interactions	0.14	0.04	0.09	0.09	0.04	0.32	0.59
Total	18.08	2.36	1.47	3.3	5.69	2.4	11.85
Organizational Form							
Country	18.27	2.18	1.34	3.25	5.78	2.08	11.35
Legal	0.03	0.68	0.93	1.44	0.66	0.74	0.35
Organization							
Interactions	1.2	0.22	1.06	1.59	0.5	2.04	2.76
Total	19.5	3.08	3.33	6.28	6.94	4.86	14.46
Ownership							
Country	18.27	2.18	1.34	3.25	5.78	2.08	11.35
Ownership	0.02	0.23	0.28	0.59	0.82	0.39	0.2
Interactions	0.27	0.72	0.56	0.72	0.3	0.73	0.93
Total	18.52	3.13	2.18	4.56	6.9	3.2	12.48

This table documents how each effect contributes to the adjusted R -square of the regression model in a sample of 40 countries for which data on settler mortality is available. The regression model in this table is $\text{Property Rights}_{ij} = \text{Country Effect}_i + \text{Firm Size}_j \text{ (or Industry Sector}_j \text{) (or Legal Organization}_j \text{) (or Ownership}_j \text{) + Country Effect}_i \text{ Firm Size}_j \text{ (or Industry Sector}_j \text{) (or Legal Organization}_j \text{) (or Ownership}_j \text{)}$. Firm Size takes a value of one to three for small, medium, and large firms, respectively, Industrial Sector could be agriculture, manufacturing, services, construction, or other, Legal Organization is one of six values that we use to reflect whether the firm is organized as a single proprietorship, partnership, cooperative, privately held corporation, corporation listed on a stock exchange, or another alternative form, and Ownership shows whether the owner of the firm is an individual, a family, conglomerate group, bank, board of directors, managers, employees, government, or other. In each regression, we capture the country effect by using one of the following variables at the country level: Country dummies, Legal Origin, Religion, Ethnic Fractionalization, or Latitude. We define the variables as follows: Legal Origin takes the value one if Common law, two if French civil law, three if German civil law, four if Scandinavian law, and five if Socialist law countries. Religion takes one of four different values depending on whether the dominant religious group in the country is Catholic, Protestant, Muslim, or Other. Ethnic Fractionalization is the probability that two randomly selected individuals in a country are not from the same ethnic group. Latitude is the absolute value of the latitude of the country scaled between zero and one. Settler Mortality is the log of the annualized deaths per thousand European soldiers in European colonies in the early 19th century. We rescale Ethnic Fractionalization, Settler Mortality, and Latitude on a five-point scale. We use dummy variables for all the country and firm variables. The Appendix provides detailed variable definitions

of explanatory power of the various theories established in Tables 5 and 6. The first row in each panel shows that the Law and Finance view is replaced by the Endowments and Ethnic Fractionalization views as the theories with the most explanatory power. Settler Mortality now explains the most variation (5.78%), followed by Ethnic Fractionalization (3.25%). Together, the institutional theories cover nearly 62% of all explainable variation at the country level.

At the firm level, firm size explains 0.54%, firm ownership explains 0.46%, legal status of the company explains 1.22%, and industry sector explains 0.02%.¹⁰ So once again, in the smaller subset of countries, the firm's legal status explains more than does ownership structure. The interaction of Latitude and Legal status of the company has the largest explanatory power at 2.04%.

Tables 5–8 summarize that, depending on the sample of countries considered, there is substantial heterogeneity in the explanatory power of different institutional factors. The Law and Finance view figures as the dominant theory when we consider the whole sample of 80 countries, but this effect is driven largely by the inclusion of former Socialist economies. When we exclude these countries, Ethnic Fractionalization does well in explaining the variation in property rights, giving support to the Ethnic Fractionalization view of property rights. The Endowments view also comes out stronger than does the Law and Finance view when we consider a smaller sample of countries for which Settler Mortality is available.

Thus, our results suggest that including the former Socialist economies in the overall sample is what drives the dominance of the Law and Finance view. Although previously the focus was on the role of Common law compared with Civil law traditions, our results show that Legal Origin matters mainly because of the extent to which transition economies are different from other countries. The poor enforcement of property rights in these countries, where institutions in general are in flux, makes them sufficiently different from other countries. This finding contributes to the explanatory power of Legal Origin. Once we remove transition economies, the difference between Common and Civil law countries is not significant enough to influence firms' perceptions of property rights. On the contrary, a country's Ethnic Fractionalization and Natural Endowments are a strong predictor of property rights in all samples.

The implications of our results are less clear-cut for the theories themselves. A researcher with strong prior belief in the importance of legal

¹⁰ These are individual contributions of the firm-level variables not summarized in Table 8. If we were to rescale legal organization into four broad categories—Sole Proprietorships, Partnerships, Corporations, and Other—the rescaled variable explains 0.77% that is still more than size and ownership.

origins would include those countries in the analysis and ascribe their differences from the other countries in the sample to differences in legal origin. Such a researcher might conclude that Tables 5 and 6 support his or her view. A researcher with strong prior beliefs about the importance of ethnic and natural endowments differences between transition economies, former colonies, and Western European countries might focus on the samples in Tables 7 and 8 and reach the opposite conclusion.

