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Truth and Robustness in Cross-country Law and Finance Regressions: A Bayesian analysis of the Empirical "Law Matters" Thesis

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Abstract

This paper applies a Bayesian model averaging algorithm to systematically evaluate the "law matters" literature and finds that the positive cross-country relationship between anti-self-dealing rules and stock market development proposed by Djankov, La Porta, Lopez-de-Silanes, and Sheifer (2008, Journal of Financial Economics 88: 430-465) is fragile. In contrast, proxies for information disclosure, political power of incumbents and economic development are found to have strong predictive power for stock market outcome variables. Finally, variant sets of variables are shown to predict stock market development, which rejects the "one-size-fits-all" specification employed in previous macro law and finance studies..

JEL classification numbers: G38; K22; C11
Keywords: small firms, survival, Cox regression, longitudinal survey

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1 Introduction

The recent law and finance movement empirically shows that law matters for stock market development[2]: The seminal paper "Law and Finance" (La Porta, López-de-Silanes, Shleifer and Vishny, 1998, henceforth LLSV) finds that the "Anti-director rights index (ANTIDRI)"[3] negatively correlates with ownership concentration, and Djankov, La Porta, López-de-Silanes and Shleifer (2008, henceforth DLLS) find that the "Anti-self-dealing index (ANTISDI)"[4] is positively correlated with various proxies for stock market development, such as market capitalization and IPO value normalized by GDP and the number of listed firms normalized by population. Additional empirical studies provide supplemental evidence that other legal institutions, such as public enforcement inputs (Jackson and Roe, 2009), disclosure requirements and liability standards (La Porta, López-de-Silanes and Shleifer, 2006), also facilitate stock market development.

Though we subscribe to the idea that law matters, the empirical strategies employed in the macro law and finance studies face severe criticism. The identification assumption that legal origins are valid instruments for endogenous institutional variables is rejected because the assumption violates the exclusion restrictions (La Porta, López-de-Silanes and Shleifer, 2008; Bazzi and Clemens, 2013). In a recent book review, Klick (2013) even uses the title "Shleifer's Failure" to express his dissatisfaction with Shleifer's negligence in the recent developments in micro-econometrics. Without valid instruments, it is highly likely that the empirical conclusion that law matters suffers from the omitted variable bias and the problem of reverse causality.

Meanwhile, the popular indices, such as the ANTIDRI and the ANTISDI, are constructed with home-country bias, which employs the American criteria as the

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[2] Legal institutions facilitate stock market development because they curb agency costs. There are mainly three types of agency problems: The one between professional managers and shareholders in firms with dispersed ownership structures; the one between controlling shareholders and minority shareholders in firms with dominant shareholders; and the one between shareholders and other corporate constituencies, such as creditors in the vicinity of insolvency (Kraakman *et al.*, 2011). This paper focuses on the laws reducing agency costs attributable to the former two relationships.

[3] The ANTIDRI is an average of six sub-indices: "Proxy by mail allowed", "Shares not blocked before the meeting", "Cumulative voting or proportional representation", "Oppressed minorities mechanism", "Preemptive rights", and "Percentage of share capital to call an extraordinary shareholders' meeting", which measures the *de jure* protection of shareholders against professional managers.

[4] The ANTISDI is constructed based on a multinational survey on the regulation of stylized self-dealing transactions, which measures the protection of minority shareholders against controlling shareholders.

yardsticks for measuring the quality of corporate governance in other countries.[5] The fundamental governance problems differ significantly between countries that are dominated by controlled firms and those that are featured by widely held firms (Martynova and Renneboog, 2011). Given the situation, Bebchuk and Hamdani (2009, p. 1720) criticize that "using a single metric for comparing countries where concentrated ownership is prevalent to those where widely held firms dominate, or more generally, countries that have a different mix of these two types of firms, is likely to produce results that would be inaccurate for many purposes."

Finally, studies conducted from time-series perspectives negate the "law matters" argument. On one hand, case studies on the business histories of the U.K. and the U.S. find that listed firms' ownership structures were already diffused long before relevant legal institutions were established (Cheffins, 2001; Coffee, 2001; Franks, Mayer and Rossi, 2009).[6] On the other hand, panel data analysis finds no significant correlation between legal institutions and proxies for stock market development (Armour, Deakin, Sarkar, Siems and Singh, 2009). Countries with weak shareholder protection, for example, those with French legal origins, have in recent years been found to converge with the best practices in *de jure* corporate governance institutions (Martynova and Renneboog, 2011).

This paper looks into the law and finance literature with a Bayesian perspective and examines systemically the robustness of the empirical conclusion that law matters using a Bayesian model averaging (BMA) algorithm, which mitigates the omitted variable bias. In addition, the home-country bias in specifying the empirical model discussed in Bebchuk and Hamdani (2009) is corrected in this paper. The proxies for curbing the agency costs between shareholders and professional managers and between minority and controlling shareholders are included separately in the model. However, we must admit that the Bayesian algorithm is not a panacea. It fails to address the problem of endogeneity.[7]

Because the law and finance theories fail to provide sufficient guidance for specifying the structural model, the model uncertainty problem, *i.e.,* which regressors should be included in the model specification, needs to be addressed.

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[5] In addition to home-country bias, Spamann (2010) finds that the ANTIDRI is constructed with coding errors; once those are corrected, the correlation between the index and ownership structure becomes insignificant.

[6] It should be noted that ownership structure evolves dynamically. Newly listed firms are shown to have concentrated ownership structures around the world (Foley and Greenwood, 2010). For listed U.K. firms, the dispersed ownership structure is mainly driven by mergers (Franks, Mayer and Rossi, 2009), whereas for listed U.S. firms, ownership becomes dispersed if their common stocks have high market valuation and sufficient liquidity (Helwege, Pirinsky and Stulz, 2007).

[7] The BMA algorithm employs no instruments and therefore cannot be expected to address the concern that legal variables, such as ANTIDRI and ANTISDI, are endogenous to the capital market development. This may compromise our empirical findings.

To illustrate the issue, a generic representation of the linear cross-country stock market development regression is given as follows:

$$y=\alpha+X\beta+\varepsilon=\alpha+X_1\beta_1+X_2\beta_2+\varepsilon \quad (1)$$

where y is a vector of the proxies for stock market development and α is a vector of intercepts. X is a set of determinants that theoretically correlate with the stock market development, which typically comprises two parts, the free variable X_1 and the doubtful variable X_2, where model uncertainty arises.[8]

Without paying attention to model uncertainty, the empirical results tend to be fragile, that is, they are sensitive to the inclusion of additional relevant regressors. Although normally empirical articles will incorporate a section titled "Sensitivity Analysis", it differs from the concept of global sensitivity analysis proposed by Leamer (1983, 1985). For example, considering the empirical research on the relationship between the ANTISDI and stock market outcomes that was tested by DLLS (2008), the ANTISDI loses its explanatory power when the variable "tax evasion"[9] is included (reported in Table 12 of their paper). DLLS (2008, p.456) ascribe it to the fact that the variable is "a subjective variable highly correlated with perceptions […] of the quality of corporate governance as proxied by the perceived incidence of insider trading".

