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Abstract

This study analyses the impact of firm-level variables as well as country-level institutional factors on firm value in the Latin American region. The theoretical framework used to develop the research hypotheses has followed a corporate governance approach. The sample includes public firms from Argentina, Brazil, Chile, Colombia, Mexico, and Peru for the 1997–2013 period. The main findings indicate that ownership concentration, capital structure, and dividend policy are significant drivers of the market value of the firm. The results from determinants at the country-level show that legal enforcement and regulatory systems positively impact the market value of the firm, while the findings show unexpected results concerning the development of the financial system.

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ORIGINAL PAPER

Determinants of firm value in Latin America: an analysis of firm attributes and institutional factors

Paolo Saona[1] · **Pablo San Martín**[2]

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Abstract This study analyses the impact of firm-level variables as well as country-level institutional factors on firm value in the Latin American region. The theoretical framework used to develop the research hypotheses has followed a corporate governance approach. The sample includes public firms from Argentina, Brazil, Chile, Colombia, Mexico, and Peru for the 1997–2013 period. The main findings indicate that ownership concentration, capital structure, and dividend policy are significant drivers of the market value of the firm. The results from determinants at the country-level show that legal enforcement and regulatory systems positively impact the market value of the firm, while the findings show unexpected results concerning the development of the financial system.

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1 Introduction

The mechanisms of corporate governance across emerging economies manifest differently from those widely observed and analyzed in developed countries, particularly in the USA (Claessens et al. 2002; Claessens and Yurtoglu 2013; De Jong et al. 2008; Klapper and Love 2004; Morey et al. 2009). Additionally, most papers have analyzed corporate governance tools at either the firm-level or the country-level, but have not paid attention to both together. Therefore, the major goal of this paper is to examine, under a corporate governance approach, how firm-level and country-level variables impact the firm market value in a sample of Latin American companies.

Following López and Crisóstomo (2010), three variables are studied from among the firm-level corporate governance systems: the ownership structure, the financing decision, and the dividend policy. The first one, ownership structure, is included in the analysis because in emerging economies, and particularly in Latin American countries, the corporate ownership structure is characterized by high concentration and/or pyramidal structures (Buchuk et al. 2014; De Jong et al. 2009). The second and the third ones, financing and dividend policies, are studied because they are two complementary ways to control for agency problems since they are likely to affect the managerś incentives and, hence, the firm value (Barclay and Smith 1999; Harris and Raviv 1991). In addition to these three variables, differently from López and Crisóstomo (2010), country-level variables were also considered in the study for a representative sample of Latin American firms. In that sense, this paper is one step forward from López and Crisóstomo (2010)́s one country study.

With regards to country-level governance systems and their impact on firm value, only a few papers have been developed in relation to emerging markets (Chari et al. 2010; Gibson 2003; Klapper and Love 2004; López and Crisóstomo 2010; Mitton 2004; Morey et al. 2009). Therefore, country-level determinants of firm value such as the legal and regulatory systems, as well as the development of the financial system, are considered in this study.

In addition to the major contributions of this paper, there are a number of limitations in the current empirical literature that we would like to address somehow, for instance (1) most of the papers do not treat properly the endogeneity problems (Balasubramanian et al. 2010; Black et al. 2012; Espinosa and Maquieira 2010; Gippel et al. 2015; Mitton 2004), and therefore, any interpretation regarding causality must be considered cautiously; (2) other limitations of these works are rooted either in their scope and/or in their scale. While on the one hand they intend to use samples of firms from different countries, they nevertheless lack representativeness for further extrapolation (e.g. see Lins (2003) for a sample of 18 emerging markets, with 4 of them from Latin America; Garay and González (2008) for Venezuelan firms; Klapper and Love (2004) for Brazil and Chile; Espinosa et al. (2012) for four Latin American countries; among other works). On the other hand, they opt for using either firm-level or country-level determinants of firm value, but rarely both. This does not allow them to verify the impact of both factors, at the firm- and country-level (De Jong et al. 2008; Morey et al. 2009); and (3) some papers establish the relationship between

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corporate governance systems and firm market value from an intuitive more than theoretical point of view (Balasubramanian et al. 2010; Silva et al. 2006), showing some results with no clear theoretical support. All these limitations in the empirical literature leave hanging several unanswered questions. Indeed, we believe that certain classical hypotheses applicable to the Anglo-Saxon context could be reversed in the context of emerging markets, given their characteristics (high concentration of ownership, low development of financial markets, weak investor protection law, and mandatory dividend, among others).

Accordingly, the motivation of this work is to contribute to the current empirical literature on the study of the firm value following a corporate governance approach, on the one hand; and in addressing some unanswered questions on corporate governance issues in the context of emerging economies, on the other hand.

The main findings of this study indicate that determinants at the firm-level: i.e., ownership concentration, capital structure, and dividend policy, are important drivers of firm value. Determinants at the country-level: i.e., improvements in the legal and regulatory systems, press up the market value of the firm. However, contrary to what was expected, when financial markets become more developed in Latin America, firm value declines.

The remainder of the paper is structured as follows: Sect. 2 describes the literature review and develops the research hypotheses. Sect. 3 articulates the methodology applied in the empirical analysis and describes the main variables and the sample of firms. The main findings are summarized in Sect. 4 and finally, in Sect. 5, we present our conclusions.

2 Literature review and research hypotheses

There is no a single and all-embracing definition of corporate governance. The theoretical literature provides many definitions from different approaches, but all of them are built upon two pillars. First, as a set of behavioral patterns, or in other words, the actual behavior of corporations in term of, for instance, the way they are managed or how their financial decisions are made, among others; and second, as a normative framework which defines the way firms are governed (Claessens and Yurtoglu 2013). Therefore, corporate governance could be understood as the set of internally and externally generated mechanisms (e.g. Norms, rules, procedures, policies, and institutions, among others) through which firms operate when ownership is separated from management in order to ensure the maximization of shareholderś wealth.

2.1 Firm-level determinants

As a consequence of the separation between ownership and control, managers have a propensity to engage in self-serving behavior such as perquisite consumption, empire building, and shirking of effort (Jensen and Meckling 1976). The literature describes several corporate governance mechanisms that alleviate the vertical—or type I—agency conflict between shareholders and managers as well as the

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horizontal agency problem—type II—between majority and minority shareholders. From here on out, the firm-level governance systems to be analysed are focused on the role of corporate ownership concentration, the financing decisions, and the dividend policy as disciplining devices.

2.1.1 Corporate ownership concentration

The way in which ownership is shared among stockholders could alleviate or aggravate agency problems. It has been widely argued that concentrated ownership structures solve some agency problems through direct supervision of managers (Ang et al. 2000). This argument suggests a positive relationship between ownership concentration and firm value as posited by the monitoring hypothesis which essentially states that vertical agency conflict could be efficiently mitigated through a higher ownership concentration (Jensen and Meckling 1976; Shleifer and Vishny 1986). Nevertheless, a highly concentrated ownership structure might negatively impact on firm value as highlighted by the expropriation hypothesis. The expropriation problem—also named the horizontal agency problem—occurs when controlling-majority shareholders use their decision power in their own best interest, which does not necessarily correspond with that of minority shareholders (de Miguel et al. 2004, 2005). As a result, there is a redistribution of wealth from minority to majority shareholders, which suggests a negative change in the firm market value when the ownership in the hands of majority shareholders increases. On the one hand, the dominant shareholder has incentives to maintain weak internal controls in order to facilitate the expropriation (Bozec and Bozec 2007); and, on the other hand, dispersion of ownership into hands different from the dominant shareholder, produces free-rider problems and wrong incentives for monitoring (Bottazzi et al. 2009).

Omran et al. (2008) state that ownership concentration is an endogenous response to poor legal protection of investors. Therefore, it is more plausible to find out evidence of the expropriation problem of minority shareholders in the Latin American corporate sector which suffers from weak legal protection of investors. Consequently, it is expected that highly concentrated ownership structure impact negatively on firm value. Nevertheless, it may also be expected a positive impact of ownership concentration on firm value at relatively low levels of concentration as the vertical agency problems are solved according to the monitoring hypothesis.

For instance, the empirical work of Crisóstomo et al. (2014) shows that in financial systems where the rights of minority shareholders are poorly protected, such as in Brazil, block ownership—comprised of nonfinancial firms—is able to reduce the intensity of financial constraints, and consequently increase the firm value. The arguments of Crisóstomo et al. (2014) support therefore the monitoring hypothesis.[1] Briefly, we can state that the configuration of corporate ownership

[1] Crisóstomo et al. (2014) claim that nonfinancial firms as blockholders in Brazil bring more active management monitoring; reduce the likelihood of overinvestment; lower the change of managerial discretionary behavior; reduce the agency conflicts between ownership and control; and improve the information with financial markets. In that sense, Dyck and Zingales (2004) analyze the premium paid for control blocks in 37 countries. Their findings suggest that the premium is 27 % for Argentina and Colombia, 65 % for Brazil, 18 % for Chile, 34 % for Mexico, and 14 % for Peru.

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concentration as a corporate governance device could be a double-edged sword that could enhance or dilute the firm market value. Then, our research hypothesis suggests that:

H1 A non-linear relationship between ownership concentration and firm value is expected in Latin American companies.

2.1.2 Capital structure decisions

Beyond the classical explanation of financing decisions based on the cost of external resources, on the asymmetric treatment of taxation or on bankruptcy costs, there are several arguments that support the interaction between capital structure and conflicts of interest in the firm, and therefore, firm value. The first way in which leverage would influence the efficiency of firms comes from the use of debt as a control mechanism by managers (Barclay et al. 2003; Harris and Raviv 1991). The preference that managers have for the consumption of perks—overinvestment in the Jensen (1986)'s words—at the expense of shareholder wealth is alleviated through more leveraged capital structures. Highly leveraged capital structures increase the firms insolvency risk and the chance of managers losing their jobs (Hunsaker 1999; López and Saona 2007). Consequently, managers would avoid such risk by following the interests of their current shareholders and increasing the firm value. Nevertheless, when the debt level is overwhelmingly high, it loses its characteristic as a corporate governance tool as a consequence of the excessive insolvency risk, which eventually impacts negatively on the firm value.

The second way is determined by restrictions imposed by debt agreements. In this case, firms reduce free cash flows by paying back the principal and interests on debt periodically, which otherwise might be used opportunistically in unprofitable investment projects (Jensen 1986).[2] The third characteristic of debt as a corporate governance system is performed by the clauses of debt covenants.[3] Although the debt covenants are supposed to have a positive impact on firm value, they might also have a negative impact. Barclay and Smith (1996) argue that affirmative covenants (for example, those requiring the firm to maintain specific working capital balances) positively impact the firm value and are usually observed at lower levels of debt. Nevertheless, they also suggest that negative covenants might exist (those prohibiting the firm from issuing additional debt unless a specified financial ratio is maintained) and are usually observed at high levels of debt. In this case, the firm might not take advantage of profitable growth opportunities and consequently the firm value could be negatively impacted.

As described above, increasing the debt level indefinitely might not contribute indefinitely to firm value. These arguments could be supplemented with the trade-off hypothesis, which suggests that firms look for a certain optimal level of leverage

[2] The free cash flows are those available for the discretional use of managers once the future growth opportunities with positive net present values have been financed.

[3] Covenants are particular clauses in debt contracts of firms that restrict business policy, giving creditors the possibility of putting precise actions into force and enhancing their incentives to monitor (Rajan and Winton 1995).

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which balances the tax-debt benefits and bankruptcy costs of debt (Myers 1984). So, from the argument above, we derive the hypothesis that:

H2 A non-linear relationship is expected between leverage and firm value in Latin American companies.

2.1.3 Dividend policy

The dividend payout may play different roles in capital markets characterized by large gaps of information and serious market imperfections (La Porta et al. 2000; Setia-Atmaja 2009) as is the case of countries with immature financial markets such as in Latin American. In these contexts, the payout policy has an informative content in the capital markets regarding the future prospects of the firm, and consequently higher payout ratios are evidenced (Brav et al. 2005). Similarly, Mitton (2004) suggests that the preference for dividends may be stronger in emerging markets with weak investor protection if shareholders perceive a greater risk of expropriation by insiders.