Again, at the firm level, different firm characteristics vary significantly in explaining the variation of property rights. Although the ownership structure of firms is the most significant explanatory variable in the full sample, the legal status of the firm explains more variation in property rights than do other firm-level variables in the smaller subsamples. Our finding that a firm's organizational choice affects the perception of property rights protection it receives is consistent with recent evidence in Demirgüç-Kunt, Love, and Maksimovic (2006) that the organizational form of the firm impacts its access to finance and growth.

4.1.3 Random and nonrandom sorts. We further test the robustness of our finding that Ethnic Fractionalization is a consistent predictor of property rights protection and that including transition economies in the sample is the main driver behind the Law and Finance view.

In Table 9, we perform other nonrandom sorts in which we drop African economies in column 1 and all low-income countries in column 2 to see whether the important predictors of property rights differ between developing and developed countries. We are interested to find that Table 9 summarizes that in both cases, Legal Origin has the highest explanatory power, followed by Latitude. We note that the sample without low-income countries contains transition economies. Of the 24 transition economies in our sample, only Azerbaijan, Georgia, the Kyrgyz Republic, Moldova, and Uzbekistan are low-income countries. We classify the others as high-income, upper middle-income, and lower middle-income countries.

In columns 3 and 4 of Table 9, we randomly sample n number of countries, where n could be either 56 or 40. We sample 56 or 40 countries so as to be consistent with the smaller sample sizes when we drop transition economies or countries with missing settler mortality data.

For each n (say $n = 56$), we perform 500 trials so that in each trial, the set of 56 countries sampled is different. We then report the frequency with which we find that each institutional theory is the most dominant predictor of property rights.

Table 9 summarizes that when we randomly sample 56 countries 500 times, Legal Origin explains the most variation in 71.4% of the cases. Ethnic Fractionalization and Latitude explain the variation in only 12.2 and 17.6% of the cases. However, when we randomly sample 40 countries, although Legal Origin is still the dominant theory, it explains the most variation in only 45.6% of the cases.

Table 9
Determinants of firms' perception of property rights protection—random and nonrandom sorts

	Contribution to adjusted <i>R</i> -square		Frequency with which the institutional theory explains the most variation			
	Nonrandom sorts		Random sorting on the full sample		Random sorting on a sample excluding former socialist countries	
	1	2	3	4	5	6
Rescaled institutional variables	No African	No low income	Sample size = 56	Sample size = 40	Sample size = 40	Sample size = 35
Country dummies	17.47	20.05				
Legal Origin dummies	6.07	8.89	71.4	45.6	13.4	16.6
Religion dummies	1.25	2.64	1.4	4.8	1.2	3.2
(Rescaled) Ethnic Fractionalization	1.64	2.77	12.2	22	71.6	64.8
(Rescaled) Latitude	2.47	5.5	17.6	31	17.2	18.8
All institutional theories together	10.38	14.15				
Number of countries	62	55	56	40	40	35
Number of observations	6463	5472	Ranges from 4785 to 5922	Ranges from 03320 to 4525	Ranges from 4174 to 4986	Ranges from 2940 to 3567

The regression model we estimate is $\text{Property Rights}_{ij} = \text{Country Effect}_i + \text{Firm Size}_j \text{ (or Industry Sector}_j \text{) (or Legal Organization}_j \text{) (or Ownership}_j \text{)}$. “Contribution to adjusted *R*-square” documents how the country- and firm-level variables contribute to the adjusted *R*-square of the regression model when entered individually. “Frequency with which the institutional theory explains the most variation” presents the frequency with which a particular institutional theory explains the most variation in property rights. In “Frequency with which the institutional theory explains the most variation”, to determine the frequencies, we perform 500 trials at each of the corresponding sample sizes. Firm Size takes a value of one to three for small, medium, and large firms, respectively, Industrial Sector could be agriculture, manufacturing, services, construction, or other, Legal Organization is one of six values that we use to reflect whether the firm is organized as a single proprietorship, partnership, cooperative, privately held corporation, corporation listed on a stock exchange, or another alternative form, and Ownership shows whether the owner of the firm is an individual, a family, conglomerate group, bank, board of directors, managers, employees, government, or other. In each regression, we capture the country effect by using one of the following variables at the country level: Country dummies, Legal Origin, Religion, Ethnic Fractionalization, or Latitude. We define the variables as follows: Legal Origin takes the value one if Common law, two if French civil law, three if German civil law, four if Scandinavian law, and five if Socialist law countries. Religion takes one of four different values depending on whether the dominant religious group in the country is Catholic, Protestant, Muslim, or Other. Ethnic Fractionalization is the probability that two randomly selected individuals in a country are not from the same ethnic group. Latitude is the absolute value of the latitude of the country scaled between zero and one. We rescale Ethnic Fractionalization and Latitude on a five-point scale. We use dummy variables for all the country and firm variables. The Appendix provides detailed variable definitions and sources.