Our research builds on that of DLLS (2008), which mainly includes ANTISDI, "logarithm of per capita GDP (GDPPERCAPITA)" and "time to collect on a bounced check (CHECK)"[10] as explanatory variables. An expanded data set of 4 dependent variables and 26 explanatory variables for 48 economies is employed.[11]

To address the problem of model uncertainty, the BMA algorithm, which has already been extensively applied in growth empirics,[12] is adopted. The algorithm admits that the "true" model is unknown and attaches probability to each possible model; additionally, the estimators of parameters are computed as weighted averages of the conditional estimates. The algorithm is discussed by Magnus, Powell and Prüfer (2010, henceforth MPP) and De Luca and Magnus (2011) in detail. The BMA analysis finds that the pervasive positive correlations between the ANTISDI and various proxies for stock market development are fragile. In

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[8] In this paper, we specify no free variables that are fixed in our empirical model.

[9] The variable "tax evasion" index assesses the prevalence of tax evasion, which comes from the World Economic Forum (2003).

[10] The variable CHECK is defined as the logarithm of the estimated calendar days of the judicial procedure to collect on a bounced check, which is used to measure the effectiveness of courts as mechanisms for resolving simple disputes and is given by Djankov, La Porta, López-de-Silanes and Shleifer (2003).

[11] We also perform BMA analysis with a sample of 44 countries and districts and a different set of 27 doubtful variables as the robustness check.

[12] For earlier applications of the modified version of "extreme bounds analysis" in the growth regressions, see Levine and Renelt (1992) and Sala-i-Martin (1997). For applications of the BMA algorithm, see Fernández, Ley and Steel (2001), Brock and Durlauf (2001), and Sala-i-Martin, Doppelhofer and Miller (2004).

addition, the proxies for information disclosure[13], political power of incumbents and economic growth perform quite well in explaining stock market development. Finally, different proxies for stock market development are predicted by diverse sets of explanatory variables, which indicate that the one-size-fits-all specification of empirical models is inappropriate. These empirical findings persist when we employ a variable selection algorithm, stepwise backward elimination (SBE).

Our paper is closely related to three previous studies. First, Beck, Demirgüç-Kunt and Levine (2003) test law and finance theory against the alternative endowment theory, which fails to consider other competing explanations, such as the political theory of stock market development. Second, in their review, La Porta *et al.* (2008, p. 326) argue that "the measured differences in legal rules matter for economic and social outcomes". Though we believe in their conclusion, our paper shows that the existing macro law and finance evidence is not able to support the conclusion that law matters for stock market development. Finally, Helland and Klick (2011) share the closest empirical strategy with ours. They apply the "extreme bound analysis" developed by Leamer (1985) to test the sensitivity of the relationship between legal origins and creditor protection and find that legal origins lose their explanatory power. Our analysis applies BMA, a more sophisticated progeny of "extreme bound analysis", to systematically investigate the empirical relationship between proxies for investor protection and stock market development. The rest of the article is arranged as follows: Section 2 reviews previous discussions on both legal and extra-legal determinants of stock market development. Section 3 presents the data set and the empirical strategies. Section 4 reports the outputs and Section 5 the robustness check. Section 6 concludes.

[13] This observation is in accordance with the theoretical argument made by Black (2001) that good information disclosure is fundamental for a strong stock market.

Table 1 Definitions, Sources, and Descriptive Statistics for the Variables

The table presents definitions, sources, and descriptive statistics for the variables included in the analysis. The sample covers 48 economies: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, Colombia, Denmark, Ecuador, Egypt, Finland, France, Germany, Greece, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, Jordan, Kenya, Malaysia, Mexico, Netherlands, New Zealand, Nigeria, Norway, Pakistan, Peru, Philippines, Portugal, Singapore, South Africa, South Korea, Spain, Sri Lanka, Sweden, Switzerland, Thailand, Turkey, U.K., U.S., Uruguay, Venezuela, and Zimbabwe.

Num	Abbreviation	Variable	Obs	Definition and Source	Mean	Std. Dev.
				Dependent Variables		
1	cmmkt	Stock market capitalization to GDP	48	Average of the ratio of stock market capitalization to gross domestic product for the period 1999-2003. Source: DLLS (2008).	74.61642	68.528
2	lnlisted	Ln (Firms /POP)	48	Logarithm of the average ratio of the number of domestic firms listed in a given country to its population (in millions) for the period 1999-2003. Source: DLLS (2008).	23.90835	28.13406
3	ipo	IPOs-to-GDP	48	The average ratio of the equity issued by newly listed firms in a given country (in thousands) to its GDP (in millions) over the period 1996-2000. Source: DLLS (2008).	2.820875	3.037239
4	trade	Stock traded to GDP	48	The average total value of stocks traded as a percentage of GDP. Source: World Development Indicators 2011.	50.81346	57.01453
				Independent Variables (Doubtful Variables)		
1	antisdi	Anti-self-dealing index	48	Average of *ex ante* and *ex post* private control of self-dealing. Source: DLLS (2008).	0.4760833	0.2531317
2	check	Time to collect on a bounced check	48	Logarithm of the length (in calendar days) of the judicial procedure to collect on a bounced check. Source: DLLS (2003).	5.187563	0.7109341
3	gdppercapita[a]	Log of GDP per capita	48	Logarithm of per capita GDP (in US dollars) in 2003. Source: DLLS (2008).	8.760896	1.472394
4	rantidri	Revised Anti-director rights	48	The revised Anti-director rights index for 2003. Sources: DLLS (2008).	3.510417	1.132168

		index				
5	onevote	One share-one vote index	48	A dummy variable that equals 1 if the Company Law or Commercial Code requires that ordinary shares carry one vote per share and 0 otherwise. Source: LLSV (1997).	0.2291667	0.4247444
6	frenchlo	French legal origin	48	A dummy variable which equals 1 if the country has the French legal origin and 0 otherwise. Sources: Klerman et al. (2011).	0.3958333	0.494204
7	commonlo	British legal origin	48	A dummy variable which equals 1 if the country has the British legal origin and 0 otherwise. Sources: Klerman et al. (2011).	0.2708333	0.4490929
8	germanlo	German legal origin	48	A dummy variable which equals 1 if the country has the German legal origin and 0 otherwise. Sources: Klerman et al. (2011).	0.1041667	0.3087093
9	mixedlo	Mixed legal origin	48	A dummy variable which equals 1 if the country has a legal system that combine elements of civil law with elements of common law and 0 otherwise. Source: Klerman et al. (2011).	0.1458333	0.356674
10	disclosure	Disclosure requirements index	48	Disclosure requirements index is calculated as the average of the following six proxies: (1) prospectus, (2) compensation, (3) shareholders, (4) inside ownership, (5) irregular contracts and (6) transactions. Source: La Porta *et al*. (2006).	0.5937917	0.2373677
11	nanalysts[b]	Number of analysts	48	The number of analysts providing an annual earnings forecast per firm, averaged in each country for the year 1996. Sources: Chang *et al*. (2000).	11.71938	8.874205
12	penforcement	Public enforcement index	48	The index of public enforcement equals the arithmetic mean of (1) supervisor characteristics index, (2) rule-making power index, (3) investigative powers index, (4) orders index and (5) criminal index. Source: La Porta *et al*. (2006).	0.4977292	0.2240691
13	itprosecution[c]	Insider trading prosecution 1999 (1996)	48	A dummy variable that equals 1 if the country files any prosecution against insider trading before 1996/1999 and 0 otherwise. Source: Bhattacharya and Daouk (2002).	0.6458333 (0.4166667)	0.4833211 (0.4982238)
14	property	Property rights protection	48	Property rights protection index of year 1997. Source: The Heritage Foundation (http://www.heritage.org).	72.5	16.82197

