

Ownership Concentration and the Determinants of Capital Structure in Latin America *

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ABSTRACT

In this paper we study the capital structure determinants of Latin American firms using a comprehensive sample from 1996 to 2005 covering seven countries. We argue that ownership control is important for capital structure decisions in Latin America, where firms present a higher ownership concentration. We find a U-shape relation between ownership concentration and leverage. When ownership concentration is low its effect on leverage is negative, and when ownership concentration is high its effect on leverage is positive. This U-shape relation is consistent with the argument that ownership-concentrated firms avoid equity issuing because they do not want to share or to lose control, and this effect is contrary if the ownership structure has enough dispersion and losing control is not an issue. Consistent with the control argument, we also find that firms with more growth opportunities exhibit higher leverage. In addition, and consistent with previous literature on developed countries, we find that other factors that do not proxy for ownership control are important determinants of leverage. Firms that are larger, with more tangible assets, and that are less profitable are also more leveraged.

JEL Classification Codes: G32, G15,

Keywords: Capital Structure, Ownership Control, Emerging Markets, Latin America.

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In this paper we study the capital structure determinants of Latin American firms using a comprehensive sample from 1996 to 2005 covering seven countries. We argue that ownership control is important for capital structure decisions in Latin America, where firms present a higher ownership concentration. We find a U-shape relation between ownership concentration and leverage. When ownership concentration is low its effect on leverage is negative, and when ownership concentration is high its effect on leverage is positive. This U-shape relation is consistent with the argument that ownership-concentrated firms avoid issuing equity because they do not want to share or to lose control; the opposite effect occurs if the ownership structure has enough dispersion and losing control is not an issue. Consistent with the control argument, we also find that firms with more growth opportunities exhibit higher leverage. In addition, and consistent with previous literature on developed countries, we find that other factors that do not proxy for ownership control are important determinants of leverage. Firms that are larger, have more tangible assets, and are less profitable are also more leveraged.

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1. Introduction

There is a recent debate on how the benefits and costs of debt counterbalance each other to determine an equilibrium capital structure for companies in the United States. Graham (2000) argues that firms are less leveraged than they should be given the tax benefits of debt. Molina (2005), on the other hand, shows how costs of financial distress measured ex-ante can counterbalance the potential tax benefits that an average firm will obtain if it levers up.

In Latin America the situation may be quite different. First, tax benefits tend to be lower. In Chile, for example, corporate taxes can be deducted from equity personal taxes, reducing the corporate tax shield to possibly zero. In Mexico and Venezuela, required inflation adjustments on corporate financial statements can turn the tax shield negative in some cases. On the other hand, the costs of financial distress are presumably higher in Latin American than in the United States. In Latin America, bankruptcy and financial distress processes are longer, more bureaucratic, and more costly due in part to a worse rule of law. According to La Porta, et al. (1997) Latin American countries, of French Civil Law origin, rank considerably lower than the U.S. in terms of rule of law.

If Latin American firms have on average fewer tax benefits and higher costs of financial distress than their U.S. counterparts, then, according to the trade-off theory of capital structure, we should expect them to be significantly less leveraged. However, this is not what we find in this study. Looking at a comprehensive sample of Latin American firms from seven countries, we find their book-value leverage ratios to be similar to those reported by Rajan and Zingales (1995) and Flannery and Rangan (2006) for U.S. firms.

We argue that Latin American firms exhibit higher leverage than what is suggested by the trade-off theory because their ownership concentration is significantly higher.¹ We argue that in Latin America, stockholders of firms with highly concentrated ownership prefer to issue debt rather than equity because Latin American shareholders do not want to put at risk firm control. Larger information asymmetries and underdeveloped financial markets also make the issuance of equity less likely in this region.

Our results support the idea that ownership structure strongly influences firms' leverage. We find a U-shape relation, where at high levels of ownership concentration the relation between leverage and ownership is positive, consistent with our argument that companies with highly concentrated ownership not seek equity financing in order to avoid losing control. On the other hand, at low levels of ownership concentration the relation between leverage and ownership is negative, indicating that when losing control is not an issue firms are more likely to finance their growth with equity. Consistent with our control argument, we also find that Latin American firms with more growth opportunities tend to exhibit high leverage. Firms issue debt when they need cash.