Although these results suggest that compared with Religion, Law and Finance and Ethnic Fractionalization or Endowment have the greatest explanatory power, it is hard to compare them and to isolate the former Socialist economy effect, because the sample of countries chosen in each trial is random. Hence, in columns 5 and 6, we perform random sampling on the sample of nontransition economies. Of the 56 nontransition countries, we randomly sample 40 or 35 countries 500 times each and calculate the frequency with which an institutional theory has the highest explanatory power. Ethnic Fractionalization has the highest explanatory power in 72% of the cases when we randomly sample 40 countries and in 65% of the cases when we randomly sample 35 countries. The results suggest that Ethnic Fractionalization has the greatest predictive power when it comes to explaining the variation in firms' perceptions of property rights in samples of nontransition economies.

4.2 Testing for linearity

Previously, we argued that there were significant nonlinearities in the construction of the Latitude and Ethnic Fractionalization variables used to represent the Endowment and Ethnic Fractionalization theories, which raise questions about their use in linear models. To level the playing field and insure that these variables are not at a statistical disadvantage in a linear model when compared with legal origin and religion, we construct a five-point scale for the variables, based on their quantiles, to insure the same number of categories as Legal Origin. Here, we provide further evidence of the nonlinearities by adding the square and cube of each of the institutional variables to see whether it makes a difference to the adjusted *R*-square of the model.

In Table 10, we present results using both the raw data and the higher-order terms and compare the results with the contributions from the rescaled variables. We show the results for the full sample of 80 countries as well as smaller subsamples of nontransition economies and former colonies.

Column 1 of Table 10 presents our results from using raw data (when we do not rescale Ethnic Fractionalization and Latitude) for the full sample of countries. We see that Legal Origin explains the most variation (3.89%) in firms' perceptions of property rights protection. In column 2, we include the higher-order terms of the institutional variables in the regression model. We note that we include the higher-order terms only for the continuous variables not for the country dummies, Legal Origin, or Religion dummies. The Ethnic Fractionalization and Endowment theories increase in explanatory power by as much as 411 and 94%, respectively, when we use higher-order terms of these variables, but Legal Origin still dominates.

Table 10
Testing for linearity

	Full sample			Without former socialist economies			40 countries		
	1	2	3	4	5	6	7	8	9
	Only institutional variable (raw data)	Institutional variable, (variable) ² , and (variable) ³ (raw data)	Only institutional variable (rescaled data)	Only institutional variable (raw data)	Institutional variable, (variable) ² , and (variable) ³ (raw data)	Only institutional variable (rescaled data)	Only institutional variable (raw data)	Institutional variable, (variable) ² , and (variable) ³ (raw data)	Only institutional variable (rescaled data)
Country dummies	17.82	17.82	17.82	16.51	16.51	16.51	18.27	18.27	18.27
Legal Origin dummies	3.89	3.89	3.89	2.16	2.16	2.16	2.17	2.17	2.17
Religion dummies	1.15	1.15	1.15	0.92	0.92	0.92	1.34	1.34	1.34
Ethnic Fractionalization (Rescaled) Ethnic dummies	0.27	1.38	1.95	1.46	3.42	4.57	3.05	4.11	3.25
Latitude (Rescaled) Latitude dummies	1.01	1.96	2.24	0.6	0.61	2.16	1.58	2.57	2.08
Settler Mortality (Rescaled) Settler Mortality dummies							5.8	6.97	5.78
All institutional theories together	7.66	9.09	8.88	5.64	7.63	8.41	10.09	12.32	9.07

The table documents how the institutional variables contribute to the adjusted *R*-square of the regression model when we enter the variables one at a time and along with the square and cube of the variable. Columns 1, 4, and 7 present our results when we use the institutional variable alone in raw data form. Columns 2, 5, and 8 present our results when we use both the institutional variable (raw data) and higher order terms. Columns 3, 6, and 9 present our results when we use rescaled variable dummies. The regression model we estimate is Property Rights = Country Effect + (Country Effect)² + (Country Effect)³. We define the variables as follows: Legal Origin takes the value one if Common law, two if French civil law, three if German civil law, four if Scandinavian law, and five if Socialist law countries. Religion takes one of four different values depending on whether the dominant religious group in the country is Catholic, Protestant, Muslim, or Other. Ethnic Fractionalization is the probability that two randomly selected individuals in a country are not from the same ethnic group. Latitude is the absolute value of the latitude of the country scaled between zero and one. Settler Mortality is the log of the annualized deaths per thousand European soldiers in European colonies in the early 19th century. Columns 1–3 present our results for the full sample of 80 countries, columns 4–6 present our results for 56 countries that do not include former Socialist economies, and columns 7–9 present our results for a sample of 40 countries for which there is data available on settler mortality. The Appendix provides detailed variable definitions and sources.

Column 3 repeats the results from Tables 5 and 6, where we used rescaled values for Latitude and Ethnic Fractionalization. Column 3 also presents that there is a substantial increase in explanatory power of the Ethnic Fractionalization (by a factor of 7) and Latitude variables (by a factor of 2.2) on rescaling. The table suggests that the results in these studies may be biased by ignoring nonlinearities present in several of the institutional theories.

We repeat the above analysis for a sample of 56 nontransition countries and a sample of 40 former colonies. In both cases, we observe a substantial increase in explanatory power when we use higher-order terms of some institutional variables or rescale them. Our results from Tables 9 and 10 again confirm that the dominance of Law and Finance view is not robust to sample specification.