15	origin	Origin country	48	A dummy variable that equals 1 if the country develops its law internally and 0 otherwise. Sources: Berkowitz *et al*. (2003).	0.2083333	0.4104141
16	latitude	Latitude	48	The absolute value of the latitude of the country, scaled to take values between 0 and 1. Source: LLSV (1999).	0.3478333	0.2074274
17	catholic	Catholic	48	A dummy variable that equals 1 if the country's primary religion is Catholic. Source: Stulz and Williamson (2003).	0.4166667	0.4982238
18	protestant	Protestant	48	A dummy variable that equals 1 if the country's primary religion is Protestant. Source: Stulz and Williamson (2003).	0.25	0.437595
19	muslim	Muslim	48	A dummy variable that equals 1 if the country's primary religion is Muslim. Source: Stulz and Williamson (2003).	0.1458333	0.356674
20	buddhist	Buddhist	48	A dummy variable that equals 1 if the country's primary religion is Buddhist. Source: Stulz and Williamson (2003).	0.0833333	0.2793102
21	newspaper	Newspaper circulation	48	Logarithm of newspaper and periodical circulation per thousand inhabitants in 2000 (or closest available). Source: DLLS (2008).	4.738292	1.03657
22	registercost	Costs of registration	48	The cost of obtaining legal status to operate a firm as a share of per capita GDP in 1999. Source: DLLS (2002).	0.26875	0.3980143
23	ethnolinguistic	Ethnolinguistic fractionalization	48	This variable measures the probability that two randomly selected persons from a given country will not belong to the same ethnolinguistic group. Source: Easterly and Levine (1997).	0.2573333	0.2567364
24	tradeopenness[d]	Trade openness 1999 (1996)	48	The sum of exports and imports of goods and services measured as a share of GDP. Sources: World Development Indicators 2011.	75.64506 (72.96948)	60.36639 (59.54328)
25	employment	Employment laws index	48	The index measures the protection of employment laws as the average of (1) the existence and cost of alternatives to the standard employment contract, (2) cost of increasing the number of hours worked, (3) cost of firing workers and (4) dismissal procedures. Source: Botero *et al*. (2004).	0.4545833	0.1858519

26	pinstab	Political instability index	48	Average of the number of assassinations per million population per year and the number of revolutions per year from 1986 to 1988. Source: Barro and Lee (1994) (http://admin.nber.org/pub/barro.lee/pinstab.prn).	0.2127146	0.2727149
Independent Variables (Additional Doubtful Variables for Sensitivity Analysis)						
27	staff	Staff per million population	44	The 2005 size of the securities regulators' staff, divided by the country's population in millions. Source: Jackson and Roe (2009).	14.43977	15.7867
28	antidri_sp	Spamann's Anti-director rights index	44	The corrected Anti-director rights index for 1997. Source: Spamann (2010).	3.75	0.918163
29	onevote_sp	Spamann's one share-one vote index	44	This variable measures if there are mandatory rules requiring that voting and cash-flow rights should be proportional. Source: Spamann (2010).	0.1818182	0.3901537

Notes: [a] In DLLS (2008), the variable of "IPOs-to-GDP" is averaged over the period 1996-2000, whereas the log of GDP per capita in 2003 is used as a control variable. We follow their approach to make our results comparable to those of DLLS (2008).
[b] To keep the sample size as large as possible, we follow the assumption of Chang *et al.* (2000) that if one country is not covered by IBES, there is no analyst following this country.
[c] Because the variable of "IPOs-to-GDP" is averaged over the period 1996-2000, we construct the dummy variable "itprosecution1996" for year 1996 to accommodate the different time intervals covered by the different dependent variables. The "itprosecution1996" is used only in the regression in which the dependent variable is "IPOs-to- GDP", and its mean and variance are shown in the parentheses.
[d] Because the variable of "IPOs-to-GDP" is averaged over the period 1996-2000, we construct the dummy variable "tradeopenness1996" for year 1996 to accommodate the different time intervals covered by the different dependent variables. The "tradeopenness1996" is used only in the regression in which the dependent variable is "IPOs-to- GDP", and its mean and variance are shown in the parentheses.

2 Determinants of Stock Market Development

This section does not provide a comprehensive review of the law and finance literature because there have been a number of published survey articles.[14] We mainly consider the legal and extra-legal determinants that are employed in the BMA analysis. The former group includes shareholder protection rules, enforcement strategies, and property rights protection, whereas the latter includes the transplantation process, politics and culture. The definitions and sources of these variables are reported in Table 1.

2.1 Legal Determinants of Stock Market Development

2.1.1 Legal Origins and Shareholder Protection Rules

Legal origins, broadly defined by La Porta *et al.* (2008, p. 286) as "a style of social control of economic life (and maybe of other aspects of life as well)" and used as the exogenous instruments for endogenous institutional variables, are very likely the most influential and debated concepts in law and finance studies.[15] LLSV (1998) argue that laws in most countries are transplanted from a small number of legal traditions through conquest, colonization, and imitation, which results in two main legal traditions: common law, which is English in origin (COMMONLO), and civil law, which derives from Roman law and can be further classified into French, German, and Scandinavian law. Common law countries are found to protect investors (shareholders and creditors) better than civil law countries (particularly French civil law), as measured by both the ANTIDRI (LLSV, 1998) [16] proxy for the legal constraints on the agency problem between shareholders and professional managers and the ANTISDI (DLLS, 2008) proxy for constraints on the agency problem between minority and controlling shareholders, both of which are found to determine stock market development.

In addition, the "one share-one vote" principle (ONEVOTE) is regarded as aligning shareholders' decision rights and cash flow rights and ensuring that

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[14] See two recent survey articles, La Porta *et al.* (2008) and Xu (2011), for discussions on this literature.

[15] The debates on legal origin theory show multiple caveats. First, as is observed by Berkowitz, Pistor and Richard (2003), the origin countries develop their legal origins endogenously rather than through exogenous transplantations. Second, the cross-country divergence in *de jure* corporate governance institutions tends to narrow, and the convergence to "best practices" is observed by multiple panel analysis (Armour *et al.*, 2009; Martynova and Renneboog, 2011). Third, Klerman, Mahoney, Spamann, and Weinstein (2011) argue that LLSV's codification of legal origins is inaccurate, and they classify five countries, Israel, South Africa, Sri Lanka, Thailand, Zimbabwe, that were originally in the common law group, into the group that have mixed legal origins. This updated classification of legal origins is adopted in this article.

[16] It should be noticed that DLLS (2008) update the ANTIDRI and present a revised ANTIDRI (RANTIDRI), which is adopted in the later analysis.

external governance mechanisms, such as the market for corporate control (Manne, 1965), function properly (Grossman and Hart, 1988). Listed firms take higher percentages of the external financing in countries with this rule because it lowers the costs of finance. Shares with disproportional voting rights could entrench insiders, who tend to exploit the high private benefits of control that are detrimental to stock market development (Dyck and Zingales, 2004).

2.1.2 Enforcement Strategies

According to Becker (1968), rational individuals who commit crimes will weigh the expected costs and benefits. The expected costs of the crime are given by the punishment stipulated by the "law on the book", and the probability of getting caught which is determined by enforcement strategies. Hence, the on-the-book rules set the *de jure* investor protection, whereas the enforcement strategies determine the law in operation and any *de facto* shareholder protection. Both private parties and public regulators could enforce the "law on the book", but Shleifer (2005) argues that pure strategies relying on either private litigation or public regulation have great social costs, which could be significantly reduced if both strategies were combined.