Theoretically speaking, dividends payment may be characterized as a value-enhancing mechanism; but also in certain situations, dividends may dilute the firm value. The arguments supporting a positive relationship between the dividend payment and firm value come basically from the agency approach. According to the agency model (Jensen 1986), the dividend policy works as a disciplining device in two different ways. First, the payment of dividends might serve to align the interests and mitigate the agency problems between managers and shareholders and enhance firm value, by reducing the discretionary funds available to managers that otherwise may be used in unproductive activities (e.g. perks consumption, empire building, overinvestment, etc.) (Ferris et al. 2009; Pindado and De La Torre 2006). Second, according to López and Saona (2007) the payout policy improves managerial supervision by incorporating the market as supervisor. In this case, at relatively low levels of dividend payment, when firms pay dividends periodically, the company is impelled to get external funds from the debt market, for instance. Consequently, such participants in the debt market take a supervisory role with the borrowed funds by monitoring the performance of managers and increasing the value of the firm (Easterbrook 1984).

However, also there are arguments which support a negative relationship between the dividend payment and firm value, from the transaction costs modeled by Rozeff (1982). According to this, at relatively high levels of dividend payment, the financing costs of issuing debt to pay dividends offset the monitoring benefits of such debt by pressing down the firm value. This notion is consistent with the fact that shareholders want to minimize the transaction costs of external financing (Dempsey and Laber 1992; Maquieira and Moncayo 2004).

Therefore, the two opposing influences of dividend payout on firm value described above lead to an optimal payout ratio that would maximize the firm value (Rozeff 1982). In a nutshell, on the one hand, when agency costs decline as dividend payout is increased, the firm value also increases; and on the other hand, when transactions costs of financing increase as dividend payout is increased, the firm

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value decreases. Then, minimization of the sum of these two costs would turn out in a single optimum level of dividends where firm value is maximized. These relationships would suggest a non-linear relationship between firm value and payout ratio.

As we stated above, the dividend policy has significant implications in contexts of relatively weak protection of investorś rights. As a matter of fact, only a handful of countries in the world apply mandatory dividends (from which Brazil, Chile, and Colombia are in our sample) to improve the protection of minority investors from wealth expropriation. This specific institutional characteristic makes even stronger the relationship between dividend policy and firm value. All these arguments articulate our third hypothesis which suggests that:

H3 The dividend policy is expected to impact in a non-linear manner the firm market value in Latin America.

2.2 Country-level determinants

The country-level determinants correspond to those exogenous variables associated with corporate governance systems that impact firm value. Demirgüç-Kunt and Levine (2004) categorize these kind of variables into: regulatory variables, macroeconomic and financial system control variables, and institutional variables. In terms of the purpose of this work, we simply categorize the country-level determinants into legal and regulatory systems and financial development systems. Claessens and Yurtoglu (2013) suggest that the current challenges of corporate governance are highly determined by the development of both financial markets and legal systems. Since this work is based on a corporate governance approach, we cannot dissociate these two groups of variables in the theoretical and empirical analysis.

2.2.1 Financial development of capital markets

The positive influence of the development of a countrýs financial sector on the level and growth rate of its per capita income has been widely accepted in the literature (Rajan and Zingales 1998). The role of financial institutions in capital markets is to serve as a middleman between saving and borrowing units by reducing the transaction costs. Financial development enhances the allocation of capital, liquidity, the firms' access to more sophisticated financial instruments, the flows of information, and reduces the cost of external financing, thereby better enabling firms to exploit current growth opportunities (Love 2011). For a sample of developed and developing countries, Raddatz (2006), for instance, provides evidence that higher financial development translates into a greater number of real growth opportunities and positive net present value projects due to the lower cost of external financing.

When financial markets are not well developed, market anomalies and opportunistic behavior arise, affecting negatively the firm value. The work of Lin and Tai (2013) reports that analysts would recommend poorly governed firms to their clients in an emerging market where information asymmetry tends to be high

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and shareholder rights are not well protected by legal systems—i.e., low financial development. They also state that the improved corporate governance gleaned from developed financial systems not only reduces agency problems within firms, but also enhances information quality produced by analysts. Consequently, our hypothesis on financial development suggests that:

H4 More developed financial markets positively affect firm value in emerging markets.

2.2.2 Legal enforcement and regulatory system

Demirguç-Kunt and Maksimovic (1998) and later on Demirgüç-Kunt and Levine (2004) find that better legal enforcement and efficient regulatory systems are associated with lower levels of corruption, which make financial systems perform with fewer frictions. Although focused on financial institutions only, Naceur and Omran (2011) study the influence of both bank regulation and concentration in the banking industry on the value of Middle East and North Africa commercial banks. They find that regulatory and institutional variables such as reduction in corruption and improvement in law and order decreases cost efficiency, which impacts positively on value. This implies that there is a positive association between legal enforcement and the efficiency of the regulatory system and firm value.

The legal and regulatory system involves a number of dimensions such as the root of the legal system; the general protection of property rights (particularly those of creditors and shareholderś); the enforcement of the law; lack of corruption; transparency and disclosure of information, among others. In cross-country analyses, many of these aspects are qualitative and consequently not easily captured and codified (Claessens and Yurtoglu 2013). For almost fifty countries, La Porta et al. (2006) analyze the specific provisions in securities laws governing IPOs and examine the relationship between these provisions and various measures of stock market development. They find strong evidence that laws mandating disclosure and facilitating private enforcement through liability rules benefit stock markets. Similarly, Klock et al. (2005) study the relationship between the cost of debt and a governance index. Particularly, they find that strong (weak) antitakeover provisions are associated with a lower (higher) cost of debt financing which improves (worsens) the firm value. Therefore, we hypothesize that:

H5 The better the regulatory and legal system across countries, the higher the market value of the firms will be.

3 Methodology, baseline model, and variables definition

3.1 Methodology

This empirical work has been done through panel data analysis, which allows us to control for two typical problems in the corporate finance literature: the heterogeneity and the endogeneity problems (Arellano 2002; Gippel et al. 2015).

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In earlier studies, researchers typically based their inferences on the estimated parameters from reduced-form cross-sectional Ordinary Least Squares (OLS) regressions of firm value. A regression model like this treats the independent variables necessarily as exogenous variables. However, in our case, causality may run in both directions, known as the endogeneity problems. The OLS estimations also suffer from unobserved heterogeneity, where the identified relationships are symptoms of some unobservable factor(s) that drive the dependent and independent variables at the same time. Because in both of these cases the independent variables are endogenous and correlated with residuals of the regressions, the OLS estimation is both biased and inconsistent (Brown et al. 2011). Consequently, it follows that any study that ignores the possibility of endogeneity, but makes causal argument, is at the very least incomplete. More significantly, according to Bebchuk and Hamdani (2009), OLS estimations in corporate finance studies could lead to erroneous calls for policy recommendations or fuel support for the so-called 'one-size fits all' viewpoint held by researchers. Therefore, as seen below, we opt for applying a superior estimation method able to handle efficiently with the endogeneity as well as the unobservable heterogeneity problems.[4]

The interaction between firm characteristics and country-level variables must be interpreted carefully because of the possibility of observing spurious relations that foster the endogeneity problem. As argued by Love (2011), the question whether better corporate governance leads to improved valuation might be driven also in the opposite direction, that is, better valuation leads to better corporate governance. She also suggests that better identification methods need to be developed in order to articulate convincing conclusions about the direction of the causality. Although we do not identify the causality direction since this is not the scope of this work, we at least apply an efficient econometric tool with robust standard errors, named the GMM system estimator (SE), to deal with this endogeneity problem.[5]

In order to deal with these sources of endogeneity, we used the two-step SE with adjusted standard errors for potential heteroskedasticity as proposed by Blundell and Bond (1998). Originally, the Arellano and Bond (1991) estimator eliminates the individual fixed effects by transforming the regression in first difference and using GMM to estimate the parameters. The Arellano and Bover (1995) and Blundell and Bond (1998) estimator corresponds to an extension of the Arellano and Bond (1991) estimator, combining a system of regression in difference and still the ones proposed by Arellano and Bond (1991) in levels.

[4] Despite of these major limitations of the reduced-form OLS estimations, for robustness purposes to double check our results, the models were also estimated under this method. In general, although the signs of the most important parameters were the same as those reported in this work; the magnitude of the regression coefficients were quite different. For saving space reasons, outputs under OLS estimations are not tabulated but are available upon request to the authors. The authors appreciate the valuable comments of one of the referees in addressing properly the estimation method through panel data analysis with robust standard errors.

[5] Love (2011) argues that neither the fixed-effect nor the instrumental variables techniques fully remove the possibility of time varying omitted variables, on the one hand; and none of these techniques address reverse causality, on the other hand.

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Since consistency depends on the orthogonality of the instruments, the Hansen overidentification test to check for exogeneity of the instruments will be used. Hansen statistic is robust to heteroskedasticity and autocorrelation.

Regarding the autocorrelation, the test proposed by Arellano and Bond (1991) is applied to the first-difference of the residuals, AR(1). Typically, the null hypothesis of no first-order correlation is not rejected.[6] Therefore, one must also perform the test for second order autocorrelation, AR(2). No rejection of the null hypothesis indicates that the moment conditions are valid.

Since we use micropanel data where the cross-section dimension far exceeds the time-series dimension (i.e., we have many more firms than years), we used a Fisher-type (Choi 2001) test which has as null hypothesis that all the panels contain a unit root to test the stationarity of the variables in the model.[7]

3.2 Sample and variables definition

The dataset for the empirical analysis was obtained from different sources. The audited financial statements and stock quotations at the end of each fiscal year were gathered from the *Thomson Reuters* database. Likewise in other similar empirical works, all financial firms were excluded from the analysis because the very nature of their business and their regulatory system might bias the findings (Black et al. 2012; Crisóstomo et al. 2014; Saona 2014; Setia-Atmaja 2009).[8] Firms with negative equity were also excluded from the sample, which are firms that are technically in bankruptcy, and those firms with lack of information for the empirical analysis (Booth et al. 2001). The macroeconomic information at country level was obtained from the updated data of Beck et al. (2000) publicly available at the World Bank web page, which provides information about financial development by country and year.[9] Worldwide Governance Indicators (WGI) regarding the legal and regulatory systems by country were obtained from the updated work of Kaufmann et al. (2011) whose data set is also publicly available.[10] Finally, the sample is composed of 609 firms from Argentina, Brazil, Chile, Colombia, Mexico, and Peru. The empirical analysis ranges within the period 1997–2013 (See Table 1, Panels A and B), with a total of 4680 observations and an average of 7.68 continuous observations per firm.

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[6] However, this is not considered a problem because $\Delta\varepsilon_{it} = \varepsilon_{it} - \varepsilon_{it-1}$ might be correlated with $\Delta\varepsilon_{it-1} = \varepsilon_{it-1} - \varepsilon_{it-2}$ given that both share the common term ε_{it-1}.

[7] We used the Fisher-type test because it does not require strongly balanced data. This test for panel data unit roots follows a meta-analysis perspective. That is, this test conducts unit-root tests for each panel individually, and then combines the p-values from these tests to produce an overall test.

[8] Financial firms, for example, have very different financing policies which are determined by regulatory constraints, reserve requirements, and portfolio risk, among other variables, which ensure the financial decisions are differently determined from non-financial firms. Thus, since in our work we use leverage as an explanatory variable, we had to remove all financial firms.

[9] The latest update took place in November 2013. Information can be downloaded from the permanent URL http://go.worldbank.org/X23UD9QUX0.

[10] The latest update took place in September 2014. Information can be downloaded from www.govindicators.org.

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Table 1 Composition of the panel data

Country	Observations	Firms	Avg. obs. per country
Panel A: composition of the panel by country			
Argentina	563	73	7.71
Brazil	1676	218	7.69
Chile	778	95	8.19
Colombia	196	29	6.76
Mexico	801	98	8.17
Peru	666	96	6.94
Total	4680	609	7.68
Years			Observations
Panel B: composition of the panel by year			
1997			99
1998			102
1999			115
2000			162
2001			177
2002			165
2003			176
2004			244
2005			285
2006			346
2007			365
2008			392
2009			347
2010			411
2011			433
2012			429
2013			432
Total			4680

Panel A describes the composition of the panel data used in the empirical analysis by country, while Panel B does it by year

The variables considered in the empirical analysis are directly related to the literature review. Details on the construction of dependent and independent variables (including the control variables) are briefly depicted as follows and further details can be found in the "Appendix".