4.2.1 Nonlinear model estimation. Here, we examine whether estimating a nonlinear model makes a difference to the explanatory power of the different theories. The traditional linear model estimated in Tables 5–10 takes the form $\mu = X\beta$, where $\mu = E(y)$, with y being the vector of observations, X the matrix of covariates, and β the vector of regression coefficients. We assume that the random effects and the error terms have a distribution that has a constant variance independent of the value of the mean of the response variable, y . To estimate a nonlinear model that recognizes that y is bounded, we have to allow for the random effects to enter into the conditional mean in a nonlinear fashion as in Equation (2) below.

The dependent variable in this study (property rights variable) is an ordered response variable with six categories ($K = 6$) representing firms' perceptions of property rights. The model best suited for an ordinal-dependent variable such as this is the proportional odds model. This model is a natural extension of the logistic regression model from binary response to ordinal response with more than two categories.

$$\log \left(\frac{\sum_{j=1}^K \pi_j}{1 - \sum_{j=1}^K \pi_j} \right) = \alpha + \beta X, \quad (2)$$

where π_j is the probability that category j of the response variable is being picked by a firm.

For the simultaneous ANOVA approach, one point of concern with the logistic regression is that the pseudo R -square statistic produced by a logistic regression is no longer a good estimate of the explanatory power of the model. However, recent research has shown that the McKelvey and Zavoina (MZ) (1975) R -square analogue is most conducive to

comparability across different types of empirical models.¹¹ When we repeat the analysis in Tables 5–8 by using the logistic regression model described above, we find that there is no change in the material results.

Table 11 presents the variance analysis on the rescaled variables using the MZ statistic. In the full sample with rescaled variables on the basis of the MZ *R*-square statistic, Legal Origin explains the most variation with 4.3%, followed by Latitude with 2.3%.

Religion and Ethnic Fractionalization are similar in their explanatory power at 1.2 and 1.8%, respectively. At the firm level (results not shown), firm size by itself explains 1.1%, ownership structure explains 1.7%, legal organization explains 0.8%, and industry sector explains 0.3%, indicating that the ownership structure of the company explains the most variation.

Thus, consistent with the results in the linear estimation in Tables 5 and 6, we find that in the full sample, the Law and Finance view holds the dominant position in explaining the variation in property rights. The slight difference between the linear estimation and the nonlinear analysis in Table 11 arises from the absence of convergence in some models when we include the interactive effects. In the smaller sample of countries (results not shown), we also find results consistent with the linear estimation. Ethnic Fractionalization (4.8%) and Settler Mortality (5.9%) replace Legal Origin (2.4%) as the variables with the most explanatory power.

4.3 Other determinants of property rights

In addition to the exogenous determinants of property rights discussed above, other variables, such as openness to trade and the political system in a country, are important for property rights protection. Although these variables are comparatively endogenous, in that they reflect endogenous factors and hence are classified separately, we include them in the robustness section to see which channels are most important in influencing property rights protection.

To capture the political view of property rights, we use variables from the Polity IV data set, averaged over the period 1995–1999 and Beck et al.'s (1999) Database of Political Institutions (DPI).

Polity IV determines the structure of the state by using three interdependent elements: the presence of institutions and procedures through which citizens can express preferences about policies and leaders, the existence of institutionalized constraints on the exercise of power by the executive, and

¹¹ DeMaris (2002) distinguished between the ordered response variable, y being a proxy for an underlying, unobserved continuous variable, or latent scale, y^* , and the response variable y actually representing a qualitative change in state with no continuous underlying referent. For the former case (which applies to the property rights variable in this study), DeMaris recommended that the MZ *R*-square become the standard estimator of explained variance. In fact, he stated “The analyst employing MZ- R^2 can therefore be confident that, at least in large samples, it will, on average be closer to ρ^2 (explained variance) than any of the other measures.”

Table 11
Determinants of firms' perception of property rights protection—nonlinear estimation

	Benchmark	Law and Finance view	Culture	Ethnic Fractionalization	Endowments	
	Country dummy	Legal Origin dummies	Religion	Ethnic Fractionalization	Latitude	All institutional theories together
Firm Size						
Country	19.4	4.3	1.2	1.8	2.3	9.2
Size	0.3	0.5	1	1.1	0.8	0.5
Interactions	2.8	0.2	0.8	0.9	0.5	1.4
Total	22.5	5	3	3.8	3.6	11.1
Industry						
Country	19.4	4.3	1.2	1.8	2.3	9.2
Industrial Sector	0.1	0.2	0.3	0.4	0.2	0.1
Interactions	25.1	0.1	0.4	0.4	0.3	1
Total	44.6	4.6	1.9	2.6	2.8	10.3
Organizational Form						
Country	19.4	4.3	1.2	1.8	2.3	9.2
Legal Organization	0.4	0.2	0.8	0.8	0.7	0.2
Interactions		0.5	0.4	1.4	0.9	2.4
Total	19.8	5	2.4	4	3.9	11.8
Ownership						
Country	19.4	4.3	1.2	1.8	2.3	9.2
Ownership	0.3	0.6	1.5	1.6	1.3	0.6
Interactions		0.8	1.3	1.5	0.9	
Total	19.7	5.7	4	4.9	4.5	9.8