We also address a second question in this paper: Are the determinants of capital structure referred to in the literature valid for Latin American firms? To find the answer, we use a comprehensive database of 806 nonfinancial firms from seven Latin American countries: Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela, from 1996 to 2005. We empirically test if factors that do not proxy for ownership control--such as asset tangibility, size, growth opportunities, and profitability--help to explain the leverage

¹ In a sample of Latin American large firms, Johnston (2004) finds that the first two stockholders hold between 54% and 69% of total ownership, and the first five stockholders hold between 65% and 87% of total ownership.

in Latin American firms. This is among the first regional studies on the determinants of capital structure.

Bradley, Jarrell, and Kim (1984); Titman and Wessels (1988); Kale, Noe, and Ramirez (1992); Flannery and Rangan (2006); and Hovakimian (2006) are part of the previous empirical literature that use large U.S. samples to test how taxes, asset tangibility, growth opportunities, profitability, product characteristics and uniqueness, volatility, and size affect the capital structure decision. Rajan and Zingales (1995) and Booth et al (2001) explore capital structure determinants outside the United States. Rajan and Zingales (1995) use data from seven developed economies, and Booth et al (2001) use data from ten developing economies but only include two Latin American countries: Brazil and Mexico.

Consistent with the literature we find that leverage determinants such as size, growth opportunities, asset tangibility, profitability, and taxes are statistically and economically important in explaining the leverage in our sample of Latin American firms. Our results apply uniformly to all countries in the sample, suggesting that common characteristics affect leverage in this region. At the country level, capital structure determinants tend to behave consistently in terms of the coefficient sign of the regression equations, but not always in terms of their statistical or economic significance, which is particularly severe in countries with small number of observations.

This paper adds to the literature by examining the relation between capital structure and ownership in the context of the Latin America region, where ownership concentration tends to be high; we also corroborate some stylized facts about the determinants of capital structure in Latin America.

The rest of the paper proceeds as follows. Section 2 describes our data set, explains the constructions of the variables, and shows the principal descriptive statistics. Section 3 reports and discuss the results. Section 4 checks the robustness of the results. Finally, section 5 presents our conclusions.

2. Data and research design

In our sample, we include data available for all Latin American firms in the Economatica² database from 1989 to 2005. Economatica has financial data for firms in seven Latin American countries: Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela. It includes mainly firms that are listed on their home countries' stock exchanges. However, the data includes a few firms that are not listed but that report their financial statements to local regulatory agencies.

The initial sample includes 1,168 Latin American firms, which excludes firms in the financial sector. We use data from fiscal year-end consolidated financial statements measured in U.S. dollars. Stock prices are taken at the end of the calendar year. We drop firms with fewer than three years of balance sheet data and firms with less than \$250,000 of total assets. We also exclude state-owned firms, firms that do not have direct operations and that are used only as vehicles for other investments, and firms with leverage ratios lower than zero and higher than one. We then apply Hadi's (1992, 1994) outliers method to the control variables (the exclusion of these outliers does not affect the results.) Our final sample includes data for 806 Latin American firms.

² Economatica is the largest database with financial information for Latin American firms.

The regression analysis includes data from 1996 to 2005. Economatica does not have complete data before 1996, but this limitation is mitigated by the fact that Latin American economies before 1995 showed significant volatility, which favors using more recent data for the analysis.³ The final sample therefore includes 6,766 firm-year observations.⁴

All countries in our sample have the same legal origin, which is the French Civil Law. It is important to note that the value of equity held by outsiders in French Civil Law countries tends to be lower, and there tend to be fewer listed firms and fewer initial public offerings than in Common Law countries (La Porta, et al, 1997). Although we are considering firms located in the same geographic area, we still obtain enough variability among the seven countries in our sample in terms of the country indexes used in La Porta et al (1997).

Variables

The selection of the variables follows Harris and Raviv's (1991) analysis of the determinants of firms' capital structure.

a. Leverage

We follow Rajan and Zingales (1995) and define leverage as the ratio of financial debt to debt plus equity. We consider both book value and market value equity. First, we define **leverage1_bv** as the ratio of total debt financing (short- and long-term) to total debt financing plus the book value of equity:

³ However, using a larger data set (1989-2005) does not change our main conclusions.