For private enforcement to work effectively, it is important that dissenting investors accumulate sufficient information about listed firms and there are efficient court systems. The information could be released owing to either mandatory disclosure or market force. The mandatory disclosure required by public regulators (DISCLOSURE) sets the minimum standards for listed firms (La Porta *et al.*, 2006), whereas the analysts who follow the listed firms (NANALYSTS) provide a private channel for information disclosure (Chang, Khanna and Palepu, 2000). In addition, the analysts sometimes even directly assume the role of monitoring, which is a highly valuable governance mechanism reducing earnings management (Yu, 2008) and excessive CEO compensation and bad acquisition decisions (Chen, Harford and Lin, 2015). Finally, court systems that determine the efficiency of private litigation are shown to have significant cross-country divergence in their efficiencies (Djankov *et al.*, 2003).

For public enforcement to function effectively, the public enforcers need to obtain *de jure* authority from securities laws (PENFORCEMENT) to investigate and sanction security wrongdoings (La Porta *et al.*, 2006) and maintain sufficient resources, such as staff members (STAFF), to actually intervene in regulation violations (Jackson and Roe, 2009). Bhattacharya and Daouk (2002) further reveal that the outputs of public enforcement, *i.e.*, the first prosecution of insider trading (ITPROSECUTION), matter for market liquidity. Although a high percentage of countries established anti-insider-trading rules at the beginning of the 1990s, a large proportion had no enforcement outputs over many subsequent years. The first enforcement output, rather than the announcement of the anti-insider-trading rules, was shown to greatly increase market confidence and liquidity.

2.1.3 Property Rights Protection

Acemoglu and Johnson (2005, p.955) define property rights institutions (PROPERTY) as "the rules and regulations protecting citizens against the power

of the government and elites", which reflects the relative priority of individuals' rights *vis-à-vis* those of the states or powerful elites. Such protection is crucial in determining firms' asset structures, as Claessens and Laeven (2003) show: They find that in countries with weak property rights protection, firms prefer to invest in fixed assets, whereas in those with strong protection, firms invest more in intangible assets. Better protection of property rights is empirically associated with more developed stock markets (Acemoglu and Johnson, 2005; Mahoney, 2001).

2.2 Extra-legal Determinants of Stock Market Development

2.2.1 Transplantation Process

Rather than legal determinants, Berkowitz, Pistor and Richard (2003) focus on the pattern of transplanting legal institutions from the origin countries to the receiving countries during their legal formation periods. [17] These authors argue that the origin countries (ORIGIN) should be distinguished from the transplanted countries, which could be further divided into receptive countries if they either adapted the transplanted law to local conditions or had a population that was already familiar with the basic principles of the transplanted law or unreceptive countries if they received the law with no similar predispositions. The transplanting process is proven to have a strong indirect (rather than direct) effect on economic development via its impact on legality[18].

2.2.2 Culture

Guiso, Sapienza and Zingales (2006) advance a theoretical proposition that culture determines economic outcomes through shaping expectations and preferences, which influence the level of social trust. One of the most prominent and established findings that supports the role of culture in facilitating securities market development is that charging interest can be a sin in one religion but not in another (Stulz and Williamson, 2003). Stulz and Williamson empirically investigate the role of religion in determining various financial outcomes and find

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[17] Acemoglu, Johnson, and Robinson (2001, 2002) provide an alternative endowment theory that focuses on the quality of the legal institutions that are transplanted to the colonized countries. In areas that are suitable for forced work in agriculture or mining because of high local population density or in which Europeans could not easily survive because of local disease, European colonizers set up "extractive states" to transfer as much of the colonies' resources to the colonizer rather than protecting private property rights and limiting the power of the government. In contrast, in other regions such as New England, where the natives were not easy to enslave, where it was difficult to organize massive exploitative activities, and where the local (disease) environment was hospitable to colonizers, many Europeans settled down and attempted to replicate European institutions with strong emphasis on private property and checks against governmental power. However, this theory only applies to transplanted countries, and consequently, it is not employed in our study.

[18] Legality is a weighted average of five components: judicial efficiency, rule of law, corruption, risk of expropriation, and risk of contract repudiation.

that Catholic countries (CATHOLIC) have smaller banking sectors relative to GDP than those of Protestant nations (PROTESTANT).

In addition to religion, public opinion also functions to curb the private benefits of insiders that negatively affect stock market development (Dyck and Zingales, 2004). Negative public opinion creates reputational sanctions for corporate scandals, the effectiveness of which depends on the existence of a large set of educated investors who read the newspaper and an independent media that publicizes facts, which is proxied by newspaper circulation scaled by population (NEWSPAPER).

2.2.3 Politics

Recent studies have shown that it is difficult or even impossible for stock markets to thrive in countries in which investors are politically weak and their interests are subordinate to or sacrificed in the interests of other social purposes. Roe (2006) argues that the first-order condition for capital markets to develop is a polity that supports the market. He constructs a "total destruction" variable that combines both economic (the ratio of GDP in 1945 to that in 1913) and military (whether a country was occupied during the World Wars) measures of destruction and contends that countries where voters' median financial savings were devastated during wartime would care less about protecting financial capital, which is insignificant compared with their human capital.[19] Hence, the labour protection index (EMPLOYMENT) constructed by Botero, Djankov, La Porta, López-de-Silanes and Shleifer (2004) is found to better predict stock market development.

In addition, stock market development may hurt those groups with vested interests, such as financial and industrial incumbents who benefit from financial repression. Financial development breeds competition, which erodes incumbents' profits; in addition, financial development requires more transparency, which directly damages incumbents' traditional methods of doing business through contracts and relationships (Rajan and Zingales, 2003). Incumbents therefore have strong incentives to retard financial development and (because of their accumulated wealth, influence, and power) sufficient resources to manipulate the political process through which the orientation of legislation and the style of financial regulation are determined.[20] However, this power to protect private rents will be

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[19] Pagano and Volpin (2006) propose a structural model and suggest that pro-shareholder rules are more likely to pass when shareholders' political power increases in the state, consequently lowering the costs of external financing. As a result, listed firms will increase their consumption of external financing, which increases the shareholder base. The feedback loop generates a positive relationship between shareholder protection and stock market development.

[20] As is predicted by the theory of regulatory capture (Stigler, 1971), incumbents could also collude with politicians and bureaucrats, who enforce entry-deterring regulations that protect the incumbents' rents (Djankov, La Porta, López-de-Silanes and Shleifer, 2002). The new entrants bear significant administrative costs to start their businesses (REGISTERCOST),

undermined as the local economy integrates more into the global economy, which is proxied by trade openness (TRADEOPENNESS).
Finally, Roe and Siegel (2011) provide evidence that political instability (PINSTAB), first measured by Barro and Lee (1994), could lead to weak stock markets. The major channel through which instability influences stock market development is the fact that sound institutional arrangements, such as legal shareholder protections and courts, do not work well in unstable environments. In addition, ethnolinguistic fractionalization (ETHNOLINGUISTIC) is found to contribute to political instability owing to its effects on inequality.

3 The Data Set and Empirical Strategies

The main data set consists of cross-sectional observations of 48 countries and districts[21], which is a subsample of that in DLLS (2008), and includes 26 explanatory variables.[22] This sample has two advantages: First, it is investigated more thoroughly than were other larger samples. There is a trade-off between the number of explanatory variables included and the sample size. Second, according to La Porta *et al.* (2006), the sample comprises the largest stock markets as measured by capitalization in the 1990s, which already accounted for the majority of important stock markets across the world.
In addition, the dependent variables are proxies for stock market development, including "CMMKT (stock market capitalization to GDP)", "LNLISTED (logarithm of the average ratio of the number of domestic firms listed in a given country to its population)", "IPO (the average ratio of the equity issued by newly listed firms in a given country to its GDP)", and the market liquidity proxy "TRADE (the average total value of stocks traded as a percentage of GDP)". The

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which reduces innovation and hence the need for external financing.