This table documents the contribution of each effect to the McKelvey and Zavoina (1975) *R*-square of the logistic regression model. The regression model in this table is Property Rights_{ij} = Country Effect_j + Firm Size_j (or Industry Sector_j) (or Legal Organization_j) (or Ownership_j) + Country Effect_i × Firm Size_j (or Industry Sector_j) (or Legal Organization_j) (or Ownership_j). Firm Size takes on one of three values for small, medium, and large firms, Industrial Sector could be agriculture, manufacturing, services, construction, or other, Legal Organization is one of six values to reflect whether the firm is organized as a single proprietorship, partnership, cooperative, privately held corporation, corporation listed on a stock exchange, or another alternative form, and Ownership reflects whether the owner of the firm is an individual, a family, conglomerate group, bank, board of directors, managers, employees, government, or other. In each regression, the country effect is captured by one of the following variables at the country level: Country dummies, Legal Origin, Religion, Ethnic Fractionalization, and Latitude. We define the variables as follows: Legal Origin takes the value one if Common law, two if French civil law, three if German civil law, four if Scandinavian law, and five if Socialist law countries. Religion takes one of four different values depending on whether the dominant religious group in the country is Catholic, Protestant, Muslim, or Other. Ethnic Fractionalization is the probability that two randomly selected individuals in a country are not from the same ethnic group. Latitude is the absolute value of the latitude of the country scaled between zero and one. We rescale Ethnic Fractionalization and Latitude on a five-point scale. We use dummy variables for all the country and firm variables. The Appendix provides detailed variable definitions and sources.

the guarantee of civil liberties to all citizens. Polity IV regards other aspects of democracy such as the rule of law, freedom of the press, and so on as specific manifestations of these general principles. Polity IV derives the Democracy indicator from coding of the competitiveness of political participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive. Polity IV also has a composite 11-point scale for Autocracy, because many polities exhibit mixed qualities of both of these distinct authority patterns. Polity IV derives the Autocracy score from coding of the competitiveness of political participation, the regulation of participation, the openness and competitiveness of executive recruitment, and constraints on the chief executive.

We score the variables Democracy and Autocracy from 0 (low) to 10 (high) to reflect the general openness and closeness of the political institutions in the country, respectively. We obtain these data from Polity IV. We obtain Checks and Balances from Beck et al.'s (1999) DPI and use this variable to measure the number of influential veto players in legislative and executive initiatives. The Political view predicts that greater competition and more checks and balances will limit the ability of the elite to dictate policy and institutional development.¹²

As a measure of openness of the country, we use Trade, which is the extent of trade as a percentage of GDP of the country. We obtain this variable from the World Development Indicators and average it over the period 1995–1999. Trade as a percentage of GDP is a potentially endogenous variable, because a country's actual openness to trade depends on investor rights. An alternative to this variable is the Frankel and Romer (1999) measure of natural openness that is based only on geographic characteristics. We present results using both Trade/GDP and the Frankel and Romer (1999) measure, although the latter is available for only 63 of the 80 countries in our sample. Restricting the sample to nonmissing values of the three political variables and the Trade/GDP variable leaves us with 75 countries.

Column 1 of Table 12 presents the results for our sample of 75 countries. The theories on openness to trade and politics do well in explaining the variation in property rights protection. The Democracy variable predicts more variation in property rights protection (3.63%) than even the Legal Origin variable (the second most dominant variable at 3.49%).

Columns 2 and 3 present results for smaller samples that exclude the former Socialist countries and for those countries for which we have data

¹² In unreported tables, we also used the Legislative and Executive Indexes of Electoral Competitiveness (LIEC/EIEC) from DPI as alternative indexes in place of Democracy and Autocracy. Democracy and Autocracy are more general measures of the openness (closeness) of the political system that include electoral competitiveness as one aspect; LIEC/EIEC are narrower measures that focus specifically on the competitiveness of elections. LIEC/EIEC explain a smaller proportion of property rights variation than do Democracy and Autocracy.

Table 12
Other determinants of property rights protection

	1	2	3
	Full sample	Excluding former socialist countries	Excluding countries with missing settler mortality data
Property Rights			
Institutional variables			
Country dummies	16.8	13.91	15.5
Legal Origin dummies	3.49	1.4	1.18
Religion dummies	1.71	0.87	1.29
Ethnic	1.88	3.41	2.31
Latitude	2.18	2.83	4.04
Settler Mortality			4.74
Openness to trade theory			
Trade	1.53	2.01	0.92
Frankel and Romer measure	1.49	0.55	0.63
Political theory			
Checks and Balances	2.02	2.06	1.83
Democracy	3.63	2.73	3.38
Autocracy	1.05	0.47	0.34
Number of countries	75	53	38