⁴ Ownership information for Argentinean and Mexican firms is not available in Economatica; therefore, we use Reuters database to hand collect ownership information for Argentina and Mexico for the years 2005 and 2006.

$$\text{leverage1_bv} = \frac{\text{debtfin_st} + \text{debtfin_lt}}{\text{debtfin_lt} + \text{debtfin_st} + \text{bv_equity}}$$

where **debtfin_st** is short-term financial debt, **debtfin_lt** is long-term debt, and **bv_equity** is the book value of equity.

Depending on the country, Economatica excludes commercial papers and bonds from financial debt, instead calling them "negotiable obligations". We consequently use **leverage2_bv** as our main measure of leverage; it includes short-term and long-term debt as well as negotiable obligations:

$$\text{leverage2_bv} = \frac{\text{debtfin_st} + \text{debtfin_lt} + \text{obligneg_st} + \text{obligneg_lt}}{\text{debtfin_lt} + \text{debtfin_st} + \text{obligneg_st} + \text{obligneg_lt} + \text{bv_equity}}$$

where **obligneg_st** equals short-term negotiable obligations and **obligneg_lt** equals long-term negotiable obligations.

leverage2_mv uses the same numerator as leverage2_bv but uses market value of equity (defined as the number of shares outstanding times the stock price) in the denominator:

$$\text{leverage2_mv} = \frac{\text{debtfin_st} + \text{debtfin_lt} + \text{obligneg_st} + \text{obligneg_lt}}{\text{debtfin_lt} + \text{debtfin_st} + \text{obligneg_st} + \text{obligneg_lt} + \text{mv_equity}}$$

mv_equity is the market value of equity; it equals the closing market price times the number of shares outstanding.

We also consider alternative measures of leverage, such as total financial debt to total book value of assets, and total liabilities to total assets. Our results are robust to the use of these alternative measures.

b. Ownership

To measure firm's ownership concentration, we use the Herfindahl index of the firm's ownership structure (**herf_ind**). Herf_ind is calculated as the sum of the squares of the fractions of equity held by each individual shareholder (as reported by Economatica):

$$herf_ind = \sum_{i=1}^n s_i^2$$

where s_i is the percentage ownership of shareholder i and n is the number of total shareholders in the firm, as reported by Economatica⁵. High levels of *herf_ind* represent high ownership concentration.⁶

Jensen and Meckling (1976) argue that shareholders of a firm with more concentrated ownership may prefer less debt if debt brings more monitoring (see also Leland and Pyle (1977) and Diamond (1984)). But alternatively, firms will prefer debt over equity if issuing equity means sharing or losing control⁷. In this direction, we expect the relation between ownership concentration and leverage to be positive. The more concentrated the firm's ownership is, the more likely current shareholders are to issue debt instead of equity when the company needs funds. That is, they will follow a debt over equity pecking order. We argue this effect should be more important or visible in Latin America than in the U.S. because ownership concentration, the percentage of

⁵ This index tends to be underestimated given that some shareholders could be related (i.e., family ties). Grouping the ownership concentration if shareholder i has the same last name as shareholder j does not change the main results.

⁶ If the firm has, for instance, only two shareholders who each own 50% of the company, the *herf-ind* will be 0.5 (=sq(0.5)+sq(0.5)). On the other hand, if the firm has 5 shareholders with 20% ownership each, the *herf-ind* will be 0.2, indicating less ownership concentration. See Curry and George (1983) for a discussion on concentration proxies.

⁷ Harris and Raviv (1988) and Stulz (1988) show that entrenchment motives may cause a controlling shareholder to increase leverage beyond the optimal point in order to "inflate" the voting power of his or her equity stake and reduce the probability of takeover attempts.

family businesses, and the asymmetry of information in Latin America tend to be higher. Shareholders of firms with highly concentrated ownership will not want to share or lose firm control, and they will avoid issuing equity if they are overconfident about the firm's future.