The firm-level determinants and dependent variable are:

Firm value is calculated as the sector-adjusted market to book ratio (*FV*). Since the literature has underlined the influence of some sectorial issues on this variable, such as sector-specific patterns of tangible to non-tangible assets, risk, growth, among others, we follow López and Crisóstomo (2010) and use a sector-adjusted firm value ratio as dependent variables. This ratio corresponds to the difference

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between a firm's market to book ratio and its median value for the firms in the same sector, year, and country.[11]

Corporate ownership concentration It is measured by the levels of ownership concentration and insider ownership (Espinosa 2009; Saona and Vallelado 2005). The ownership concentration (*OWN*) is the proportion of outstanding shares in hands of the majority shareholder. Insider ownership (*INSOWN*) corresponds to the ownership that is closely held and represents the fraction of outstanding shares held by cross holdings (e.g. corporations and holding companies), government, employees, and insiders (e.g. managers, officer and directors).[12]

Capital structure decisions Following similar works (Hovakimian and Li 2011), we measure the capital structure of the firm by the leverage at book value (*LEV*). Whether to measure leverage at market or book value is an issue of debate (Parsons and Titman 2008). Chen and Zhao (2006) argue that the book value of the debt ratio implies a cumulative use of retained funds, debt and equity, thereby revealing the financial policy of the company and its potential impact on firm value. According to Lang et al. (1996) a measure of leverage based on market values could give too much importance to the recent changes in equity. Additionally, Graham and Harvey (2001) provide survey evidence that managers are concerned mostly with book values rather than with market values. Finally, since we would like to measure the governance power of the firm's financing policy, leverage at book value is more suitable since it is not biased by capital market shocks to the firm market value. Consequently, we use book values for the leverage ratio.

Dividend policy Following Mitton (2004) and Adjaoud and Ben-Amar (2010) the payout ratio is measured primarily as dividends per share over earnings per share (*DIV*1) and alternatively we used a dummy variable for the mandatory dividends (*DIV*2).

The country-level determinants are:

Legal enforcement and regulatory system Using the data base provided in Kaufmann et al. (2011), for the legal system the following variables were used, resulting in a total of six dimensions of governance which go from approximately −2.5 (weak) to 2.5 (strong): (1) Voice and Accountability (*VA*); (2) Political Stability and Absence of Violence/Terrorism (*PS*); (3) Government Effectiveness (*GE*); (4) Regulatory Quality (*RQ*); (5) Rule of Law (*RL*); and (6) Control of Corruption (*CC*).

Financial development Six measures of financial development are used throughout the paper (Beck et al. 2000). The first three of them are associated with the development of the banking system such as (1) Deposit Money Bank Assets to GDP (*DBAGDP*); (2) Private Credit by Deposit Money Banks to GDP

11FL01 [11] We appreciate the thorough recommendation of one of the anonymous referees to measure the
11FL02 dependent variable in this way.

12FL01 [12] A much better way to analyse the ownership structure is based on the relationship between the cash
12FL02 flow rights and voting rights of the major/controlling shareholder. However, since we do not account for
12FL03 this sort of information from our firms sample, we had to measure the ownership concertation based only
12FL04 on the direct voting rights. Despite this particular limitation in the construction of these variables, the
12FL05 measure applied in the empirical analysis has also been widely used in the previous empirical literature
12FL06 (Gupta et al. 2009; Jara et al. 2008; López and Crisóstomo 2010).

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(*PCBGDP*); and (3) Bank Credit to Bank Deposits (*BCBD*). The last three variables measure the development of capital markets: (1) Stock Market Capitalization to GDP (*SMKGDP*); (2) Stock Market Total Value Traded to GDP (*SMKVTGDP*); and (3) Stock Market Turnover Ratio (*SMKTO*).

Control variables are:

Firm size We use the natural logarithm of total assets to measure the company size (*SIZE*) (de Miguel et al. 2004; Lins 2003; McConnell and Servaes 1990; Saona 2014).

Profitability Is measured as the return on assets (*ROA*) (Haugen and Baker 1996; Yang et al. 2010).

Firm risk Is measured through the alternative Altman Z-Score which was specifically derived for developing countries (*Z*) (Altman 2005).

Corporate diversification Follows a business approach based on the number of industry groups in which a firm operates (*DIVERSIF*) (Martin and Sayrak 2003).

Bank Concentration Is the market share of the three largest banks per country (*BANKCONC*).

Dummy variables International Financial Reporting System (*IFRS*), industry-level, country-level and year-level variables are included in the models as control variables too.

3.3 Model

The estimation model is in line with our theoretical framework and hypotheses development and according to the following panel data model:

$$FV_{it} = \beta_1 + \beta_2 OWN_{it} + \beta_3 OWN_{it}^2 + \beta_4 LEV_{it} + \beta_5 LEV_{it}^2 + \beta_6 DIV_{it} + \beta_7 DIV_{it}^2 + \beta_8 LEGSYS_{it} + \beta_8 FINDEV_{it} + \sum_{k=1}^{K} \delta_k C_{it} + \sum_{j=1}^{J} \gamma_j D_{it} + \epsilon_i + \mu_t + \varepsilon_{it} \quad (1)$$

where FV_{it} represents the firm value for the i firm in the t period. *OWN* is the ownership concentration, *LEV* is the proxy for the capital structure, *DIV* measures the dividend policy. *LEGSYS* and *FINDEV* are country-level variables which represent the different alternative measures of the development of the legal and regulatory systems and financial development, respectively. *C* represents the vector of *K* firm-level control variables which include the firm size (*SIZE*), profitability (*ROA*), firḿs insolvency risk (*Z*), and corporate diversification (*DIVERSIF*). *D* is the vector of *J* country-level control variables which include bank concentration (*BANKCONC*), the adoption of the International Financial Reporting System (*IFRS*), and time, industry-level and country-level dummy variables. Using the proposed panel data methodology allows us to control for any constant and unobservable heterogeneity (Arellano 2003) as well as fixed-effects, such as the specific features of each firm that remain invariant over time (e.g. organizational culture, managerial style, internal policies, among others), denoted by the fixed-effect term, ε_i. This fixed-effects terms is unobservable and, hence, becomes part of the random component in the estimated model. We also control for the time effect, μ_t, which may impact the firm value temporally. Finally, the random error term, ε_{it}, controls

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for the error in the measurement of the variables and the omission of some relevant explanatory variables.

4 Results

4.1 Descriptive statistics

Table 2 displays the most important statistics for the variables used in the empirical analysis. It can be observed that the sector-adjusted market value of a representative firm is about 1.38 times greater that its book value (*FV*). This simple statistic shows how overpriced the firm value is in emerging markets. Among the firm-level corporate governance devices, we observe that the corporate ownership structure is highly concentrated in Latin America as mentioned in previous literature (Paredes and Flor 1993; Sáenz González and García-Meca 2014). The shares in the hands of the controlling shareholder (*OWN*) are about 24.1 % for a typical firm. Particularly, the outstanding shares in the hands of cross holdings, government, employees, managers, top executives and relevant shareholders (*INSOWN*) represent about 56.30 % of total common shares. As mentioned previously, high ownership concentration in emerging markets is the natural response to the lack of efficient corporate governance mechanisms that ensures protection of investors' rights.

An average firm has a debt level (*LEV*) of 53.30 % of total assets and a payout ratio (*DIV*1) of almost 39.00 % of earnings. In terms of the firms' profitability we can observe an average rate of return on assets of about 6.10 % for our sample. Since the average indicator for the insolvency risk (*Z*) is higher than 2.6, we can say that a typical firm is operating in the safe zone with low bankruptcy risk (since firms with negative equity were removed from the sample). Finally, the measure used for corporate diversification (*DIVERSIF*) indicates that a typical Latin American firm operates in about 3 different business segments. This finding is comparatively lower than the one observed in developed markets (Denis et al. 1997).

All the other variables are basically indicators that measure the country-level determinants of firm value. The country-level variables are classified in two big groups (see Table 2, Panel C). The first one includes variables which measure the financial development of capital markets and the second group is related to the development of the legal enforcement and regulatory systems.

Concerning the financial development variables as determinants of firm value, we have included the bank concentration which shows that the three largest banks have an average 58.10 % of market share. In addition to this particular variable, we have used another six different indicators to measure the relative development of financial markets. These indicators in turn are broken down into two subgroups: (1) development of the banking system and (2) development of the capital market as suppliers of funds. The development of the banking system includes the Deposit Money Bank Assets to GDP (*DBAGDP*); Private Credit by Deposit Money Banks and Other Financial Institutions to GDP (*PCBGDP*); and Bank Credit to Bank Deposits (*BCBD*); whilst the development of the capital market is measured by the

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Table 2 Descriptive statistics

	Variables	Mean	1	2	3	4	5	6	7	8	9	10	11	12
Panel A: mean values and correlation matrix														
1	FV	1,377	1.000											
2	OWN	0.241	−0.015	1.000										
3	INSOWN	0.563	0.014	0.341	1.000									
4	LEV	0.533	−0.108	0.013	−0.008	1.000								
5	DIV1	0.388	0.039	0.013	0.014	−0.109	1.000							
6	DIV2	0.569	−0.094	−0.134	−0.152	0.026	0.098	1.000						
7	SIZE	6.506	−0.049	−0.009	−0.129	0.369	0.078	0.254	1.000					
8	ROA	0.061	0.291	0.032	0.076	−0.255	0.193	0.007	−0.039	1.000				
9	Z	3.398	0.549	−0.021	0.036	−0.311	−0.038	−0.240	−0.195	0.138	1.000			
10	DIVESIF	2.956	−0.125	−0.082	−0.048	0.126	0.077	0.032	0.115	−0.004	−0.080	1.000		
11	IFRS	0.384	−0.018	0.176	−0.160	−0.031	0.081	−0.044	0.035	0.116	−0.017	−0.153	1.000	
12	BANKCONC	0.581	0.034	0.150	−0.044	0.013	0.051	−0.236	−0.048	0.141	0.027	0.026	0.340	1.000
13	DBAGDP	0.545	−0.094	−0.093	−0.218	0.053	0.088	0.915	0.276	−0.001	−0.210	−0.143	0.170	−0.046
14	PCBGDP	0.354	−0.103	0.000	−0.219	0.032	0.101	0.751	0.248	0.024	−0.201	−0.214	0.406	0.151
15	BCBD	0.851	−0.094	0.121	−0.167	−0.031	0.099	0.309	0.127	0.046	−0.149	0.058	0.620	0.309
16	SMKGDP	0.484	−0.070	0.095	−0.076	−0.006	0.075	0.470	0.120	0.121	−0.138	0.027	0.386	0.331
17	SMKVTGDP	0.191	−0.096	−0.029	−0.192	0.043	0.074	0.783	0.258	0.003	−0.177	0.174	0.235	0.078
18	SMKTO	0.391	−0.087	−0.096	−0.191	0.040	0.069	0.827	0.286	−0.048	−0.162	0.203	0.081	−0.079
19	VA	0.292	−0.045	−0.049	−0.086	0.027	0.028	0.734	0.156	0.033	−0.138	−0.082	−0.027	−0.230
20	PS	−0.334	−0.064	−0.134	−0.092	0.026	0.039	0.606	0.157	−0.044	−0.146	−0.011	−0.154	−0.266
21	GE	−0.058	0.003	−0.076	0.009	−0.008	−0.100	0.032	−0.015	−0.149	0.072	−0.149	−0.215	−0.396
22	RQ	0.178	−0.002	−0.015	−0.008	−0.049	0.042	0.026	−0.006	0.027	−0.010	−0.091	0.168	0.328
23	RL	−0.373	−0.077	−0.048	−0.163	−0.015	0.088	0.689	0.181	0.015	−0.175	−0.190	0.299	−0.059
24	CC	−0.145	−0.074	−0.094	−0.097	−0.026	0.087	0.698	0.116	0.044	−0.181	−0.003	0.082	−0.176

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Table 2 continued

	Variables	Mean	13	14	15	16	17	18	19	20	21	22	23	24
13	DBAGDP	0.545	1.000											
14	PCBGDP	0.354	0.921	1.000										
15	BCBD	0.851	0.484	0.755	1.000									
16	SMKGDP	0.484	0.587	0.665	0.431	1.000								
17	SMKVTGDP	0.191	0.936	0.941	0.581	0.639	1.000							
18	SMKTO	0.391	0.928	0.875	0.479	0.470	0.953	1.000						
19	VA	0.292	0.722	0.611	0.211	0.441	0.697	0.656	1.000					
20	PS	−0.334	0.532	0.385	0.089	−0.092	0.439	0.520	0.678	1.000				
21	GE	−0.058	−0.045	−0.046	0.026	−0.271	−0.082	0.008	0.127	0.286	1.000			
22	RQ	0.178	−0.019	0.107	0.278	0.152	−0.037	−0.005	−0.222	−0.261	0.399	1.000		
23	RL	−0.373	0.728	0.795	0.710	0.376	0.698	0.671	0.679	0.591	0.369	0.272	1.000	
24	CC	−0.145	0.608	0.590	0.445	0.341	0.514	0.521	0.640	0.504	0.378	0.392	0.830	1.000