[21] A significant subsample excluded from our study is the former and current socialist countries, which could be counted as both benefits and costs. The costs of excluding these markets are obvious, given that they have been growing rapidly and now account for an important part of the world stock market. However, this treatment comes with huge benefits. The legal institutions and market mechanisms were not well established in these former and current socialist countries in the 1990s, and thus, they are difficult to categorize. In addition, the stock markets could have been regulated differently from those in capitalist countries, which renders the explanatory variables included in our study irrelevant. For example, the public regulator of stock markets in China, the China Securities Regulatory Commission, occasionally suspends admissions of new listed firms, which distorts the effects of other determinants on stock market development.

[22] The sampled countries and districts are the same as those employed in LLSV (1998) except that Taiwan is excluded because its data are extremely fragile. Furthermore, in the section on the robustness check, we employ a variant sample with 44 economies and 27 doubtful variables.

variable TRADE is not included in DLLS (2008) as a dependent variable, although it is a very important characteristic of stock market development.[23] To create a level field for the theoretical explanatory variables to compete with each other, we set no free variables that comprise X_1 in Equation (1) *a priori*. The 26 explanatory variables discussed in the previous literature and reviewed in Section 2 of this article are included as the doubtful variables and to form X_2. Model uncertainty arises whenever a different subset of X_2 is excluded. The exclusion of doubtful variables means that the corresponding elements of β_2 are set to zero (Raftery, Madigan and Hoeting, 1997). The descriptive statistics of the explained and doubtful variables are reported in Table 1.

Bayesian thinking differs from classic statistics in that the regression parameters are deemed to be uncertain and therefore have probability distributions. The estimators are the expectations of the stochastic coefficients, conditional on the observed data. Because each model estimated will contribute to the knowledge on parameter distribution, a Bayesian weight is calculated and applied to combine all of the information. Thus, the BMA algorithm assigns each model a posterior probability that will be used as the Bayesian weights to average over all possible estimated parameters. To compute the Bayesian weight, we follow the previous practice and impose equal prior probabilities on each model in the model space, in addition to assigning the conventional noninformative priors to the parameters β_1 of the free variables and the error variance and an informative Gaussian prior to the parameters β_{2i} of doubtful variables.[24]

The dimension of the model space is determined by the number of doubtful variables, k_2, and equals 2^{k2}, the i^{th} of which is given by Equation (2)

$$y=\alpha+X_1\beta_1+X_{2i}\beta_{2i}+\varepsilon \tag{2}$$

where X_{2i} is a $48\times k_{2i}$ matrix of observations on the included subsets of k_{2i} doubtful variables and β_{2i} denotes the corresponding k_{2i} sub-vector of β_2. Additionally, Equation (2) could be regarded as Equation (1) subjected to the restriction that the k_2-k_{2i} components of β_2 equal zero. With our research, the dimension of the model space I equals 2^{26} (approximately $6.71*10^7$). To give an example, if the research is directed to test whether endowment or legal origin theory robustly explains stock market development, a simplified research question that was investigated by Beck, Demirgüç-Kunt and Levine (2003), then k_2=2. Further, suppose that there are no free variables except for the constant. Therefore, the dimension of the model space

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[23] Earlier studies have identified that high stock market liquidity stimulates productivity growth (Levine and Zervos, 1998) and affects firm performance and operating profitability (Fang, Noe and Tice, 2009), and Cumming *et al.* (2010) are devoted to a discussion solely on the effects of exchange rules on stock market liquidity.

[24] We do not trouble readers with the technical details of the BMA algorithm employed here because the algorithms are obviously not the end of this article; we instead refer readers to MPP (2010) and De Luca and Magnus (2011) for additional information.

is four: One regression with only the intercept, one with the intercept and both endowment proxies and legal origins, and the remaining two with the intercept and either endowment proxies or legal origins.

4 Discussions of Outputs

4.1 Sampling Bias

To show that sampling is not a source of bias that leads to our conclusion that ANTISDI is not robustly correlated with stock market outcome variables, we first replicate the prior analysis reported in Table 6 of DLLS (2008) with their model specification and the smaller sample of 48 countries and districts. The results are shown in Table 2. Unsurprisingly, the ANTISDI is significant in the first three regressions, with the dependent variables CMMKT, LNLISTED, and IPO, and insignificant in the fourth regression with the dependent variable TRADE, which is not reported in the analysis of DLLS (2008).

4.2 BMA Analysis

The outputs of the BMA analysis with 4 dependent variables and 26 doubtful variables are reported in Table 3. The dimension of the model space is 2^{26} (approximately $6.71*10^7$) for each panel, which has three columns. The first column reports the estimated coefficients for each regressor, and the other two report the respective t-statistic and posterior inclusion probability (PIP)[25]. A regressor is viewed as robustly correlated with the dependent variable if the corresponding t-statistic is greater than 1 in absolute value or if PIP is larger than 0.5, in which case the adjusted R^2 will rise after the corresponding regressor is included (MPP, 2010; De Luca and Magnus, 2011).

A general observation from Table 3 is that the established positive correlations between "on-the-book" shareholder protection rules and the proxies for stock market development are fragile. In sharp contrast to its high significance in the regressions reported in Table 2 of the previous subsection, the ANTISDI is not robustly correlated with any of the dependent variables in all four panels. Similarly, the RANTIDRI has no robust correlations with the four dependent variables, which is already shown in DLLS (2008), in which RANTIDRI loses its explanatory power when ANTISDI is included in the model specification.

[25] The posterior inclusion probability is the probability that a given variable is included in the model.

Table 2 Results of OLS Estimation Testing Sampling Bias

The regression estimated is: $Y=a + b * X +\varepsilon$, where the variable "*Y*" represents four dependent variables of interest, namely, CMMKT, LNLISTED, IPO and TRADE. "*X*" represents three independent variables, namely, "anti-self-dealing index", "time to collect on a bounced check", and "GDP per capita". The regressions are estimated using Ordinary Least Squares.

Dependent variables				
Independent variables	CMMKT	LNLISTED	IPO	TRADE
Anti-self-dealing index	76.1634*	50.0525***	3.9128**	-1.0308
	(39.09545)	(17.06564)	(1.805301)	(24.27067)
Time to collect on a bounced	-22.5998**	-0.1941	0.3887	-29.2071***
check	(9.738229)	(5.529378)	(0.5589768)	(10.13397)
GDP per capita	15.7183***	7.5921***	1.0360***	15.9889***
	(5.30491)	(1.74676)	(0.2142326)	(4.523028)
Constant	17.8875	-65.4276	-10.1349**	62.7409
	(67.29334)	(40.72796)	(4.283676)	(61.34448)
R-squared	0.3946	0.4433	0.3865	0.3952
Observation	48	48	48	48

Notes: [a] The sample includes 48 economies.
[b] The regression specification follows the one employed in Table 6 of DLLS (2008).
[c] The robust t-statistics are reported in the parentheses.
[d] *, **, *** indicate 10%, 5%, and 1% levels of significance, respectively.

In addition, the doubtful variables differ in their explanatory power with respect to different proxies for stock market development. When conducting empirical studies, investigators frequently employ a one-size-fits-all specification to explain different proxies for stock market development, although they recognize that these proxies represent different aspects of the stock market. BMA analysis suggests that this treatment could be biased.