On the other hand, if the firm's ownership structure is dispersed (that is, there is low ownership concentration), the value of ownership control may lose importance for shareholders. In that case, other factors may play a role in making capital structure decisions, leaving us without a clear direction for this relation.⁸

There are several country-specific reasons that Latin American companies should be less leveraged than their U.S. counterparts. For example, in Chile, corporate taxes are deducted from shareholders' personal taxes, making the corporate tax shield almost nonexistent. In Mexico and Venezuela, firms are required to adjust their earnings by inflation, producing an effect that can result in a negative tax shield if the firm uses debt to finance current assets. In addition, debt markets in Latin America are smaller and less efficient. Fewer debt options, such as long-term bonds, are available to firms. Thus, Latin American companies should be less leveraged than those in the United States. However, as we show in the next section, this is not the case. We argue that firms in Latin America are more leveraged than they should be and that this *overleverage* can be explained by firms' ownership structures.

c. Size

⁸ Du and Dai (2005) show empirical evidence from East Asian firms that supports the idea that controlling shareholders with relatively small ownership concentration (high separation of cash flow rights and control rights) tend to increase leverage in order to obtain nondilutive shareholder control.

We use the log of sales as our measure of firm size (**log_sales**). We expect a positive relation between size and leverage. Bigger firms are less likely to default on their debt obligations because they are more diversified and because it is cheaper for them to renegotiate and issue long-term debt securities. We consider the log of book value of assets as a robustness check.

d. Taxes

We use the effective tax rate (**tax_rate**), which is calculated as the ratio of paid taxes to earnings before taxes. The paid taxes are calculated by subtracting earnings after taxes from earnings before taxes. We limit this variable to be between zero and one.

The expected sign for this variable depends on the capital structure theory we use. On one hand, a positive sign is consistent with the trade-off theory (De Angelo and Masulis 1980; Graham, 1996a, 1996b); on the other hand, a negative sign could be a proxy of firm's profitability and, consistent with the pecking-order theory, a lower debt level will be expected (Myers, 1977; Myers and Majluf, 1984).

e. Asset tangibility

We use the lag value of the ratio of fixed assets to total assets in order to assess the firm's asset tangibility (**txa_ta**), which is a proxy for collateral value. The greater the collateral value of a firm's assets, the more value the debtholder can recover in case of default (Jensen and Meckling, 1976). We expect a positive coefficient relating tangibility and leverage.

f. Profitability

To assess the firm's profitability, we use the lag value of the ratio of earnings before interest and taxes to total assets (**ebit_ta**). The expected sign for this variable depends also on the capital structure theory we use. On one hand, a positive sign is consistent with the trade-off

theory, which implies that the higher the firm's profitability, the higher the potential tax shields and therefore the higher the firm's debt level (De Angelo and Masulis, 1980); on the other hand, a negative sign indicates that the firm will finance its operations and investment opportunities using its own cash flow instead of using debt (Myers and Majluf, 1984).

g. Growth opportunities

We use two measures of firm's growth opportunities. First we consider a market-to-book ratio, **mve_bve**. Second, we use the ratio of capital expenditure to fixed assets (**capex_ta**).

Capital expenditure is estimated as the one-year variation in fixed assets.

The expected sign of this variable is negative given the agency relation between managers and debtholders and given that growth opportunities are noncollateral assets; however, this relation depends on debt maturity because some of the agency problems could be mitigated issuing short-term debt (Myers, 1977). As in Titman and Wessels (1988), we will expect a negative relation between long-term debt and growth opportunities and a positive relation between short-term debt and growth opportunities. In Latin America most debt obligations are short-term, therefore we expect a positive relation between our proxies for growth opportunities and leverage.⁹

In addition, if we argue that Latin American firms avoid issuing equity because they are interested in preserving control rights, growth opportunities should be positively related to leverage ratios.

⁹ La Porta et al (1997) argues that "the quality of legal protection has a significant effect on the ability of firms in different countries to raise external finance." Moreover, these authors find that French Civil Law countries have particularly small narrow debt and equity markets.

Descriptive statistics

a. Measure of debt ratios

In Table 1 we present the descriptive statistics for our three main leverage measures across the sample and across countries for the period 1996–2005. As a whole, and using book values, the region has a **leverage1_bv** of 29.45% and increases to 32.16% when we use **leverage2_bv** (debt plus negotiable obligations). These ratios are similar to the 34% reported in Rajan and Zingales (1995) for the U.S. for a 1989–1996 sample period, and are higher than the 24.85% reported in Flannery and Rangan (2006), which uses a more recent and comprehensive data set of U.S. firms from 1965 to 2001. These results show, as we argued before, that Latin American firms are overleveraged compared with their U.S. counterparts.