Country	Mean	SD	Min.	Max.
Panel B: descriptive statistics of firm level variables by country				
Argentina				
FV	1.359	0.0698	0.022	1.038
OWN	0.251	0.298	0.000	0.986
INSOWN	0.654	0.248	0.022	1.000
LEV	0.560	0.240	0.032	0.947
DIV1	0.268	0.583	0.000	3.974
DIV2	0.000	0.000	0.000	0.000
SIZE	6.026	1.809	1.364	9.573
ROA	0.033	0.108	−0.438	0.321
Z	4.446	0.570	0.288	10.794
DIVESIF	2.321	0.370	1.000	5.000

Table 2 continued

Country	Mean	SD	Min.	Max.
Brazil				
FV	1.450	0.675	0.094	4.550
OWN	0.230	0.219	0.000	1.000
INSOWN	0.529	0.264	0.000	1.000
LEV	0.553	0.215	0.007	0.947
DIV1	0.452	0.613	0.000	3.974
DIV2	1.000	0.000	1.000	1.000
SIZE	6.960	1.927	0.284	13.223
ROA	0.059	0.105	−0.438	0.623
Z	3.218	0.763	0.328	14.611
DIVESIF	3.029	0.491	1.000	6.000
Chile				
FV	1.067	0.194	0.002	2.620
OWN	0.438	0.297	0.000	1.000
INSOWN	0.861	0.191	0.420	1.000
LEV	0.371	0.254	0.007	0.947
DIV1	0.397	0.708	0.000	3.974
DIV2	1.000	0.000	1.000	1.000
SIZE	3.503	1.814	−1.122	9.696
ROA	0.089	0.134	−0.102	0.496
Z	1.265	0.833	0.390	3.097
DIVESIF	3.211	0.497	1.000	6.000
Colombia				
FV	1.025	0.082	0.067	1.259
OWN	0.276	0.268	0.002	0.869
INSOWN	0.800	0.211	0.321	0.986

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Table 2 continued

Country	Mean	SD	Min.	Max.
LEV	0.289	0.182	0.026	0.759
DIV1	0.721	0.711	0.000	3.974
DIV2	1.000	0.000	1.000	1.000
SIZE	4.895	1.620	1.798	7.778
ROA	0.058	0.050	−0.050	0.162
Z	1.241	0.973	0.109	4.802
DIVESIF	1.903	0.000	1.000	4.000
Mexico				
FV	1.247	0.279	0.056	5.128
OWN	0.156	0.225	0.000	0.989
INSOWN	0.575	0.266	0.011	1.000
LEV	0.546	0.199	0.024	0.947
DIV1	0.149	0.404	0.000	3.974
DIV2	0.000	0.000	0.000	0.000
SIZE	6.731	1.646	2.763	11.246
ROA	0.028	0.083	−0.438	0.395
Z	1.551	0.099	0.047	3.054
DIVESIF	2.670	0.302	1.000	5.000
Peru				
FV	0.926	0.077	0.042	3.282
OWN	0.321	0.324	0.000	1.000
INSOWN	0.639	0.309	0.002	1.000
LEV	0.484	0.247	0.007	0.947
DIV1	0.442	0.581	0.000	3.974
DIV2	0.000	0.000	0.000	0.000

Table 2 continued

Country	Mean	SD	Min.	Max.
SIZE	5.540	1.787	−0.033	10.620
ROA	0.103	0.125	−0.204	0.623
Z	8.316	1.204	0.146	15.917
DIVESIF	3.663	0.473	1.000	5.000

Variable	Argentina	Brazil	Chile	Colombia	Mexico	Peru
Panel C: mean values of financial system and legal and regulatory systems variables by country						
Financial development						
DBAGDP	0.263	0.771	0.315	0.379	0.310	0.243
PCBGDP	0.151	0.475	0.417	0.363	0.193	0.224
BCBD	0.697	0.882	1.509	1.651	0.702	0.852
SMKGDP	0.281	0.555	0.610	0.470	0.277	0.528
SMKVTGDP	0.027	0.310	0.106	0.054	0.077	0.034
SMKTO	0.112	0.589	0.087	0.118	0.288	0.070
Legal and regulatory systems						
VA	0.284	0.428	1.045	−0.201	0.155	0.017
PS	−0.110	−0.108	0.560	−1.601	−0.484	−0.900
GE	−0.087	−0.084	1.219	−0.072	0.222	−0.274
RQ	−0.544	0.127	1.466	0.250	0.351	0.399
RL	−0.577	−0.235	1.294	−0.460	−0.506	−0.658
CC	−0.417	−0.037	1.451	−0.332	−0.294	−0.297
LEGALSYS	−0.242	0.015	1.173	−0.403	−0.093	−0.285
Obs.	563	1676	778	196	801	666

Panels A, B, and C show the variables used in the empirical analysis. For each variable of Panel A, it shown the mean value and the correlation coefficient between the variables. Panel B shows the basic descriptive statistics (mean, standard deviation, minimum and maximum values) of all the firm level variables by country. Panel B shows the mean values of the financial systems variables and regulatory system variables by country

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Stock Market Capitalization to GDP (*SMKGDP*); Stock Market Total Value Traded to GDP (*SMKVTGDP*); and the Stock Market Turnover Ratio (*SMKTO*).

The descriptive statistics show that the deposit money bank assets represent about 54.50 % of GDP for the whole sample, while the stock market capitalization corresponds to 48.40 % of GDP. This simple description identifies how relevant the banking sector is as a supplier of funds to firms in Latin America. The civil-law regime that characterizes the legal systems of Latin American countries has favored funds privately supplied through bank debt. Consequently, a higher relative size of the banking system than the capital markets in these kinds of emerging economies is expected.

The legal enforcement and regulatory system variables are basically six corporate governance indicators by country recorded in Kaufmann et al. (2011). In addition to that we have included a dummy variable that measures the adoption of the International Financial Reporting System (*IFRS*). Based on this variable, we can observe that about 38.40 % of the observations in our sample correspond to firms with IFRS standards.[13] The worldwide governance indicators are: (1) Voice and Accountability (*VA*) which is the process by which governments are selected, monitored, and replaced; (2) Political Stability and Absence of Violence/Terrorism (*PS*) which measures the perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism; (3) the Government Effectiveness (*GE*) corresponds to the quality of public and civil services, and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies; (4) Regulatory Quality (*RQ*) which measures the perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development; (5) Rule of Law (*RL*) which reflects the confidence of agents to abide by the rules of society, and in particular the quality of contract enforcement, property rights, police, and the courts, as well as the likelihood of crime and violence; and finally (6) the Control of Corruption (*CC*) which measures the perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests. Despite the original values for each one of these six indicators ranges from approximately −2.5 (weak) to 2.5 (strong) governance performance (Kaufmann et al. 2011); in our sample such values are not that extreme.

Table 2, Panel A shows also the correlation matrix where we do not observe any relatively high correlation among the independent variables. This minimizes the likelihood of observing autocorrelation problems. Panel B displays the descriptive statistics of the firm level variables by country. In this panel we can observe that Argentina and Brazil concentrate the companies with the highest sector-adjusted average firm value (*FV*); while in the other extreme Peru is the only country with an average market to book ratio lower than the unit, but with the highest return on asset.

[13] This is a consequence of the gradual adoption of the IFRS of the firms in our sample during the period of analysis. For instance, Brazil and Chile adopted the international accounting standards in 2010, Argentina in 2011, Mexico and Peru in 2012 and Colombia in 2015 (outside of our period of analysis).

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4.2 Multivariate analysis

The starting point of the empirical analysis was to check whether the panel data and the individual time series are stationary. Using a Fisher-type test, we found no evidence of a unit root in the series under consideration. To do so, we repeated the test performing the augmented Dickey-Fuller test as well as the Phillips-Perron test that show the variables follow a unit-root process. In all the cases, we found that the variables were generated by a stationary process. These tests are in accordance with most of the literature that assumes stationarity in the non-financial industry.

Table 3 displays the regressions between independent variables and the sector-adjusted firm value (*FV*). In all the regressions we use robust errors and observe that according to the Wald test the independent variables are jointly significant. There is no second-order autocorrelation among the variables. Regarding the moment conditions, the Hansen overidentification tests did not reject the overidentifying restrictions, meaning that the set of instruments is orthogonal to the estimated residuals. Thus, the results reported in Table 3 (and in all subsequent tables) are robust, according to the standard diagnostic tests for the panel data.

4.2.1 Firm-level determinants

Table 3 helps us to assess the impact of the ownership concentration (*OWN*) as a corporate governance system on firm value. The formulated hypothesis suggests a non-linear relationship between the corporate ownership structure and firm value. Such a relationship is supported by the interaction of both the monitoring and the expropriation hypotheses. Our findings support a nonlinear relationship between *OWN* and *FV*. In fact, we can observe that as the concentration of corporate ownership increases, firm value also increases as a consequence of fewer principal-agent conflicts of interest. Therefore, it seems to be that the controlling shareholder fulfills efficiently his or her role as monitor, which aligns the interest between shareholders and executives. Nevertheless, when the concentration of ownership becomes excessive, firm value is eroded as a result of the expropriation of wealth of minority shareholders by the controlling one. In all the regressions in Table 3 we observe that the sign for the OWN^2 (the squared computation of *OWN*) variable is negative and statistically significant. This means that the function takes a quadratic form where the firm value is optimized at a certain level (critical value) of the concentration of the corporate ownership. This critical value can be estimated by the optimization of each regression as a function of the *OWN* variable. For instance, in regression (1) of Table 3 we observe that the critical value is at 37.50 % of the corporate ownership.[14] This means that the monitoring hypothesis is predominant and value is created as long as the voting capital in the hands of the main

[14] The computation of the critical value in the first regression of Table 3 is done by calculating the first derivative of this regression with respect to the *OWN* variable, and then making it equal to zero as $\frac{\partial FV}{\partial OWN} = 0$. After that we have to solve for *OWN* which represents the point at which the firm value is maximized. Specifically talking, this solution takes the form: $\frac{\partial FV}{\partial OWN} = 2.202 - 2 \times (2.937 \times OWN) = 0$. Consequently, when $OWN = 37.50\,\%$ the firm value is maximized. Idem calculations are done for all the other regressions which include OWN^2.

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Table 3 Regression analysis of the firm-level variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	2.103*	3.542	7.200*	−4.412**	−3.979***	−5.020***	−7.357***
	(0.215)	(0.490)	(0.679)	(1.131)	(1.207)	(1.283)	(1.081)
OWN	2.202*	4.544*	7.967**	10.583**	10.128***	8.572**	5.533***
	(0.936)	(0.782)	(1.357)	(1.248)	(1.289)	(1.331)	(0.885)
OWN^2	−2.937**	−5.645*	−11.754**	−15.265**	−14.733***	−12.548***	−8.664***
	(1.105)	(0.990)	(1.775)	(1.676)	(1.730)	(1.799)	(1.224)
Critical Value OWN	0.375	0.402	0.339	0.347	0.344	0.342	0.319
LEV		3.900**	4.161	19.975**	18.107**	18.779*	31.677*
		(1.736)	(2.943)	(3.527)	(3.439)	(3.536)	(2.853)
LEV^2		−9.650*	−3.911	−19.68*	−17.777***	−18.367**	−31.471***
		(1.686)	(2.938)	(3.176)	(3.119)	(3.283)	(2.577)
Critical Value LEV		0.202	–	0.507	0.509	0.511	0.503
DIV1			1.325*	0.912*	0.864**	0.838**	
			(0.485)	(0.577)	(0.571)	(0.597)	
$DIV1^2$			−1.136**	−0.922*	0.905	−0.931*	
			(0.136)	(0.149)	(0.147)	(0.151)	
Critical Value DIV1			0.583	0.495	–	0.450	
DIV2							−1.825**
							(0.737)
SIZE				−0.272**	−0.263*	0.188	−0.371
				(0.108)	(0.134)	(0.148)	(0.101)
ROA				2.901***	2.853*	2.326**	3.654*
				(0.980)	(0.964)	(0.947)	(0.650)
Z				0.145***	0.144***	0.147***	0.134***
				(0.008)	(0.008)	(0.008)	(0.006)