In Panel A, NANALYSTS (t-statistics=1.24) proxy for the analysts' activities and TRADEOPENNESS (t-statistics=1.67) proxy for the political power of incumbents are shown to be robustly correlated with the dependent variable CMMKT. The coefficient of variable NANALYSTS confirms the positive effects of private efforts in information disclosure and monitoring. In addition, the positive effect of TRADEOPENNESS is consistent with the empirical conclusion observed in Rajan and Zingales (2003), who argue that TRADEOPENNESS is negatively correlated with the political power of incumbent industrial and financial groups that repress financial development and hence facilitate stock market development.

The purpose of this paper is to assess the likelihood of survival of small firms. To do so, we employ the technique of survival or duration analysis. In particular, the

post-entry survival times or duration of small firms in the market are expressed in terms of a hazard function. The hazard function, also known as conditional failure rate, gauges a firm's proneness to exit the market due to poor financial performance, given that it has survived up to a certain time period. This hazard, in turn, can be viewed as a function of a set of predisposing factors.

Table 3 Results of BMA Estimation

	Panel A			**Panel B**			**Panel C**			**Panel D**		
	Dependent variable:			**Dependent variable:**			**Dependent variable:**			**Dependent variable:**		
	CMMKT			**LNLISTED**			**IPO**			**TRADE**		
Doubtful variables	**coefficient**	**t-stat**	**pip**	**coefficient**	**t-stat**	**pip**	**coefficient**	**t-stat**	**pip**	**coefficient**	**t-stat**	**pip**
antisdi	8.465448	0.32	0.13	-0.3907158	-0.06	0.06	0.053112	0.1	0.05	0.1609706	0.02	0.04
check	-1.027823	-0.19	0.07	1.016896	0.33	0.14	0.0585975	0.23	0.08	-1.977815	-0.31	0.12
gdppercapita	4.359441	0.49	0.25	**12.524***	**3.63**	**0.99**	**1.082995***	**2.67**	**0.93**	0.3977456	0.17	0.07
rantidri	0.2639076	0.11	0.05	0.598527	0.32	0.13	0.0093528	0.1	0.05	0.0132113	0.01	0.04
onevote	0.0495706	0.01	0.04	-0.2624602	-0.15	0.06	0.007667	0.05	0.04	0.7519027	0.16	0.06
frenchlo	-2.138087	-0.24	0.09	-3.454036	-0.45	0.22	-0.0133241	-0.06	0.05	-4.35427	-0.4	0.18
commonlo	0.4939346	0.08	0.05	0.1660344	0.07	0.05	**2.380417***	**1.84**	**0.84**	0.8381168	0.16	0.06
germanlo	0.101393	0.02	0.04	0.0306244	0.01	0.05	0.0129603	0.05	0.04	0.9214838	0.15	0.05
mixedlo	0.9363471	0.13	0.05	0.2855339	0.12	0.05	-0.0618223	-0.13	0.06	-0.0213024	-0.01	0.04
disclosure	21.45044	0.49	0.24	-0.0449039	-0.01	0.05	0.6502807	0.39	0.18	7.245904	0.33	0.14
nanalysts	**2.192506***	**1.24**	**0.67**	-0.2212014	-0.53	0.27	0.0070599	0.24	0.09	**3.93507***	**4.25**	**0.99**
penforcement	2.338942	0.17	0.06	**43.37354***	**2.92**	**0.96**	0.3049804	0.28	0.11	0.4594175	0.07	0.04
itprosecution	2.504776	0.24	0.09	0.1702793	0.08	0.05	0.0068958	0.04	0.04	0.5420711	0.12	0.05
property	0.0457797	0.18	0.07	-0.0144485	-0.16	0.06	0.001283	0.1	0.06	0.0625131	0.26	0.1
origin	2.514344	0.23	0.08	-9.257004	-0.82	0.47	0.0034214	0.02	0.04	1.342572	0.19	0.07
latitude	4.990144	0.21	0.09	-0.624003	-0.1	0.05	0.080016	0.1	0.05	3.593528	0.23	0.08
catholic	-1.325287	-0.19	0.07	**-14.86166***	**-1.54**	**0.79**	-0.0588643	-0.2	0.07	-3.415822	-0.36	0.15
protestant	0.6023518	0.1	0.05	-1.628368	-0.29	0.12	-0.0030098	-0.02	0.04	2.249285	0.27	0.1
muslim	-0.6093499	-0.1	0.05	-0.1645338	-0.07	0.05	0.0245376	0.09	0.04	-0.2241955	-0.06	0.04
buddhist	-8.712656	-0.37	0.16	-0.6287112	-0.17	0.06	-0.0428049	-0.12	0.05	-1.142912	-0.16	0.06

newspaper	0.1254197	0.04	0.05	-0.0138601	-0.01	0.05	0.0242873	0.11	0.06	1.352092	0.3	0.12
registercost	-1.79744	-0.2	0.07	0.7483625	0.22	0.08	-0.0117011	-0.05	0.04	-0.1706753	-0.05	0.04
ethnolinguistic	3.832411	0.18	0.08	0.550641	0.12	0.06	0.0094652	0.02	0.05	0.133577	0.02	0.04
tradeopenness	**0.3667119***	**1.67**	**0.81**	**0.1340797***	**1.86**	**0.85**	0.0004609	0.19	0.07	-0.0009832	-0.04	0.04
employment	-10.38397	-0.33	0.14	-1.755256	-0.23	0.09	-0.0048078	-0.01	0.05	-1.716961	-0.15	0.06
pinstab	-0.1120533	-0.02	0.04	-0.3917351	-0.14	0.05	0.1791251	0.25	0.09	0.1584461	0.03	0.04
constant	-32.31503	-0.39	1	**-110.41***	**-3.34**	**1**	**-8.566456***	**-2.54**	**1**	-2.947554	-0.06	1

Notes: [a] The sample includes 48 economies.
[b] The regression estimated is: $y=\alpha+X\beta+\varepsilon$, where the variable "$y$" represents four dependent variables, namely, CMMKT, LNLISTED, IPO and TRADE, "X" is a vector of 26 doubtful variables, and "α" is the constant term, which is fixed in our model specification.
[c] For regressions with dependent variables CMMKT, LNLISTED, and TRADE, the regressors ITPROSECUTION and TRADEOPENNESS are included with observations for year 1999; for regressions with dependent variable IPO, these two regressors are included with observations for year 1996. This strategy reflects the fact that these two subsets of dependent variables cover different time intervals.
[d] * indicates that the t-ratio is greater than one in absolute value for free variables and that either t-ratio is greater than one in absolute value or PIP is larger than 0.5 for doubtful variables.

Additionally, Panel B reports that GDPPERCAPITA (t-statistics=3.63), PENFORCEMENT (t=2.92), CATHOLIC (t=-1.54), and TRADEOPENNESS (t=1.86) are robustly correlated with the dependent variable LNLISTED. According to La Porta et al. (2006), the *de jure* power enjoyed by public regulators, as measured by PENFORCEMENT, is important for public regulators to intervene and investigate the crimes of corporate insiders, which should be positively correlated with the stock market development. In addition, CATHOLIC is shown to have a negative coefficient, indicating that Catholic countries have relatively few listed firms per capita. The negative effect is similar to that reported by Stulz and Williamson (2003) on debt markets.

5 Robustness Check

In this section, we show that our conclusions are robust to the varied data set and empirical method. On one hand, some of the theoretical determinants of stock market development are excluded in the previous analysis due to missing observations. In section 5.1., we therefore employ two indices updated by Spamann (2010) and one constructed by Jackson and Roe (2009). On the other, we analyze the question from a variable selection perspective. In section 5.2., we employ SBE to show that our conclusions are not driven by the Bayesian algorithm.