This table presents how the firm-level variables and the rescaled country level variables contribute to the adjusted *R*-square of the regression model when we enter them one at a time. The regression model we estimate is Property Rights = Country Effect + *e*. In each regression, we capture the country effect by using one of the following variables at the country level: Country Dummies, Legal Origin, Latitude, Trade, Checks and Balances, Autocracy, or Democracy. We define the variables as follows: Legal Origin takes the value one if Common law, two if French civil law, three if German civil law, four if Scandinavian law, and five if Socialist law countries. Religion takes one of four different values depending on whether the dominant religious group in the country is Catholic, Protestant, Muslim, or Other. Ethnic Fractionalization is the probability that two randomly selected individuals in a country are not from the same ethnic group. Latitude is the absolute value of the latitude of the country scaled between zero and one. Trade is the sum of exports and imports as a fraction of GDP. The Frankel and Romer measure is the trade openness measure based solely on the geographic characteristics from Frankel and Romer (1999). Checks and Balances measures the number of veto-players in the political decision process. Democracy is a measure of the openness of the political system while autocracy is a measure of how closed the political system is. We rescale Ethnic Fractionalization, Latitude, Trade, Frankel and Romer measure, Checks and Balances, Autocracy, and Democracy on a five-point scale. We use dummy variables for all the country variables. The Appendix provides detailed variable definitions and sources.

on Settler Mortality. In the smaller subsamples, both the openness to trade and political theories do better than does the law and finance view. However, the relatively less endogenous Frankel and Romer (1999) measure of openness to trade explains less than both Ethnic Fractionalization and Legal Origin. Overall, the results suggest that Ethnic Fractionalization and Endowment have significant explanatory power when compared with the proposed endogenous determinants of property rights protection.

5. Conclusion

In this article, we assess the contribution of firm- and country-level factors to firms' perceptions of property rights protection. Using a variance decomposition method, we examine how much of the variation in firms' perceptions of property rights can be attributed to firm characteristics, such as size, ownership structure, industrial sector, and organizational form, and how much to country-level institutional variables. At the country level, we compare the explanatory power of four different theories: Legal Origin, Culture, Ethnic Fractionalization, and the Endowment view of property rights protection.

At the country level, we find that for the full sample of 80 countries, the use of country dummies caps the total explainable variation in firms' perceptions of property rights at 17.82%. Legal Origin accounts for nearly 22% of the total explainable variation (i.e., 22 of 17.82%). Second is the Endowment view, for which Latitude serves as the proxy, which explains 12% of the total explainable variation. Entered together, all the institutional theories explain about 50% of the explainable cross-country variation.

However, the dominance of the Law and Finance view in explaining property rights variation depends critically on sample selection. Removing the former Socialist economies or using a smaller sample of countries for which data on settler mortality is available significantly reduces the explanatory power of the Law and Finance view. In a sample of 56 non-Socialist economies, Legal Origin explains around 13% of the total explainable variation in firms' perceptions. However, in this reduced sample, Ethnic Fractionalization explains nearly 28% of the total variation in firms' perceptions of property rights. This reduced explanatory power of Legal Origin is significant, because the critical distinction in La Porta et al. (1998), 1999 is between Common law and Civil law not between former Socialist regimes and other countries. It is likely that the Socialist legal origin in our sample is a proxy for country characteristics and problems associated with transition economies that are not caused by the differences in legal systems that underlie La Porta et al.'s work.

Proponents of the Ethnic Fractionalization and Endowments views argue that the ethnic fractionalization of the country and its initial endowments shape a country's institutions. We find that measures of initial endowments and Ethnic Fractionalization explain the variation of property rights better than do specific proxies for institutions, such as legal origin, in colonies and samples without former Socialist economies. This finding suggests either that there are other unidentified channels by which Ethnic Fractionalization and endowments influence property rights or that the proxies in current use do not measure the underlying institutions well.

When we compare the firm-level factors with the institutional theories we discuss above, we find that the firm-level variables of size, ownership structure, and organizational form are comparable in their explanatory power to the different theories. For instance, in the full sample of 80 countries, comparing the firm variables with country dummies, ownership structure explains 8% as much as country dummies, size explains 6% as much as country dummies, and organizational form explains 4% as much as country dummies.

We also find that the firm-level characteristics are, in turn, endogenously determined by the country-level factors. Their explanatory power decreases when put together in a single equation along with country-level variables, masking their true importance.

Our analysis also uncovers a methodological issue: the explanatory power of several institutional theories depends on the proxies used to represent these theories. We identify several potentially significant scaling issues that occur if the empirical tests do not pay attention to the nonlinearities that arise due to the way the proxies are scaled. These scaling issues have the potential to overturn conclusions drawn from tests. For instance, the latitude variable almost doubles in explanatory power when we rescale the variable into quintiles. Although rescaling does not affect the material order of importance of the different theories in our article, it may have significant implications in other studies that do not take the inherent nonlinearities into account.

Finally, this article provides a new methodology for estimating the importance of different country- and firm-level factors in explaining the variation in property rights. The intuitive appeal of this approach lends itself to use in examining other questions in finance and economics.