Table 3 continued

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
DIVERSIF				−0.220*	−0.123	−0.159	−0.139**
				(0.025)	(0.025)	(0.025)	(0.025)
IFRS					−0.143	0.162*	0.350***
					(0.089)	(0.099)	(0.071)
BANKCONC						0.023**	0.007*
						(0.005)	(0.004)
Obs.	4680	4680	4257	4257	4257	4249	4672
Number of iden	609	609	578	578	578	578	609
Wald-test	58.11***	121.74***	14.01**	30.48***	29.05***	33.88***	32.58***
AR(2)	−2.43	−2.44	−2.01	−1.76	−1.76	−1.70	−2.35
Hansen-test	109.26	202.44	216.70	211.49	214.64	201.05	249.10
Lind-Mehlum test (OWN)	10.82***	11.30***	7.82***	5.57***	8.20***	6.67***	10.33***
Lind-Mehlum test (LEV)	–	14. 03**	–	12.69**	12.38***	12.08**	12.44***
Lind-Mehlum test (DIV1)	–	–	5.82**	5.39*	–	7.35*	–

Dependent variable is FV

The sample includes firms from Argentina, Brazil, Chile, Colombia, Mexico, and Peru. The period is 1997–2013. The estimated regression model takes the form:

$$FV_{it} = \beta_0 + \beta_1 OWN_{it} + \beta_2 OWN_{it}^2 + \beta_3 LEV_{it} + \beta_4 LEV_{it}^2 + \beta_5 DIV_{it} + \beta_6 DIV_{it}^2 + \sum_{k=1}^{K} \delta_k C_{it} + \sum_{j=1}^{J} \gamma_j D_{it} + \epsilon_i + \mu_t + \varepsilon_{it}$$

The table shows the regression results with the GMM System Estimator. A detailed definition of variables is provided in the "Appendix". Temporal, industry, and country dummy variables are included in the estimations but not tabulated. Critical Value is the threshold in the ownership concentration, leverage and dividend payout ratio at which the firm value is optimized. The Wald test is a Chi-square test of the joint significance of all of the variables considered in the analysis. AR(2) corresponds to the second-order serial correlation test using residuals in first differences, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen test of overidentifying restrictions is asymptotically distributed as Chi-square under the null of no relation between the instruments and the error term. Lind-Mehlum's test is used to verify the non-linear relationships in the case of the corporate ownership concentration (OWN), the leverage (LEV), and dividends (DIV1). Standard deviations are located beneath the regression coefficients in parenthesis

*, ** and *** indicate significance at the 10, 5 and 1 % levels, respectively

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shareholder is not higher than 37.50 % in model 1, Table 3. Nevertheless, when the concentration goes beyond that level, the expropriation problem appears to press down the firm value. The average critical value among all the regressions included in Table 3 is about 35.25 %. Consequently, this approximately represents the threshold at which the firm value is maximized for a typical Latin American firm. In order to test this inverse U-shaped relationship between *OWN* and *FV*, the appropriate Lind-Mehlum test (Lind and Mehlum 2010) is used. According to the results provided at the bottom of the table, the null hypothesis of a monotone or U-shape is rejected for all regressions. Therefore, it is accepted the hypothesis H1 that supports a non-linear relationship between ownership concentration and firm value.

Regressions (2) through (7) provide information for the statistical contrast of hypothesis H2 which also supports a non-linear relationship between leverage (*LEV*) and sector-adjusted firm value (*FV*). There we can see that firm value increases and then decreases as the debt level rises. The trade-off approach provides a lucid explanation for a result such as this. In the specific case of regression (2), for instance, it is observed that since the interests paid on debt are tax deductible, higher levels of debt are value-enhancing financing policies. Nevertheless, it seems to be that when debt is about 20.20 % of total assets, then the firm value is pressed down as a consequence of the higher default risk. The computation of this critical value is similar to the one described in footnote 14 for the corporate ownership concentration. The range of critical value of the degree of financial leverage goes from 20.20 to 51.10 % with an average value of 44.64 % calculated from the significant regressions in Table 3. This finding deserves to be highlighted because the average critical value of the leverage position is lower than the average level of debt of 53.30 % described in Table 2, Panel A. Consequently, we might state that firms in Latin America are operating with a level of debt relatively lower than the one which maximizes firm value. As can be seen at the end of the table, the Lind-Mehlum test rejects the null hypothesis of a monotone or U-shaped relationship between *FV* and leverage (*LEV*) in the five significant regressions in Table 3. Consequently, hypothesis H2 is accepted.

Table 3 shows that there is an inverse U-shaped relationship between the dividend payout (*DIV*1) and the value of the firm. As stated in hypothesis H3, the dividend policy is expected to impact in a non-linear manner the firm market value in Latin America. The findings seem to support this non-monotonic relationship. In a first stage, the payout ratio behaves as a value-enhancing mechanism, supporting a positive relationship between *FV* and *DIV*1. In this case we observe that at relatively low levels of dividend payment, such cash disbursement solve efficiently potential problems of discretionary managerial behavior by shortening resources which otherwise may be used opportunistically by executives. This situation is usually described in firms with lack of future growth opportunities. An alternative explanation is provided by Easterbrook (1984) who suggest that when companies require external funds from the market to finance cash dividends, these participants in the financial markets take a supervisory role by monitoring managers, thereby leading to higher firm value.

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However, such bonding or monitoring role just takes place at relatively low levels of dividends. When dividend payment gets relatively large, the monitoring effect turns out to cause a negative impact on firm value. For instance, Rozeff (1982) conjectures that rational stockholders realize that the firm is financing the dividend by new funds and that this is costly. Therefore, as the financing costs increase when external funds are needed to pay dividends, the firm value is pressed down. Thus, the previous competing arguments cause opposing influences of dividend payout on firm value. If agency costs decline as dividend payout is increased, firm value is enhanced; and if transactions costs of financing increase as dividend payout is increased, firm value is consequently diluted. Therefore, the minimization of the sum of these two costs produces a unique optimum payout ratio (Maquieira and Danús 1998; Maquieira and Moncayo 2004; Rozeff 1982) which as a result maximizes the firm value.

Our findings seem to support the previous arguments. Regressions (3), (4), and (6) in Table 3 show that the firm value is maximized at a certain critical (optimal) point of payout ratio (*DIV*1). In regression (3) for instance, it is observed that the dividend policy is a value-enhancing decision as long as the annual dividend per share does not exceed 58.30 % of the earnings per share. Thus, up to this point the agency costs are minimized and firm value increased. However, when the payout ratio exceeds the critical value, the financing costs of external funds offset the benefits of debt and firm value is eroded. The average critical point at which the sector-adjusted firm value variable (*FV*) is maximized corresponds to a level of 0.51 monetary units paid in dividends per monetary unit generated in earnings. When firms pay less than this critical level, the firm value is enhanced, otherwise is diluted. The non-monotonic relationship is statistically tested throughout the Lind–Mehlum test for *DIV*1 variable located at the bottom of the table. In the relevant and significant regressions, the hypothesis of a non-monotonic inverse U-shaped relationship between *DIV*1 and *FV* variables is accepted at the standard statistical confidence levels. Briefly, these findings support the hypothesis H3, according to which there is a non-monotonic relationship between the payout ratio and firm value for Latin American firms.

Only in regression (5) the outcomes support a positive impact of dividend payout ratio on firm value. Despite of this finding, as seen in the subsequent tables, we still believe that most of the relationship between *DIV*1 and *FV* takes a non-linear motion rather than a linear one.

Alternatively, the variable *DIV*2, which corresponds to a dummy variable for those countries with mandatory dividends in our sample (Brazil, Chile and Colombia) was used. In the last regression of Table 3 we observe that countries with mandatory minimum payments negatively impact on firm value. However, this negative impact on firm value is about 1.83 times higher than in economies without this legal requirement. We can see how sensitive firm value is to mandatory dividends, but also how focused on future investments the shareholders are. The results in general seem to show that shareholders are willing to cut dividends with the goal of increasing resources and allocating them in profitable investment projects.

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At country-level variables in Table 3 only two measures were included so far (*BANKCONC* and *IFRS*). Further analysis of country-level variables is depicted in Table 4. The *IFRS* variable is an indirect measure of the efficiency of the legal and regulatory system. Table 3 suggests that the value of the firm is between 16.20 % and 35.00 % higher for those firms that changed from local accounting standards to international reporting systems (see regressions 6 and 7 in Table 3). The *BANKCONC* variable is associated with the development of the financial system. This variable measures the average market share by the three largest banks per country. A higher *BANKCONC* variable means a relatively less developed and efficient financial system as a consequence of the monopoly power exercised by financial institutions in the banking system. In Table 3 we see that more concentrated banking systems positively impact on sector-adjusted firm value. In other words, in emerging markets such as those of Latin America that have immature financial systems, firms take advantage of higher financial opacity and less competition to increase the market value of the firm. More details about the development of the financial system and its impact on the market value of the firm are provided in Table 4.

Among the control variables we included firm size (*SIZE*), profitability (*ROA*), insolvency risk (*Z*), and corporate diversification (*DIVERSIF*). The main results displayed in Table 3 show that the physical dimension of the firm (*SIZE*) negatively impacts its market value. It seems to be that larger and consequently more complex firms are more difficult to monitor. The decision making process in large firms is perhaps more bureaucratic and time consuming. Larger firms are also more mature, diversified, and sometimes are operating in non-profitable industries which negatively impact the firm value. On the contrary, smaller firms are more dynamic and able to quickly adjust their financial decisions to market shocks. Moreover, smaller firms have more growth opportunities than large firms, which in turn positively impacts on their value. In addition to that, it is worth noting that more profitable firms (*ROA*) show relatively higher firm value than less profitable firms. The economic impact of the coefficient for *ROA* variable is remarkably high—it is in between 2.326 and 3.654 in the last four regressions in Table 3—which indicates that investment decisions and their capacity to generate income are quite important determinants of firm value. The next variable to be analyzed is the insolvency risk (*Z*). According to the construction of this variable, the insolvency risk increases as the variable *Z* decreases. Therefore, as can be seen in Table 3, the positive sign of *Z* variable must be interpreted as a negative impact of the default risk on the value of the firm. The last of the control variables is the corporate diversification (*DIVERSIF*). We observe that there is a corporate diversification discount. This might be a consequence of diversification strategies that lead to discretionary behavior by firms managers and controlling shareholders in the Latin American region. This discount can be supported by inefficient resource allocation from more productive segments to lower performance units (Berger and Ofek 1995). Similarly, Campa and Kedia (2002) point that this diversification discount is the consequence of firms overinvestment in business segments that have lower investment opportunities. According to our findings, these arguments seem to apply in the case of Latin American firms.

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Table 4 Regression analysis of the firm-level and country-level variables

Variables	Development of the financial system					
	Banking system			Capital markets		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	−4.455**	−4.191*	−3.404**	−2.724**	−4.559*	−5.455
	(1.180)	(1.206)	(1.240)	(1.244)	(1.217)	(1.173)
OWN	8.725***	8.940**	9.084*	4.468***	5.540***	8.191***
	(1.239)	(1.253)	(1.312)	(0.991)	(1.047)	(1.168)
OWN^2	−12.668***	−13.290*	−13.606***	−7.675***	−8.714***	−12.087**
	(1.654)	(1.664)	(1.748)	(1.364)	(1.346)	(1.508)
Critical value OWN	0.344	0.336	0.334	0.291	0.318	0.339
LEV	19.636*	17.667**	16.605**	15.693*	15.635*	19.675**
	(3.411)	(3.579)	(3.675)	(3.235)	(3.434)	(3.546)
LEV^2	−19.259**	−17.465***	−16.245***	15.404	−15.586**	−19.479***
	(3.118)	(3.249)	(3.351)	(2.953)	(3.058)	(3.197)
Critical value LEV	0.510	0.506	0.511	–	0.502	0.505
DIV1	0.227***	1.388**	1.504**	0.896*	0.902**	0.124***
	(0.566)	(0.561)	(0.566)	(0.484)	(0.519)	(0.563)
$DIV1^2$	−0.858***	−0.928**	−0.959***	−0.731	−0.785	−0.863*
	(0.149)	(0.146)	(0.147)	(0.125)	(0.131)	(0.143)
Critical value DIV1	0.132	0.748	0.784	–	–	0.072
SIZE	−0.304**	−0.398*	−0.351	−0.263	−0.521*	0.556
	(0.144)	(0.137)	(0.134)	(0.123)	(0.129)	(0.131)
ROA	1.922*	3.028***	3.003**	3.333**	3.379**	2.137*
	(1.069)	(1.004)	(0.969)	(0.963)	(0.952)	(0.969)
Z	0.145***	0.143***	0.146***	0.144***	0.145***	0.146***
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
DIVERSIF	−0.094	−0.112	−0.124*	−0.118**	−0.140*	0.144*
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)