5.1 BMA Analysis with a Different Sample

Spamann (2010) updates two indices ONEVOTE and ANTIDRI proposed by LLSV (1998). He finds that the original ANTIDRI is constructed with errors and proposes a corrected version of ANTIDRI (ANTIDRI_SP). Furthermore, he reconsiders the "one share-one vote" principle and constructs the variable ONEVOTE_SP based on whether the legal rules mandate that the voting and cash-flow rights should be proportional. In addition, Jackson and Roe (2009) put forward a resource-based theory of regulation, arguing that STAFF, the proxy for the resources owned by the public enforcers, predicts stock market development. To incorporate these three variables, our sample size is reduced to 44 economies and 27 doubtful variables.[26] The outputs of the BMA analysis with this variant data set are reported in Table 4, in which the dimension of the model space is 2^{27} (approximately $1.34*10^8$) for each panel.

[26] The excluded countries are Indonesia, Sri Lanka, Venezuela and Zimbabwe.

Table 4 Results of Robustness Checks of the BMA Estimation

	Panel A Dependent variable: CMMKT			Panel B Dependent variable: LNLISTED			Panel C Dependent variable: IPO			Panel D Dependent variable: TRADE		
Doubtful variables	**coefficient**	**t-stat**	**pip**	**coefficient**	**t-stat**	**pip**	**coefficient**	**t-stat**	**pip**	**coefficient**	**t-stat**	**pip**
antisdi	9.231953	0.33	0.14	2.99742	0.32	0.13	0.0047229	0.01	0.05	0.2987173	0.04	0.04
check	-0.8699835	-0.17	0.06	0.1639762	0.12	0.05	0.0656963	0.24	0.09	-1.70039	-0.28	0.11
gdppercapita	3.291711	0.4	0.19	2.003384	0.55	0.3	**1.187422***	**2.5**	**0.91**	0.3500049	0.15	0.06
antidri_sp	0.2121881	0.09	0.04	0.5794723	0.3	0.12	-0.0153151	-0.14	0.05	-0.1389017	-0.08	0.04
onevote_sp	0.1085203	0.02	0.04	0.1416722	0.08	0.04	-0.0298662	-0.12	0.05	0.3214887	0.08	0.04
frenchlo	-1.75433	-0.21	0.08	-4.353759	-0.57	0.29	-0.0056825	-0.02	0.04	-3.275787	-0.33	0.14
commonlo	0.3244599	0.05	0.05	-0.0597206	-0.03	0.05	**2.619932***	**1.93**	**0.85**	0.7873206	0.15	0.06
germanlo	0.2401179	0.04	0.04	0.039904	0.02	0.04	0.0145806	0.06	0.04	0.932627	0.14	0.05
mixedlo	0.9032099	0.11	0.05	1.224201	0.26	0.09	-0.1047157	-0.17	0.07	-0.131869	-0.03	0.04
disclosure	25.31572	0.53	0.27	4.29161	0.37	0.16	0.5991213	0.35	0.15	7.387872	0.33	0.13
nanalysts	**2.213395***	**1.22**	**0.66**	-0.01174	-0.08	0.06	0.00604	0.22	0.08	**3.964728***	**3.89**	**0.98**
penforcement	1.191638	0.09	0.05	2.304707	0.25	0.1	0.2548037	0.25	0.09	0.4041131	0.06	0.04
itprosecution	4.585646	0.31	0.12	4.386917	0.58	0.31	0.0075303	0.04	0.04	1.028818	0.16	0.06
staff	0.6119403	0.69	0.38	**1.145044***	**4.08**	**0.98**	0.0040917	0.23	0.09	0.0305008	0.18	0.06
property	0.0315551	0.14	0.06	-0.0055118	-0.06	0.06	0.0009293	0.08	0.05	0.0565315	0.24	0.09
origin	2.484849	0.23	0.08	-0.5683517	-0.16	0.07	0.0029247	0.01	0.04	1.25646	0.18	0.06
latitude	2.075489	0.12	0.06	-0.1302158	-0.02	0.06	0.1030342	0.12	0.05	2.769638	0.19	0.07
catholic	-1.196427	-0.18	0.07	-5.571627	-0.63	0.35	-0.0300649	-0.13	0.05	-4.077827	-0.38	0.16
protestant	0.449312	0.08	0.05	-0.5506327	-0.13	0.07	-0.0003723	0	0.04	2.10185	0.26	0.1
muslim	-0.0829432	-0.01	0.04	-0.4237459	-0.12	0.05	0.0237085	0.08	0.04	-0.0141977	0	0.04

buddhist	-4.822641	-0.26	0.1	-1.412124	-0.23	0.08	-0.0619864	-0.14	0.05	-1.205434	-0.15	0.05
newspaper	0.1400433	0.04	0.05	0.0623719	0.04	0.06	0.0414599	0.16	0.06	1.357537	0.28	0.11
registercost	-1.340576	-0.17	0.06	-0.2871111	-0.11	0.06	-0.0023243	-0.01	0.04	-0.117425	-0.03	0.04
ethnolinguistic	2.915321	0.16	0.06	0.3656614	0.08	0.06	-0.0205208	-0.04	0.04	0.2272953	0.03	0.04
tradeopenness	**0.2249076***	**0.91**	**0.51**	0.004801	0.17	0.06	0.0002896	0.14	0.05	-0.0017069	-0.06	0.04
employment	-3.768245	-0.19	0.07	-0.2170581	-0.05	0.04	0.0119929	0.02	0.04	-1.177344	-0.11	0.05
pinstab	-0.2213327	-0.03	0.04	-0.8162005	-0.19	0.07	0.2126067	0.27	0.1	0.1998215	0.04	0.04
constant	-26.10953	-0.33	1	-15.38059	-0.48	1	**-9.629286***	**-2.46**	**1**	-3.831801	-0.08	1

Notes: [a] The sample includes 44 economies.

[b] The regression estimated is: $y=\alpha+X\beta+\varepsilon$, where the variable "$y$" represents four dependent variables, namely, CMMKT, LNLISTED, IPO and TRADE, "X" is a vector of 27 doubtful variables, and "α" is the constant term, which is fixed in our model specification.

[c] For regressions with dependent variables CMMKT, LNLISTED, and TRADE, the regressors ITPROSECUTION and TRADEOPENNESS are included with observations for year 1999; for regressions with dependent variable IPO, these two regressors are included with observations for year 1996. This strategy reflects the fact that these two subsets of dependent variables cover different time intervals.

[d] * indicates that the t-ratio is greater than one in absolute value for free variables and that either t-ratio is greater than one in absolute value or PIP is larger than 0.5 for doubtful variables.

In general, the results of BMA analysis with a different data set are similar to those reported in Section 4. The ANTISDI is not correlated with any of the four dependent variables, nor is the ANTIDRI_SP. In addition, the variable STAFF (t=4.08) shows significant predictive power for LNLISTED in Panel B. The result is consistent with that reported by Jackson and Roe (2009) that resources owned by public regulators have strong predictive power for stock market development. However, one caveat is that STAFF is observed for the year 2005, which could lead to reverse causality, *i.e.*, more per capita listed firms lead to larger public enforcers.

5.2 Stepwise Backward Elimination

To show that our findings are consistent when different empirical method is employed, we adopt the variable selection algorithm, SBE, which is discussed and realized by Lindsey and Sheather (2010), to select the optimal predictors of stock market development. SBE works as follows: It starts from a general model with all candidate regressors and then eliminates regressors using any of the two information criteria: Adjusted R-squared and Akaike information criterion (AIC). The algorithm attempts to identify the model that optimizes the information criteria.