In another paper, Booth et al (2005) reported average leverage ratios for Brazil and Mexico of 30.3% and 34.7%, respectively, for the period 1985–1991. In Table 1 we report similar leverage ratios for Brazil and Mexico—37.78% and 31.96%, respectively—for the period 1996–2005.

[INSERT TABLE 1 HERE]

Colombia and Venezuela have lower average book value debt ratios in our sample, with **leverage2_bv** of 16.23% and 14.82%, respectively. However, they also have the fewest firm-year observations, making it possible that the leverage in these two countries is underestimated. After taking out Colombia and Venezuela, the average leverage in the sample is around 30% (**leverage1_bv**) and 32% (**leverage2_bv**).

In the whole sample, the number of observations falls dramatically when leverage using market values is considered (**leverage2_mv**). For the full sample, **leverage2_mv** averages 55.04%, which is much higher than similar leverage measures in the U.S. (Rajan

and Zingales, 1995; Flannery and Rangan, 2006). Although this difference is consistent with the higher market-to-book ratios historically shown by U.S. firms, it is also true that market liquidity and high transaction costs could considerably affect market values in our sample¹⁰.

b. Debt determinants

In Table 2 we present the descriptive statistics for the seven main debt determinants measured across the sample and across countries for the period 1996–2005. In terms of size (**log_sales**), Brazilian and Mexican firms tend to be bigger. Size is calculated as the natural logarithm of sales in U.S. dollars, averaging 12.08 and 12.41, respectively. Booth, et al (2001) report a similar size measures for the period 1980–1990, averaging 13.1 and 11.2 for Brazil and Mexico, respectively. As expected, the firms in our sample tend to be much smaller than their counterparts in the U.S. and other developed countries.

Mexican firms tend to have higher effective tax rates (**tax_rate**), averaging 28%, and Chilean and Peruvian firms the lowest, averaging 16% and 19%, respectively. For the full sample, the average effective tax rate is 24% with a standard deviation of 17%. In all countries, the standard deviation of the effective tax rate tends to be high. Booth et al (2001) report a 26.3% effective tax rate for Mexico.

Our measure of asset tangibility (**fxa_ta**), which is a proxy for collateral value, has a minimum value of 30% (Colombia) and a maximum value of 54% (Chile); however, the sample is very uniform across the countries and averages 48% for the whole period. Around half of the firm's assets in our sample could be used as collateral to raise

¹⁰ See Chong and Lopez-de-Silanes (2007) for a recent account of the development of Latin American financial markets.

external capital. This is consistent with Booth et al (2001) for their sample of ten emerging markets for the period 1980–1990.

[INSERT TABLE 2 HERE]

Profitability (**ebit_ta**) is also uniform across the sample, averaging 6%, but its intracountry variability appears to be high. Chilean firms are the most profitable in our database, averaging 7%, and Colombian firms are the least profitable, averaging 4%. Booth et al (2001) report average profitability for Brazilian firms of 6.7% and 8.1% for Mexican firms, similar to the profitability values we report in Table 2 for Brazil and Mexico.

We report two measures of growth opportunities. Our first measure, the firm's market-to-book-value ratio (**mve_bve**), is equal to 0.65 in our sample. Our second measure, the ratio of capital expenditure to fixed assets (**capex_ta**) averages 4% in our sample, and it is uniform across countries.

We also report in Table 2 our measure of ownership concentration. As expected, and consistent with La Porta et al. (1997) and more recently Chong and Lopez-de-Silanes (2007), the Latin American firms in our sample tend to be highly concentrated,¹¹ averaging an ownership Herfindahl index of 0.33. Peruvian firms show the highest concentration, with a Herfindahl index of 0.41, and Colombia the lowest with 0.24. Our levels of concentration are similar to those reported by Chong and Lopez-de-Silanes (2007).

¹¹ Chong and Lopez-de-Silanes (2007) reported the following ownership concentration levels for the countries in our sample (except Peru): Argentina, 53%; Brazil, 57%; Chile, 45%; Colombia, 63%; Mexico, 64%; and Venezuela, 51%.

In Table 3 we report the univariate correlation between leverage and our main explanatory variables. Using **leverage2_bv**, we find that our proxies for size and tangibility exhibit the expected positive linear relation with leverage. The two growth-opportunities proxies are positively related to leverage, consistent with the argument that debt in the Latin American region is mainly short-term. Finally, profitability is negatively related to leverage, consistent with the pecking-order theory of corporate financing.