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Table 4 continued

Variables	Development of the financial system					
	Banking system			Capital markets		
	(1)	(2)	(3)	(4)	(5)	(6)
IFRS	−0.111	0.044*	0.190	0.011	0.102	0.304*
	(0.091)	(0.108)	(0.129)	(0.090)	(0.080)	(0.088)
DBAGDP	−0.004*					
	(0.007)					
PCBGDP		−0.020***				
		(0.007)				
BCBD			−0.013**			
			(0.004)			
SMKGDP				−0.028*		
				(0.003)		
SMKVTGDP					−0.050***	
					(0.006)	
SMKTO						−0.021***
						(0.003)
VA						
PS						
GE						
RQ						
RL						
CC						
Observations	4256	4256	4256	4256	4256	4256
Number of iden	578	578	578	578	578	578
Wald-test	31.79***	31.86***	29.91***	39.26***	33.24***	31.78***
AR(2)	−1.74	−1.77	−1.75	−1.69	−1.73	−1.75
Hansen-test	214.34	214.4	210.97	216.8	214.91	217.12

Table 4 continued

Variables	Development of the financial system					
	Banking system			Capital markets		
	(1)	(2)	(3)	(4)	(5)	(6)
Lind–Mehlum test (OWN)	12.44***	12.23***	8.55***	8.12***	11.57***	9.90***
Lind–Mehlum test (LEV)	15.57***	15.86***	17.38***	–	16.31***	16.63**
Lind–Mehlum test (DIV1)	3.27**	2.51*	3.49***	–	–	3.13*
Variables	Development of the legal and regulatory systems					
	(7)	(8)	(9)	(10)	(11)	(12)
Constant	−4.354	−4.109*	−4.398**	−4.677*	−3.219**	−5.032***
	(1.181)	(1.203)	(1.255)	(1.253)	(1.159)	(1.259)
OWN	9.484*	9.636**	9.805***	9.830**	8.907***	10.437*
	(1.278)	(1.288)	(1.283)	(1.279)	(1.271)	(1.339)
OWN^2	−14.084**	−14.186***	−14.564***	−14.592***	−13.631**	−14.790***
	(1.718)	(1.727)	(1.717)	(1.718)	(1.703)	(1.778)
Critical value OWN	0.337	0.340	0.337	0.337	0.327	0.353
LEV	18.582***	18.003**	18.831*	18.785**	16.873	19.472**
	(3.446)	(3.520)	(3.512)	(3.472)	(3.552)	(3.459)
LEV^2	−18.204***	−17.721**	−18.404***	18.211	−16.422***	−18.858**
	(3.144)	(3.185)	(3.192)	(3.160)	(3.206)	(3.136)
Critical value LEV	0.510	0.508	0.512	–	0.514	0.516
DIV1	0.450***	0.246*	0.464***	0.516***	0.142***	0.595**
	(0.571)	(0.589)	(0.600)	(0.600)	(0.562)	(0.573)
$DIV1^2$	−0.925**	−0.884*	−0.921	−0.919	−0.843***	−0.963*
	(0.148)	(0.147)	(0.150)	(0.148)	(0.140)	(0.148)
Critical value DIV1	0.243	0.139	–	–	0.084	0.309
SIZE	−0.318**	−0.278	−0.301	−0.321**	0.213	−0.386***

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Table 4 continued

Variables	Development of the legal and regulatory systems					
	(7)	(8)	(9)	(10)	(11)	(12)
	(0.133)	(0.133)	(0.143)	(0.136)	(0.133)	(0.143)
ROA	2.765*	2.698	2.641	2.534*	2.723***	1.182
	(0.957)	(0.951)	(0.951)	(0.969)	(0.942)	(1.140)
Z	0.143***	0.142***	0.144***	0.147***	0.142***	0.149*
	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)
DIVERSIF	−0.109**	−0.147	−0.142	−0.132*	0.164	−0.188**
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	(0.026)
IFRS	0.165	−0.142	0.168*	0.193**	0.336**	0.251**
	(0.088)	(0.089)	(0.097)	(0.095)	(0.151)	(0.104)
DBAGDP						
PCBGDP						
BCBD						
SMKGDP						
SMKVTGDP						
SMKTO						
VA	0.299*					
	(0.461)					
PS		0.037*				
		(0.171)				
GE			0.344**			
			(0.317)			
RQ				0.502		
				(0.240)		
RL					0.948**	
					(0.423)	

Table 4 continued

Variables	Development of the legal and regulatory systems					
	(7)	(8)	(9)	(10)	(11)	(12)
CC						0.109***
						(0.292)
Observations	4256	4256	4256	4256	4256	4256
Number of iden	578	578	578	578	578	578
Wald-test	29.32***	28.29***	31.62***	29.49***	46.52***	31.05***
AR(2)	−1.77	−1.78	−1.76	−1.73	−1.7	−1.7
Hansen-test	215.91	213.83	215.45	215.48	213.54	203.23
Lind–Mehlum test (OWN)	8.22***	2.42**	10.03***	7.86***	6.25***	5.88***
Lind–Mehlum test (LEV)	15.15***	16.94***	12.97***	–	16.02***	15.53**
Lind–Mehlum test (DIV1)	2.84**	2.94**	–	–	2.62***	1.72*

Dependent variable is FV

The sample includes firms from Argentina, Brazil, Chile, Colombia, Mexico, and Peru. The period is 1997–2013. The estimated regression model takes the form:

$$FV_{it} = \beta_0 + \beta_1 OWN_{it} + \beta_2 OWN_{it}^2 + \beta_3 LEV_{it} + \beta_4 LEV_{it}^2 + \beta_5 DIV_{it} + \beta_6 LEV_{it}^2 + \beta_7 LEGSYS_{it} + \beta_8 FINDEV_{it} + \sum_{k=1}^{K} \delta_k C_{it} + \sum_{j=1}^{J} \gamma_j D_{it} + \epsilon_i + \mu_t + \varepsilon_{it}$$

The table shows the regression results with the GMM System Estimator. A detailed definition of variables is provided in the "Appendix". Temporal, industry, and country dummy variables are included in the estimations but not tabulated. Critical Value is the threshold in the ownership concentration, leverage and dividend payout ratio at which the firm value is optimized. The Wald test is a Chi-square test of the joint significance of all of the variables considered in the analysis. AR(2) corresponds to the second-order serial correlation test using residuals in first differences, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen test of overidentifying restrictions is asymptotically distributed as Chi-square under the null of no relation between the instruments and the error term. Lind-Mehlum's test is used to verify the non-linear relationships in the case of the corporate ownership concentration (OWN), leverage (LEV), and dividends (DIV1). Standard deviations are located beneath the regression coefficients in parenthesis. The first six regressions include variables which measure the development of the financial system; while the last six regressions include variables which measure the development of the legal and regulatory systems

*, ** and *** indicate significance at the 10, 5 and 1 % levels, respectively

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4.2.2 Country-level determinants

Table 4 offers further details about the impact of the country-level variables on the firm value. The first six columns include variables that describe the development of the financial system (e.g. development of the banking system measured by *DBAGDP*, *PCBGDP*, and *BCBD*; and the development of capital markets measured by *SMKGDP*, *SMKVTGDP*, and *SMKTO*). The higher the value of these variables, the more developed the financial system is. The last six columns include governance indicators regarding the legal and regulatory systems (e.g. *VA*, *PS*, *GE*, *RQ*, *RL*, and *CC*), and also in this case, higher values of these variables mean better governance indicators.

Regressions in Table 4 show that all variables that measure the development of the financial system negatively impact on firm value at the standard level of statistical significance. In other words, positive marginal changes in deposit money bank assets, private credits, bank credits to bank deposits, as well as changes in the stock market capitalization, its total value traded and its turnover ratio, are negatively associated with a marginal change in the value of firms, *ceteris paribus*. Contrary to what was hypothesized, these results reject the fact that more developed financial systems positively impact the firm value in emerging markets. These findings are in line with those reported by Saona and Muro (2015), which suggest that more developed banking systems and capital markets where more complex and sophisticated financial instruments and services might be supplied, where banks can efficiently exercise a monitoring role on the performance of the firm, and where markets transfer more informative contents, firm value seems to be negatively impacted. This might be explained by saying that in the Latin American markets, firms have taken advantage of this immature stage of development of their financial systems characterized by opacity, large asymmetries of information, and inefficient regulation, in order to realize certain overvaluation or abnormal returns, which are not perceived as such by the participants in these markets. Consequently, when the financial markets achieve a higher stage of development, reducing with it its asymmetries of information, this overvaluation is reduced, impacting negatively on the *FV* variable. Consequently, as the stock markets become more developed, dynamic, and transparent, the participants of these markets might scrutinize firms more efficiently. In this process, the firm is less likely to obtain abnormal returns, supporting the negative relationship between the financial development variables and the firḿs market value. Out of the six measures of the financial development (*DBAGDP*, *PCBGDP*, *BCBD*, *SMKGDP*, *SMKVTGDP*, and *SMKTO*), the Stock Market Total Value Traded to GDP (*SMKVTGDP*) is the one with the strongest impact on the sector-adjusted firm value (coefficient equal to −0.050); whilst Deposit Money Bank Assets to GDP (*DBAGDP*) is the one with the lowest impact on the firm value (coefficient of −0.004).

Concerning the variables which measure the impact on firm value caused by the legal and regulatory systems, six indicator were used (*VA*, *PS*, *GE*, *RQ*, *RL*, and *CC*). In other words, the firm value is enhanced if the processes by which the governments are assessed improve (*VA*); political instability and terrorism are constrained (*PS*); government quality improves and is more independent from

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political pressures (*GE*); the quality of contract enforcement, property rights, policy and the courts improve, as well as the likelihood of crime and violence diminishes (*RL*); and corruption is effectively controlled by different legal statuses (CC). The only variable that is not statistically significant is regulatory quality (*RQ*) (although it still has a positive sign), understood as the ability of the government to implement policies that promote private sector development.

These findings indicate that as the legal bodies mandating disclosure and private enforcement through liability rules and the granting of control issues such as corruption and political instability significantly benefit the value of the firm. These results allow for accepting our H5 hypothesis which suggests a positive relationship between the improvements of the legal and regulatory systems and *FV*.

4.2.3 Principal Component Factoring Analysis

Since we account for a large number of variables used as measures for the external governance indicators such as *DBAGDP*, *PCBGDP*, *BCBD*, *SMKGDP*, *SMKVTGDP*, and *SMKTO* for the development of the financial system; and *VA*, *PS*, *GE*, *RQ*, *RL*, and *CC* as measures of the regulatory environment, and due to the fact that all these variables are highly correlated (see Table 2, Panel A) we cannot include all of them together in a single regression. In order to address this issue in modeling the value of the firm, we applied the principal component factoring technique to take advantage of the informative content of all the variables. All these variables measure specific constructs of the development of the financial system, such as the capacity of the banking industry to supply credit to the private sector, the amount of deposits collected from savings units, and the total amount of deposit money bank assets, on the one hand. In addition to that, financial development variables also measure the development of the stock market such as its capitalization at country level and its total value traded and turnover ratio, on the other hand. The set of legal and regulatory variables are specific governance indexes used to measure different attributes of the quality of the legal environment such as the accountability by which the governments are elected, monitored and replaced if needed; the level of political stability and government effectiveness which measures the quality of public and civil services; the regulatory quality and contract enforcement; and the control of corruption and violence.

The major benefits of this technique are that the factors created are not correlated, on the one hand; and such factors record a large extent of the variability of the individual variables used in the estimation of the factors, on the other hand (Kim and Mueller 1978). Table 5 displays the number of factors generated for the variables used to assess the financial development and the variables used for the legal and regulatory system. In its Panel A we can observe that there is only one factor which measures the country financial development whose Eigen value is higher than one (4.450) as the standard discrimination value. This factor records about 74.20 % of the variability of all the six alternative variables used to assess the financial development. Likewise, Panel B shows that there are two factors (with Eigen values of 3.176 and 1.544, respectively) enough to record about 78.70 % of the variability of the covariates used to measure the legal and regulatory systems.