To maintain the largest possible sample size, we employ our original data set with 48 countries and districts used in Section 4, rather than the one with 44 countries and districts used in Section 5.1. Hence, there are 26 candidate explanatory variables. The outputs are reported in Table 5, which unsurprisingly confirm the conclusions made in the previous section that ANTISDI is not positively correlated with stock market development. Although selected as one of the predictors for LNLISTED, it is negative in magnitude, which conflicts with its theoretically positive effects. In addition, RANTIDR is selected as one of the predictors for LNLISTED and is positive in magnitude and selected as one of the predictors for TRADE but is negative in magnitude. Finally, diverse sets of variables are selected as the optimal predictors with respect to different outcome variables, which confirm our previous concern about the validity of “one-size-fits-all” model specification.

Table 5 Results of Stepwise Backward Elimination

Panel A						Panel B					
Dependent Variable: CMMKT						Dependent Variable: LNLISTED					
Adjusted R^2			AIC			Adjusted R^2			AIC		
variables	**coefficient**	**t-stat**	**variables**	**coefficient**	**t-stat**	**variables**	**coefficient**	**t-stat**	**variables**	**coefficient**	**t-stat**
gdppercapita	14.05767*	1.82	gdppercapita	15.65006**	2.06	antisdi	-34.0457**	-2.22	antisdi	-31.1083**	-2.07
disclosure	68.72203	1.63	disclosure	73.167*	1.74	check	6.937857	1.69	check	7.652627*	1.89
nanalysts	1.795097	1.53	nanalysts	1.819698	1.55	gdppercapita	18.03766***	7.12	gdppercapita	17.50402***	7.05
receptive	-31.8408	-1.62	receptive	-30.815	-1.57	rantidri	8.720184***	3.07	rantidri	8.342457***	2.96
catholic	-42.3168	-1.66	catholic	-41.6003	-1.63	onevote	-5.24046	-1.02	nanalysts	-0.71251*	-1.98
protestant	-45.1576*	-1.69	protestant	-43.08	-1.62	nanalysts	-0.73752**	-2.05	penforcement	50.06216***	4.36
muslim	-36.0971	-1.25	muslim	-44.3019	-1.59	penforcement	52.9775***	4.48	origin	-17.3487**	-2.41
buddhist	-93.5103***	-2.96	buddhist	-91.1366***	-2.89	origin	-18.6125**	-2.55	catholic	-35.3398***	-4.78
registercost	-22.1311	-1.02	tradeopenness	0.345416**	2.53	catholic	-35.3318***	-4.78	protestant	-12.5771	-1.49
tradeopenness	0.344421**	2.52	employment	-60.7918	-1.4	protestant	-12.4109	-1.47	muslim	-11.7952	-1.39
employment	-65.847	-1.51				muslim	-9.80664	-1.13	buddhist	-20.8368**	-2.22
						buddhist	-18.8139*	-1.96	tradeopenness	0.181624***	4.15
						tradeopenness	0.177509***	4.04			
constant	-51.289	-0.71	constant	-76.542	-1.13	constant	-189.761***	-5.35	constant	-188.98***	-5.33
Adjust R^2	0.5561		Adjust R^2	0.5557		Adjust R^2	0.7741		Adjust R^2	0.7738	

Panel C						Panel D					
Dependent Variable: IPO						Dependent Variable: TRADE					
Adjusted R^2			AIC			Adjusted R^2			AIC		
variables	**coefficient**	**t-stat**	**variables**	**coefficient**	**t-stat**	**variables**	**coefficient**	**t-stat**	**variables**	**coefficient**	**t-stat**

check	1.911109***	3.22	check	1.911109***	3.22	rantidri	-10.2765	-1.57	rantidri	-8.86597	-1.37
gdppercapita	1.548581***	3.84	gdppercapita	1.548581***	3.84	disclosure	101.0772**	2.7	disclosure	94.08629**	2.53
disclosure	3.476144*	1.8	disclosure	3.476144*	1.8	nanalysts	2.449634**	2.59	nanalysts	2.30254**	2.44
nanalysts	0.10838*	1.88	nanalysts	0.10838*	1.88	penforcement	-55.5679*	-1.8	penforcement	-44.2885	-1.5
receptive	-1.55627	-1.46	receptive	-1.55627	-1.46	itprosecution	33.83439**	2.03	itprosecution	29.92404*	1.82
origin	-1.65976	-1.35	origin	-1.65976	-1.35	property	1.138246**	2.37	property	0.859464*	2.02
catholic	-1.84116**	-2.17	catholic	-1.84116**	-2.17	receptive	-64.5997***	-3.45	receptive	-50.8269***	-3.39
buddhist	-2.91613**	-2.39	buddhist	-2.91613**	-2.39	origin	-24.8648	-1.22	muslim	-23.5413	-1.38
tradeopenness	0.010817*	1.69	tradeopenness	0.010817*	1.69	muslim	-28.6992	-1.64	buddhist	-56.7615**	-2.47
employment	-3.38163*	-1.7	employment	-3.38163*	-1.7	buddhist	-67.5244***	-2.75	employment	-55.7882	-1.51
pinstab	1.673907	1.26	pinstab	1.673907	1.26	employment	-53.8834	-1.47			
constant	-21.9192***	-4.39	constant	-21.9192***	-4.39	constant	-24.2731	-0.55	constant	-15.3454	-0.35
Adjust R^2	0.5373		Adjust R^2	0.5373		Adjust R^2	0.5876		Adjust R^2	0.5822	

Notes: [a] The sample includes 48 economies.
[b] No variable is fixed in the model specification; hence, there are in total 26 candidate variables for selection.
[c] For regressions with dependent variables CMMKT, LNLISTED, and TRADE, the regressors ITPROSECUTION and TRADEOPENNESS are included with observations for year 1999; for regressions with dependent variable IPO, these two regressors are included with observations for year 1996. This strategy reflects the fact that these two subsets of dependent variables cover different time intervals.
[d] *, **, *** indicate 10%, 5%, and 1% levels of significance, respectively.

6 Conclusion

The law and finance literature has achieved great successes in terms of academic citations and influence on the policies adopted by the World Bank and the International Monetary Fund. However, the identification strategies undermine its credibility. As was stated at the beginning of this paper, we have great sympathy for the argument that law matters for stock market development and, more generally, economic growth. However, the empirical evidence provided by macro law and finance studies should be viewed sceptically. This paper applies the BMA algorithm to this literature and provides counter-evidence to the conclusions that "law matters" as proposed by DLLS (2008). The study finds that anti-self-dealing rules are not robustly correlated with stock market development after taking model uncertainty into account. Our findings do support the correlation between the information disclosure, political power of incumbents and economic development and stock market development.

As was cautioned by Klick (2011), scholars who are interested in the effects of legal institutions on development and economic activity should be careful when they attempt to examine these relationships empirically because statistical identification problems such as omitted variables and endogeneity are difficult to resolve. In future studies, a deeper understanding of the relationship between legal institutions and economic performance can scarcely be expected unless we find better empirical methods by which the aforementioned problems can be solved convincingly. In addition, before we attempt to measure and codify targeted legal rules, we must learn the nuances of specific laws more deeply (perhaps with the assistance of lawyers), understand the relationships between laws and other governance mechanisms that can be used to support stock markets (substitute or complement), and address the factors that might influence the functioning of a legal system, such as politics, culture, and history. In summary, there is much work to be accomplished before we can persuasively argue that the law truly matters for finance.

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