[INSERT TABLE 3 HERE]

The effective tax rate and the **herf_ind** of ownership concentration are both negatively related to leverage. In the first case, we argued above that the effective tax rate will be negatively related to leverage if the effective tax rate serve as a proxy of firm's profitability. In the second case, our concentration proxy is negatively correlated to leverage; however, the correlation is too low ($\rho=0.0721$) to make any inference.

3. Results

In this section, we first estimate leverage using as capital-structure determinants our proxies of growth opportunities, asset tangibility, size, and profitability in order to compare our results with other international evidence. Then we include proxies of ownership concentration to study the effect of ownership control on leverage. Our estimations consider fixed-effect models and lagged independent variables.¹²

In Table 4, Panel A, we use **leverage2_bv** as the dependent variable (we obtain similar nonreported results using **leverage1_bv**). Consistent with Titman and Wessels

¹² Fixed-effect models help to capture the effect of omitted explanatory variables, as explained by Himmelberg et al. (1999).

(1988), Rajan and Zingales (1995), and Booth et al (2001), we find that asset tangibility (**fxa_ta**) and size (**log_sales**) influence positively firms' leverage in our sample of Latin American firms. Both coefficients are statistically significant for the full sample and remain positive and significant for each country (except for Venezuela where the t-value for **fxa_ta** was 1.10). In the case of tangibility, the coefficient is negative only in Peru.

[INSERT TABLE 4 HERE]

The effect of profitability (**ebit_ta**) is negative and significant in each country, consistent with previous evidence. The effect of our proxy for growth opportunities (**capex_ta**) is positive and significant in the full sample regression and positive and significant in Brazil, Chile, and Peru. Although inconsistent with the international evidence (Rajan and Zingales, 1995), the positive relation we find between growth opportunities and leverage in Latin America can be explained by the desire of Latin American firms to avoid equity issuances and the consequent loss of control. Another reason is the higher use of short-term debt in the region (Titman and Wessels, 1988).

The results remain, but are somehow less strong, when we estimate the regression model using **leverage_mv** as dependent variables. However, as shown in Panel B, the number of observations for this estimation fell significantly.

In sum, we conclude that asset tangibility and size are positively related to leverage, and profitability is negatively related to leverage in Latin American companies. We also find a positive relation between growth opportunities and leverage, supporting the idea that debt is preferred to equity in this region. There are other reasons that could also explain this preference, such as the high transaction costs and low liquidity typical of the Latin American financial markets (Chong and Lopez-de-Silanes, 2007).

In Table 5, we include in the model our tax proxy (**tax_rate**), and more important, the ownership concentration variable (**herf_ind**). The results from Table 4 regarding the positive relation between leverage and growth opportunities, asset tangibility, and size, and the negative relation between leverage and profitability continue to be strong in Table 5. We also report in Table 5 a negative and significant relation between leverage and taxes, consistent with the pecking-order theory and the idea that tax rate is a proxy for firm profitability.

In the first column of Table 5 we report a negative but not significant coefficient for ownership concentration. This result can be explained by the agency theory of capital structure (Jensen and Meckling, 1976; Fama 1980; Fama and Jensen, 1983), which argues that high level of ownership concentration induces firms to issue less debt to avoid monitoring.

In Table 5, column 2, we include in the estimation the square value of **herf_ind** to test whether the relation between leverage and ownership exhibits a nonlinear relation. We obtain a negative and significant coefficient for **herf_ind** and a positive and significant coefficient for **herf_ind**². We interpret this result as evidence of a U-shape relation between leverage and ownership, where firms with low ownership concentration exhibit a negative relation with leverage, and firms with high ownership concentration exhibit a positive relation with leverage.

[INSERT TABLE 5 HERE]

Because we find a U-shape relation between ownership concentration and leverage, we are now interested in finding the inflection point at which the effect of ownership concentration on leverage becomes positive. In Table 5, columns 3 through 5,

we follow Morck, Shleifer, and Vishny (1988) and split the **herf_ind** variable in two. We consider three inflection points: 0.4, 0.5, and 0.6. **Herf_ind** is then split into **herf_ind_{0-x}** and **herf_ind_{x-1}**. **Herf_ind_{0-x}** is equal to **herf_ind** if **herf_ind** is lower than x (inflection point), and **herf_ind_{0-x}** is equal to x otherwise. On the other hand, **herf_ind_{x-1}** is equal to x (inflection point) if **herf_ind** is lower than x , and **herf_ind_{x-1}** is equal to **herf_ind** otherwise.