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Table 5 Principal component factoring (PCF) analysis

Variables	Factor	Eigenvalue	Difference	Proportion	Cumulative
Panel A: financial development variables					
DBAGDP	Factor1	4.450	3.677	0.742	0.742
PCBGDP	Factor2	0.774	0.124	0.129	0.871
BCBD	Factor3	0.650	0.566	0.108	0.979
SMKGDP	Factor4	0.084	0.056	0.014	0.993
SMKVTGDP	Factor5	0.028	0.014	0.005	0.998
SMKTO	Factor6	0.014	–	0.002	1.000
Panel B: legal and regulatory systems variables					
VA	Factor1	3.176	1.631	0.529	0.529
PS	Factor2	1.544	0.810	0.257	0.787
GE	Factor3	0.734	0.499	0.122	0.909
RQ	Factor4	0.235	0.071	0.039	0.948
RL	Factor5	0.165	0.018	0.027	0.976
CC	Factor6	0.146	–	0.024	1.000

The table shows the results for the analysis of the principal component factoring applied to the external variables. Panel A shows the factor analysis for the financial development variables (DBAGDP, PCBGDP, BCBD, SMKGDP, SMKVTGDP, and SMKTO); whilst Panel B displays the factor analysis the legal and regulatory systems variables (VA, PS, GE, RQ, RL, and CC)

Altogether, these components are included in the regression analysis as tabulated in Table 6. As noticed in the table, the IFRS variable enters significantly in most of the regressions. International accounting standards as a corporate governance mechanism aim to standardize financial information and improve the quality of accounting reports by reducing the opacity of accounting numbers and enhancing firm value (Soderstrom and Sun 2007). Another corporate governance device which deserves to be highlighted is ownership concentration. In this respect, the findings remain in line with those of the *OWN* variable developed above, justifying a non-linear relationship with the *FV* variable. Concerning the *INSOWN* variable, the results are consistent with earlier findings of Morck et al. (1988), McConnell and Servaes (1990) and Durnev and Kim (2005), who argue that greater ownership concentration by insiders may align their interests with those of minority shareholders, but it also may result in a greater degree of managerial entrenchment as shown in the inverse U-shaped relationship between *INSOWN* and the sector-adjusted firm value.

The variables which measure the deepness of the financial system were transformed into the factor *FinDevFactor*1. Likewise before, the regressions in Table 6 show that the development of the financial system impacts negatively on firm value, as suggested above when the variables about financial development were analyzed individually. This finding might be used as a robustness analysis of our previous results.

The impact of the legal system and the regulatory environment in the Latin American region on firm value is studied with the two variables created out of the factor analysis (*LegalEnvFactor*1 and *LegalEnvFactor*2). Both variables enter the

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Table 6 Estimations with factors from PCF analysis

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	−5.602***	−4.953***	−6.033***	−6.362**	−0.362	0.474	−2.397***	−6.749***
	(1.255)	(1.260)	(1.283)	(1.236)	(0.382)	(0.400)	(0.482)	(0.395)
OWN	5.303***	10.124***	5.349*	0.04**				
	(1.073)	(1.288)	(1.056)	(0.722)				
OWN^2	−8.394**	−14.933**	−8.421*	−1.817				
	(1.393)	(1.725)	(1.368)	(0.902)				
Critical value OWN	0.316	0.339	0.318	–				
INSOWN					1.104**	2.923***	1.342***	1.574***
					(0.444)	(0.432)	(0.407)	(0.518)
$INSOWN^2$					−1.730*	−2.740**	−1.796**	−1.904*
					(0.354)	(0.324)	(0.313)	(0.484)
Critical value INSOWN					0.319	0.533	0.374	0.413
LEV	14.151***	19.695***	14.761**	23.876**	19.117***	19.562***	20.161*	29.238***
	(3.523)	(3.483)	(3.494)	(2.765)	(0.545)	(0.782)	(0.990)	(0.732)
LEV^2	−14.156	−18.998*	−14.531*	−23.576**	−20.389***	−19.678***	−21.117	−29.572***
	(3.183)	(3.168)	(3.160)	(2.574)	(0.520)	(0.731)	(1.047)	(0.732)
Critical value LEV	–	0.518	0.508	0.506	0.469	0.497	–	0.494
DIV1	0.880***	0.627***	0.051**		0.370**	0.202***	0.279	
	(0.517)	(0.592)	(0.517)		(0.030)	(0.029)	(0.048)	
$DIV1^2$	−0.791*	−0.946**	−0.822		−0.512*	−0.520*	0.411	
	(0.132)	(0.149)	(0.132)		(0.006)	(0.009)	(0.011)	

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Table 6 continued

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Critical value DIV1	0.556	0.331	–		0.361	0.194	–	
DIV2				−2.317***				3.580
				(0.680)				(0.480)
SIZE	−0.546*	−0.355**	−0.590**	−0.49	−0.407	−0.695***	−0.199**	−0.189
	(0.131)	(0.141)	(0.135)	(0.113)	(0.033)	(0.025)	(0.035)	(0.030)
ROA	3.533**	2.176*	3.332***	2.130*	17.283**	16.336	15.766***	15.830*
	(0.995)	(1.015)	(1.012)	(0.544)	(0.167)	(0.315)	(0.253)	(0.305)
Z	0.146**	0.148*	0.151**	0.131***	0.002***	0.003*	0.003	0.003**
	(0.008)	(0.008)	(0.008)	(0.006)	(0.000)	(0.000)	(0.000)	(0.000)
DIVERSIF	−0.173**	−0.185	−0.180	−0.176*	−0.207**	−0.155	−0.236	−0.201**
	(0.032)	(0.032)	(0.033)	(0.031)	(0.031)	(0.033)	(0.033)	(0.033)
IFRS	0.215	0.254**	0.094	0.171***	0.665*	0.907**	1.310***	1.791
	(0.093)	(0.112)	(0.102)	(0.063)	(0.063)	(0.065)	(0.080)	(0.101)
FinDevFactor1	−0.944*		−1.025***	−0.807*	−1.032		−1.345*	−1.663**
	(0.125)		(0.129)	(0.108)	(0.037)		(0.037)	(0.029)
LegalEnvFactor1		0.018	0.164	0.494***		0.750***	0.225***	0.771*
		(0.123)	(0.113)	(0.076)		(0.026)	(0.043)	(0.029)
LegalEnvFactor2		0.132**	0.148**	0.196***		1.185*	1.470*	1.235*
		(0.065)	(0.062)	(0.046)		(0.029)	(0.028)	(0.033)
Obs.	4256	4256	4256	4678	2728	2687	2687	2904
Number of iden	578	578	578	609	501	500	500	532
Wald-test	36.83***	30.06***	38.48***	32.59***	40.14***	34.51***	40.81***	44.52***
AR(2)	−1.71	−1.71	−1.67	−2.36	−2.27	−2.24	−2.24	−2.34
Hansen-test	211.35	213.99	209.26	235.02	277.02	274.88	269.34	275.2

Table 6 continued

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lind-Mehlum test (OWN)	12.54***	11.93***	9.33**	–	–	–	–	–
Lind-Mehlum test (INSOWN)	–	–	–	–	20.12***	30.88***	23.97***	12.73***
Lind-Mehlum test (LEV)	–	12.35***	10.82***	13.20***	29.02***	22.44***	22.68***	21.95***
Lind-Mehlum test (DIV)	3.97**	4.50***	–		4.30*	4.18***	–	

The sample includes firms from Argentina, Brazil, Chile, Colombia, Mexico, and Peru. The period is 1997–2013. The estimated regression model takes the form:

$$FV_{it} = \beta_0 + \beta_1 OWN_{it} + \beta_2 OWN_{it}^2 + \beta_3 LEV_{it} + \beta_4 LEV_{it}^2 + \beta_5 DIV_{it} + \beta_6 DIV_{it}^2 + \beta_7 LEGSYS_{it} + \beta_8 FINDEV_{it} + \sum_{k=1}^{K} \delta_k C_{it} + \sum_{j=1}^{J} \gamma_j D_{it} + \epsilon_i + \mu_t + \varepsilon_{it}$$

The table shows the regression results with the GMM System Estimator. A detailed definition of variables is provided in the "Appendix". Temporal, industry, and country dummy variables are included in the estimations but not tabulated. Critical Value is the threshold in the ownership concentration, insiderś ownership, leverage and dividend payout ratio at which the firm value is optimized. The Wald test is a Chi-square test of the joint significance of all of the variables considered in the analysis. AR(2) corresponds to the second-order serial correlation test using residuals in first differences, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen test of overidentifying restrictions is asymptotically distributed as Chi-square under the null of no relation between the instruments and the error term. Lind-Mehlumś test is used to verify the non-linear relationships in the case of the corporate ownership concentration (OWN), insiderś ownership (INSOWN) leverage (LEV), and dividends (DIV1). The extremum is outside of the interval of DIV1 variable in model 3, and consequently there is a trivial rejection of the null hypothesis (monotonic or inverse U-shaped relationship). Standard deviations are located beneath the regression coefficients in parenthesis. The regressions include the factors generated in Table 5

*, ** and *** indicate significance at the 10, 5 and 1 % levels, respectively

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regressions with positive and significant coefficients. Again, we observe that as the legal and regulatory systems improve, the firm value of Latin American corporations is enhanced, giving stronger support to our hypothesis H5, according to which best regulatory and legal systems positively impact on firm value.

4.2.4 *Comparative analysis by institutional system*

This final part of the empirical analysis offers a comparison by institutional context. In this case, the sample was split into two big groups depending on the relative efficiency of their legal and regulatory systems. In order to do so, we computed the average value among *VA*, *PS*, *GE, RQ*, *RL*, and *CC* by country as seen in the variable *LEGALSYS* in Table 2, Panel C. Chile and Brazil only had a positive average value whilst the other countries had a negative average. This means that, for our period of analysis and sample, Chile and Brazil had a relatively better institutional environment than Argentina, Colombia, Mexico, and Peru. Therefore, we re-estimated the regressions taking into consideration these two groups of countries. The results are displayed in Table 7. In this table we observe that under both institutional contexts the dominant shareholder in his or her controlling role does efficient work as long as this controlling shareholder has no more than 57.40 % of the voting rights—computed as the average critical value of *OWN* variable between models 1 and 2—. Beyond this level of ownership concentration the expropriation of minority shareholders appears and consequently firm value is diluted.

In terms the ownership in the hands of the controlling shareholder and managers (*INSOWN*), the non-linear effect is lost in countries with weaker legal systems as reported in model 4. In fact, the relationship turns out to be negative, highlighting the expropriation and entrenchment hypotheses.

Concerning leverage (*LEV*), it seems to be that the trade-off theory provides a sound background to support the way firms in Latin America make their capital structure decisions. In other words, we can say that in general firms take advantage of the tax deductibility of interests paid on debt by increasing leverage up to the point where marginal benefits of debt exceed the marginal bankruptcy costs, *ceteris paribus*. Nevertheless, it seems to be that in Chile and in Brazil the insolvency risk takes place at lower levels of debt (between 51.30 and 57.20 % of total assets as seen in models 1 and 3) than in other countries (between 57.40 and 63.10 % of total assets as shown in models 2 and 4) according to the critical values estimated for the *LEV* variable.