Appendix

Variable	Variable definition	Source
Dependent variables		
Property rights	This variable is an indicator of firm responses to the survey question "I am confident that the judicial system will enforce my contractual and property rights in business disputes." We score the variable on a scale of one to six. One denotes the highest level of confidence and six denotes the poorest.	World Business Environment Survey
Firm variables		
Firm Size dummies	We define a firm as small if it has between 5 and 50 employees, medium size if it has between 51 and 500 employees, and large if it has more than 500 employees.	World Business Environment Survey
Ownership dummies	These variables indicate the identity of the owner. We identify nine different categories: individual, family, conglomerate group, bank, board of directors, managers, employees, government, and other.	World Business Environment Survey
Industry dummies	These variables indicate the industrial sector in which the firm operates. We identify five different categories: manufacturing, agriculture, services, construction, and other.	World Business Environment Survey
Legal Organization dummies	These variables indicate the legal status of the company, whether it is organized as a single proprietorship, partnership, cooperative, privately held corporation, corporation listed on a stock exchange, or other.	World Business Environment Survey
Institutional variables		
Legal origin	This variable indicates the type of legal system in the country. It takes the value of one for English Common law, two for French Civil law, three for German Civil law, four for Scandinavian Civil law, and five for Socialist law countries.	La Porta et al. (1999)
Religion	This variable indicates the dominant religious group in the country. It takes the value of one for Catholic, two for Protestant, three for Muslim, and four for Other.	La Porta et al. (1999)

Ethnic Fractionalization	This variable indicates the probability that two randomly selected individuals in a country are not from the same ethnic group.	Alesina et al. (2003)
Settler Mortality	Log of the annualized deaths per thousand European soldiers in European colonies in the early 19th century.	Acemoglu, Johnson, and Robinson (2001)
Latitude	Absolute value of the latitude of a country, scaled between zero and one.	La Porta et al. (1999)
Trade	Share of imports plus exports in GDP.	World Development Indicators
Frankel and Romer measure	Exogenous measure of openness to trade based on geographic characteristics.	Frankel and Romer (1999)
Checks and Balances	Measures the number of veto players in the political decision process, both in the executive and in the legislature. Average for 1990–1995.	Beck et al. (2001)
Democracy	This variable indicates the general openness of political institutions, scored from zero (low) to ten (high). The 11-point scale is an additive weighted indicator of the following political variables (weights used are indicated in brackets): Competitiveness of Executive Recruitment [Election (+2), Transitional (+1)], Openness of Executive Recruitment [Dual/Election (+1), Election (+1)], Constraint on Chief Executive [Executive party or subordination (+4), Intermediate category (+3), Substantial limitations (+2), Intermediate category (+2)], and the Competitiveness of Political Participation [Competitive (+3), Transitional (+2), and Factional (+1)]. The Polity IV manual makes available detailed descriptions of the subcomponents of the democracy indicator.	Polity IV data set
Autocracy	This variable indicates in general how closed the political institutions are, scored from zero (low) to ten (high). The 11-point scale is an additive weighted indicator of the following political variables (weights used are indicated in brackets): Competitiveness of Executive Recruitment [Selection (+2)], Openness of Executive Recruitment [Closed (+1), Dual/designation (+1)], Constraint on Chief Executive [Unlimited authority (+3), Intermediate category (+2), Slight to moderate limitations (+1)], Regulation of Political Participation [Restricted (+2), Sectarian (+1)], and the Competitiveness of Political Participation [Repressed (+2), and Suppressed (+1)]. The Polity IV manual makes available detailed descriptions of the subcomponents of the autocracy indicator.	Polity IV data set

References

- Acemoglu, D., S. Johnson, and J. A. Robinson, 2001, "The Colonial Origins of Comparative Development: An Empirical Investigation," *American Economic Review*, 91, 1369–1401.
- Acemoglu, D., S. Johnson, and J. A. Robinson, 2002, "Reversal of Fortunes: Geography and Institutions in the Making of the Modern World Income Distribution," *Quarterly Journal of Economics*, 117(4), 1231–1294.
- Alesina, A., A. Devleeschauwer, W. Easterly, S. Kurlat, and R. Wacziarg, 2003, "Fractionalization," *Journal of Economic Growth*, 8(2), 155–194.
- Ayyagari, M., A. Demirgüç-Kunt, and V. Maksimovic, 2005, "What Determines Protection of Property Rights? An Analysis of Direct and Indirect Effects" World Bank Working Paper Series #3940 (http://papers.ssrn.com/sol3/papers.cfm?abstract_id=923247).
- Batra, G., D. Kaufmann, and A. Stone, 2003, "The Firms Speak: What the World Business Environment Survey Tells Us About Constraints on Private Sector Development" (mimeo), World Bank.
- Beck, T., G. Clarke, A. Groff, P. Keefer, and P. Walsh, 2001, "New Tools and New Tests in Comparative Political Economy: The Database of Political Institutions," *World Bank Economic Review*, 15, 165–176.
- Beck, T., A. Demirgüç-Kunt, L. Laeven, and V. Maksimovic, 2005, "The Determinants of Financing Obstacles," forthcoming in *Journal of International Money and Finance*.
- Beck, T., A. Demirgüç-Kunt, and R. Levine, 2003, "Law, Endowments, and Finance," *Journal of Financial Economics*, 70(2), 137–181.
- Beck, T., A. Demirgüç-Kunt, and R. Levine, 2005, "Law and Firms' Access to Finance," *American Law and Economics Review*, 7(1), 211–252.
- Beck, T., A. Demirgüç-Kunt, and V. Maksimovic, 2005, "Financial and Legal Constraints to Firm Growth: Does Firm Size Matter?" *Journal of Finance*, 60(1), 137–179.
- Beck, T., A. Demirgüç-Kunt, and V. Maksimovic, 2006, "The Influence of Financial and Legal Institutions on Firm Size," forthcoming in *Journal of Banking and Finance*.
- Beck, T., and R. Levine, 2002, "Industry Growth and Capital Allocation: Does Having a Market- or Bank Based System Matter?" *Journal of Financial Economics*, 64, 147–180.
- Burkart, M., F. Panunzi, and A. Shleifer, 2003, "Family Firms," *Journal of Finance*, 58, 2173–2207.
- DeMaris, A., 2002, "Explained Variance in Logistic Regression : A Monte Carlo Study of Proposed Measures," *Sociological Methods & Research*, 31(1), 27–74.
- Demirgüç-Kunt, A., I. Love, and V. Maksimovic, 2006, "Business Environment and the Incorporation Decision," forthcoming in *Journal of Banking and Finance*.
- Demirgüç-Kunt, A., and V. Maksimovic, 1998, "Law, Finance, and Firm Growth," *Journal of Finance*, 53, 2107–2137.
- Demirgüç-Kunt, A., and V. Maksimovic, 1999, "Institutions, Financial Markets and Firm Debt Maturity," *Journal of Financial Economics*, 54, 295–336.
- Djankov, S., R. La Porta, F. Lopez-de-Silanes, and A. Shleifer, 2003, "Courts," *Quarterly Journal of Economics*, 118(2), 453–517.
- Easterly, W., and R. Levine, 1997, "Africa's Growth Tragedy: Policies and Ethnic Divisions," *Quarterly Journal of Economics*, 112, 1203–1250.
- Engerman, S., and K. Sokoloff, 1997, "Factor Endowments, Institutions, and Differential Paths of Growth Among New World Economies," in S. H. Haber (ed.), *How Latin America Fell Behind*, Stanford University Press, Stanford, CA, pp. 260–304.
- Frankel, J., and D. Romer, 1999, "Does Trade Cause Growth?" *American Economic Review*, 89(3), 379–399.

- Jensen, M., and W. Meckling, 1976, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics*, 3, 305–360.
- Jinks, J. L., and D. W. Fulker, 1970, "Comparison of the Biometrical Genetical, MAVA, and Classical Approaches to the Analysis of Human Behavior," *Psychological Bulletin*, 73, 311–349.
- Johnson, S., R. La Porta, F. Lopez-de-Silanes, and A. Shleifer, 2000, "Tunneling," *American Economic Review*, 90, 22–27.
- Khanna, T., and J. Rivkin, 2001, "Estimating the Performance Effects of Business Groups in Emerging Markets," *Strategic Management Journal*, 22(1), 45–74.
- Kumar, K., R. Rajan, and L. Zingales, 2002, "What Determines Firm Size?" Working Paper, University of Chicago GSB.
- La Porta, R., and F. Lopez-de-Silanes, 1999, "The Benefits of Privatization: Evidence from Mexico," *Quarterly Journal of Economics*, 114(4), 1193–1242.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny, 1997, "Legal Determinants of External Finance," *Journal of Finance*, 52, 1131–1150.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny, 1998, "Law and Finance," *Journal of Political Economy*, 106, 1113–1155.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny, 1999a, "The Quality of Government," *Journal of Law, Economics, and Organization*, 15, 222–279.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny, 1999b, "Corporate Ownership Around the World," *Journal of Finance*, 54, 471–517.
- La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. W. Vishny, 2000, "Investor Protection and Corporate Governance," *Journal of Financial Economics*, 58, 3–27.
- Laeven, L., and C. Woodruff, 2004, "The Quality of the Legal System and Firm Size," SSRN Working Paper Series.
- Love, I., and N. Mylenko, 2003, "Credit Reporting and Financing Constraints," World Bank Working Paper 3142.
- McGahan, A. M., and M. E. Porter, 1997, "How Much Does Industry Matter, Really?" *Strategic Management Journal*, 18, 15–30.
- McGahan, A. M., and M. E. Porter, 2002, "What Do We Know About Variance in Accounting Profitability?" *Management Science*, 48(7), 834–851.
- McKelvey, R. D., and W. Zavoina, 1975, "A Statistical Model for the Analysis of Ordinal Dependent Variables," *Journal of Mathematical Sociology*, 4, 103–120.
- Menard, S., 1995, "Applied Logistic Regression Analysis." Sage University Paper Series on Quantitative Applications in the Social Sciences 07–106, Sage, Thousand Oaks, CA.
- Rumelt, R., 1991, "How Much Does Industry Matter?" *Strategic Management Journal*, 12(3), 167–185.
- Schmalensee, R., 1985, "Do Markets Differ Much?" *American Economic Review*, 75(3), 341–351.
- Sleuwaegen, L., and M. Goedhuys, 2002, "Growth of Firms in Developing Countries, Evidence from Cote d'Ivoire," *Journal of Development Economics*, 68, 117–135.
- Stulz, R., A. Karolyi, and C. Doidge, 2004, "Why Do Countries Matter So Much for Corporate Governance?" NBER Working Paper 10726.
- Stulz, R., and R. Williamson, 2003, "Culture, Openness and Finance," *Journal of Finance*, 70(3), 313–349.
- Wooldridge, J. M., 2003, *Introductory Econometrics: A Modern Approach* (2d ed.), Thomson South-Western Publication, United States.

Copyright of Review of Financial Studies is the property of Society for Financial Studies and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.