Additionally, the dividend policy and firm value still describes an inverse U-shaped relationship in the Brazilian and Chilean corporate sector only. In this case we observe that firm value is enhanced up to a certain critical point of the dividend ratio as described in Table 7 models 1 and 3, and after that critical point, firm value is diluted. The scenario turns out differently when companies from relatively worse institutional environments are analyzed. In this case, the set of countries comprised by Argentina, Colombia, Mexico, and Peru systematically show a positive relation between the dividend policy and firm value. Therefore, we might suggest that in the context of countries with relatively weak institutional

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Table 7 Estimations by institutional system

Variables	(1) Brazil and Chile	(2) Other Countries	(3) Brazil and Chile	(4) Other Countries
Constant	−2.148**	−39.219**	−0.443*	−26.260***
	(0.088)	(0.040)	(0.113)	(0.629)
OWN	4.673***	1.664***		
	(0.048)	(0.032)		
OWN^2	−4.626*	−1.293***		
	(0.061)	(0.029)		
Critical value OWN	0.505	0.643		
INSOWN			0.509***	−44.564***
			(0.111)	(1.499)
$INSOWN^2$			−0.645*	29.49
			(0.099)	(1.252)
Critical value INSOWN			0.395	–
LEV	6.376***	72.439**	13.742*	124.807***
	(0.159)	(0.064)	(0.169)	(2.050)
LEV^2	−5.573***	−63.117***	−13.404***	−98.855*
	(0.141)	(0.053)	(0.133)	(1.604)
Critical value LEV	0.572	0.574	0.513	0.631
DIV1	0.125*	1.031*	0.675*	1.902**
	(0.019)	(0.010)	(0.028)	(0.238)
$DIV1^2$	−0.103***	1.525	−0.786***	−1.542
	(0.005)	(0.004)	(0.008)	(0.067)
Critical Value DIV1	0.607	–	0.429	–
SIZE	0.227**	2.476*	−0.090***	−1.206***
	(0.008)	(0.007)	(0.008)	(0.126)
ROA	15.565*	9.915**	18.545	14.103*
	(0.083)	(0.017)	(0.049)	(0.414)
Z	0.054**	0.149*	0.002**	0.292***
	(0.001)	(0.000)	(0.000)	(0.001)
DIVERSIF	0.355	0.230	−0.155*	−0.180**
	(0.017)	(0.017)	(0.022)	(0.021)
IFRS	0.529**	−0.366**	1.358*	−0.533*
	(0.006)	(0.008)	(0.013)	(0.066)
FinDevFactor1	−1.637*	4.091***	−2.012	3.036**
	(0.010)	(0.013)	(0.012)	(0.220)
LegalEnvFactor1	0.279***	1.823***	0.317***	3.860
	(0.009)	(0.002)	(0.008)	(0.082)
LegalEnvFactor2	0.131***	0.007**	1.413***	1.227*
	(0.006)	(0.003)	(0.010)	(0.080)
Obs.	2441	1815	1846	841

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Table 7 continued

Variables	(1) Brazil and Chile	(2) Other Countries	(3) Brazil and Chile	(4) Other Countries
Number of iden	318	260	303	197
Wald-test	128.95***	35.13***	368.86***	120.77***
AR(2)	−1.02	−1.90	−1.27	−1.28
Hansen-test	245.77	216.09	221.46	148.06
Lind–Mehlum test (OWN)	44.83***	46.20***		
Lind–Mehlum test (INSOWN)	–	–	17.91**	–
Lind–Mehlum test (LEV)	14.11**	21.39***	43.4***	78.32***
Lind–Mehlum test (DIV1)	11.55**	–	12.83**	–

The sample includes firms from Argentina, Brazil, Chile, Colombia, Mexico, and Peru. The period is 1997–2013. The estimated regression model takes the form: $FV_{it} = \beta_0 + \beta_1 OWN_{it} + \beta_2 OWN_{it}^2 + \beta_3 LEV_{it} + \beta_4 LEV_{it}^2 + \beta_5 DIV_{it} + \beta_6 DIV_{it}^2 + \beta_7 LEGSYS_{it} + \beta_8 FINDEV_{it} + \sum_{k=1}^{K} \delta_k C_{it} + \sum_{j=1}^{J} \gamma_j D_{it} + \epsilon_i + \mu_t + \varepsilon_{it}$

This table includes the regressions by institutional system. The sample was split into two groups based on the efficiency of the legal system (LEGALSYS) by country (see Table 2, Panel C). The first group with relatively better legal system includes Brazil and Chile; while Argentina, Colombia, Mexico and Peru (Other Countries) were incorporated in the second group. A detailed definition of variables is provided in the "Appendix". Critical Value is the threshold in the ownership concentration, insiderś ownership, leverage and dividend payout ratio at which the firm value is optimized. The Wald test is a Chi-square test of the joint significance of all of the variables considered in the analysis. AR(2) corresponds to the second-order serial correlation test using residuals in first differences, asymptotically distributed as N(0,1) under the null of no serial correlation. The Hansen test of overidentifying restrictions is asymptotically distributed as Chi-square under the null of no relation between the instruments and the error term. Lind-Mehlumś test is used to verify the non-linear relationships in the case of the corporate ownership concentration (OWN), insiderś ownership (INSOWN) leverage (LEV), and dividends (DIV1). The extremum is outside of the interval of INSOWN variable in model 4, and consequently there is a trivial rejection of the null hypothesis (monotonic or U-shaped relationship). The extremum is outside of the interval of DIV1 variable in models 2 and 4, and consequently there is a trivial rejection of the null hypothesis (monotonic or inverse U-shaped relationship). Standard deviations are located beneath the regression coefficients in parenthesis. The regressions include the factors generated in Table 5

*, ** and *** indicate significance at the 10, 5 and 1 % levels, respectively

environments, shareholders are mostly concerned about the free cash flow's agency problem and try to minimize it by increasing the cash disbursement in dividends, which otherwise may be used opportunistically by managers in private rent seeking activities.

The financial development factor (*FinDevFactor*1) describes a dissimilar pattern once moderated by the quality of the institutional environment. In the case of Brazil and Chile we still observe a negative impact on firm value as a consequence of improvements to the financial system as analyzed in Sect. 4.2.3. However, in the context of countries with relatively poor legal and regulatory systems (or worse institutional environments) this relationship is positive and statistically significant (e.g. see variable *FinDevFactor*1 in models 2 and 4), meaning that for the subsample of firms from Argentina, Colombia, Mexico, and Peru, financial

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development fosters an efficient allocation of capital, liquidity, and firmś access to more and better financial instruments which eventually enhances firm value. Love (2011) suggests that more sophisticated financial systems are associated with reduced costs of external financing which press up the value of the firm. Therefore, our research hypothesis H4, which stated that more developed financial markets positively affect firm value in emerging markets, seems to be accepted only in the contexts of countries with relatively weaker institutional environments.

Finally, the two factors used to measure the legal and regulatory systems *LegalEnvFactor*1 and *LegalEnvFactor*2 behave in the same way as analyzed above.

5 Conclusions

The goal of this paper was to analyze, under a corporate governance approach, how internal and external variables impact the market value of Latin American firms. At the firm-level, our results confirm that ownership structure plays a dissimilar role in monitoring firms. For instance, it is observed that ownership concentration positively impacts firm value, which seems to be supported by the monitoring hypothesis. That monitoring hypothesis takes place through the alignment of interests between majority and minority shareholders. Beyond that critical level of concentration, the firm value is diluted, which seems to be supported by the expropriation hypothesis. Such expropriation takes place when dominant shareholders take advantage of their voting power by divesting resources into private benefits. Concerning financial leverage, we find that firm value experiences a non-linear relationship with debt level. Additionally, results show that the dividend payment ratio achieves a certain optimal level which might be explained by the interaction between the marginal transaction costs when external capital is increased to fund those dividends and the marginal benefits of reducing the agency costs of external financing when the firm increases the dividend payment. Consequently, the impact of dividends on the sector-adjusted firm value is represented by an inverse U-shaped form which means that dividend payout ratio is used in a first stage as a governance mechanism which reduces the agency costs, but then such benefits are offset by the transaction costs incurred to get funds to finance the dividend payment. As long as we know, this is a pioneering research in analyzing this non-monotonic relationship between the payout ratio and firm value in the Latin American context.

Concerning external variables, there is a dissimilar influence of the financial development of the country *vis-à-vis* the enhancement of legal and regulatory systems. On the one hand, we conclude that, contrary to what was expected, the development of the financial system impacts negatively on the firm value. It is possible that in immature financial markets such as those in Latin America, firms take advantage of both the asymmetries of information and the multiple market frictions to be overvalued. Consequently, when the financial markets become more efficient, the market competition increases, pressing down the market value of the firm. On the other hand, concerning the legal and regulatory systems, we conclude that the enforcement of the law is a value-enhancing mechanism.

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This work has both corporate governance and policy level implications. At the corporate governance level, we provide evidence that a good regulatory system that efficiently protects the rights of shareholders is associated with a premium in the market value of the firm. This fact generates higher market confidence that allows firms to undertake profitable investment options. Despite this positive view of the efficiency of regulatory systems in Latin America, we also observe that constraining the expropriation of minority shareholders by the controlling shareholders is still a pending task. Consequently, we suggest that policy makers undertake measures to improve even further the rights of minority shareholders. Moral hazard problems such as the expropriation of minority shareholders need to be addressed in Latin America. Finally, and in the same line, we observe that there is a demand for improvements in financial systems. Despite the advances in the development of capital markets in Latin America over the period of analysis, there is still a lack of competition, which allows firms to be inefficiently overvalued. Therefore, measures are needed to develop even more the financial systems to alleviate these market imperfections.

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Appendix

Sector-adjusted firm value

$$FV = \frac{MkCptz_{it} + TD_{it}}{TA_{it}}$$

where $MkCptz_{it}$ corresponds to the market capitalization of the firm i in year t. TD_{it} is the total short- and long-term debt and TA_{it} is the firḿs total assets. Following López and Crisóstomo (2010), the sector-adjusted firm value is then computed by subtracting the median value for the firms in the same industrial sector, year and country.

Corporate ownership concentration

OWN corresponds to the percentage of outstanding shares in the hands of the controlling shareholder.

INSOWN is the percentage of closely held shares which includes the shares in the hands of executives, directors, controlling shareholder, cross holdings (e.g. related parties), government, and employees.

Capital structure

$$LEV = \frac{TD_{it}}{TA_{it}}$$

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Dividend policy

$$DIV1 = \frac{DPS_{it}}{EPS_{it}}$$

where DPS_{it} is the annual dividend per share and EPS_{it} is the earnings per share.

$$DIV2 = \begin{cases} 1, & \textit{if the country requires mandatory dividends} \\ 0 & \textit{otherwise} \end{cases}$$

Firm size

$$SIZE = Ln(TA_{it})$$

Profitability

$$ROA = \frac{EBT_{it}}{TA_{it}}$$

where EBT_{it} is the pretax income.

Insolvency risk

$$Z = 6.56WC_{it} + 3.26RE_{it} + 6.72EBIT_{it} + 1.05BvE_{it} + 3.25$$

where WC_{it} is the working capital over total assets, RE_{it} is the retained earnings over total assets, $EBIT_{it}$ is the earnings before interest and taxes, and BvE_{it} is the book value of equity over total liabilities.

Corporate diversification

DIVERSIF corresponds to the number of industry groups in which a firm operates according to the SIC (Standard Industrial Classification) codes.

IFRS

$$IFRS = \begin{cases} 1, & \textit{if the company uses IFRS} \\ 0, & \textit{otherwise} \end{cases}$$

where *IFRS* is the International Financial Reporting System.

Legal and regulatory systems

All the following legal system variables were obtained from Kaufmann et al. (2011) where the indexes range from approximately −2.5 (weak) to 2.5 (strong) governance performance, although for our sample these variables do not have such extreme values.

1. *VA* measures the Voice and accountability.
2. *PS* measures the Political stability and absence of violence/terrorism
3. *GE* measures the Government effectiveness.

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4. *RQ* measures the Regulatory quality.
5. *RL* measures the Rule of law.
6. *CC* measures the Control of corruption.

Bank Concentration

BankConc is the market share of the three largest banks by country.

Financial development

All the following financial development variables were obtained from Beck et al. (2000).

DMBAGDP is the claims on domestic real nonfinancial sector by deposit money banks as a share of GDP, calculated using the following deflation method: $\frac{0.5\left[\frac{F_t}{P_{et}}+\frac{F_{t-1}}{P_{et-1}}\right]}{\left[\frac{GDP_t}{P_{at}}\right]}$; where F is deposit money bank claims, P_e is end-of the period Consumer Price Index (CPI), and P_a is average annual CPI.

PCOFIGDP is the Private credit by deposit money banks and other financial institutions as a share of GDP, calculated using the following deflation method: $\frac{0.5\left[\frac{F_t}{P_{et}}+\frac{F_{t-1}}{P_{et-1}}\right]}{\left[\frac{GDP_t}{P_{at}}\right]}$; where F is the credit to the private sector, P_e is end-of the period Consumer Price Index (CPI), and P_a is average annual CPI.

BCBD is the private credit by deposit money banks as a share of demand, time and saving deposits in deposit money bank.

SMKGDP which is the value of listed shares to GDP, calculated using the following deflation method: $\frac{0.5\left[\frac{F_t}{P_{et}}+\frac{F_{t-1}}{P_{et-1}}\right]}{\left[\frac{GDP_t}{P_{at}}\right]}$; where F is the stock market capitalization, P_e is end-of the period CPI, and P_a is average annual CPI.

SMKVTGDP is the total shares traded on the stock market exchange to GDP.

SMKTO is the ratio of the value of total shares traded to average real market capitalization, the denominator is deflated using the following method: $\frac{\frac{T_t}{P_{at}}}{0.5\left[\frac{M_t}{P_{et}}+\frac{M_{t-1}}{P_{et-1}}\right]}$; where T is total value traded, M is the stock market capitalization P_e is end-of the period CPI, and P_a is average annual CPI.

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