In all our regressions the coefficient for **herf_ind_{0-x}** is negative and significant, and it is positive and significant for **herf_ind_{x-1}**. In sum, these results show a U-shape relation between ownership concentration and leverage. This U-shape relation is consistent with the argument that, as the firm's ownership concentration increases, firms avoid issuing equity because they do not want to lose or share their control rights.

Consistent with this idea, we show in Table 5a positive and significant coefficient for our proxy of growth opportunities (**capex_ta**), which demonstrates that in our sample of Latin American firms growth is mainly financed by debt. This effect is still positive, although not significant, when we include ownership concentration in our regressions.

The country regressions we show in Panel B of Table 5 also exhibit the U-shape relation, although it is statistically significant only in Brazil and Chile. In Colombia, Peru, and Venezuela, the number of firm-year observations are only 111, 436, and 78, respectively, which reduces considerably the statistical power of the estimation.

4. Robustness

In this section we perform three robustness checks (the results are not reported in tables, but are available upon request). First we estimate our model using the lag value of each

independent variable. Second, we include in our model three macroeconomic variables that could also influence our results. And third, we run the regressions separately with a reduced sample from 2001 to 2005 in order to test whether our main results change with a more recent and presumably better-quality data.

a. Lag values of explanatory variables

Here we take a one-year lag for each of the independent variables. The basic results remain: coefficients for growth opportunities, asset tangibility, and size are positive and significant, and the coefficient for profitability is negative and significant. We obtain similar results when we include in our model the effective tax rate and our concentration proxies: **herf_ind** and **herf_ind²**.

b. Macroeconomic variables

Then we consider a model with three macroeconomic variables: stock market capitalization as a percentage of GDP (**mkcap_gdp**), economic growth as the percentage change in GDP (**growth**), and inflation rate (**inflation**).

Although we still use fixed-effect estimation for this augmented model, we seek to capture the great heterogeneity of the economic environment in these seven Latin American countries, not only across countries but also across time.

Previous findings on the impact of asset tangibility, size, and profitability on leverage do not change. Inflation and growth tend to affect negatively firms' leverage, but with low economic significance. The size of the capital market does not affect firm leverage in our sample.

When we include our ownership concentration coefficient with the macro variables using **leverage2_bv** as the dependent variable, we obtain a negative and significant **herf_ind_{0-0.6}** ($t=-3.31$, $p<0.01$), and a positive and significant **herf_ind_{0.6-1}** ($t=2.93$, $p<0.03$). We lose statistical significance when we use **leverage2_mv**.

These results are consistent with Booth et al (2001), which argued that macroeconomic variables play, if anything, a minor role in most capital-structure models.

c. Subsample 2001–2005

We perform a set of regressions using **leverage2_bv** and **leverage2_mv** as before but using a subsample from 2001 to 2005. This is important because we believe the quality of the data has improved in recent years in Latin America. Basic results not only remained in the 2001–2005 subsample, but they also improved in terms of their statistical significance. The coefficients for growth opportunities, asset tangibility, and size are positive and significant, and the coefficient for profitability is negative and significant. We obtain similar results when we include in our model the effective tax rate and our concentration proxies: **herf_ind** and **herf_ind²**.

5. Conclusions

In this paper we use a comprehensive database of 806 nonfinancial Latin American firms from 1996 to 2005 to test how ownership concentration affects capital structure decisions and to verify the main determinants of capital-structure decisions in Latin America. Using fixed-effect panel regression models, we find support for the idea that ownership structure influences a firm's leverage. We find a U-shape relation where at high levels of ownership concentration the relation between leverage and ownership is positive,

consistent with our argument that highly concentrated firms want to avoid dilution and thus will not seek equity financing. On the other hand, at low levels of ownership concentration the relation between leverage and ownership is negative, indicating that when losing control is not an issue firms will be more inclined to finance their growth with equity. Consistent with our control argument, we also find that Latin American firms with more growth opportunities tend to exhibit higher leverage.

We also find empirical support for the previous findings that size, growth opportunities, asset tangibility, profitability, and taxes are statistically and economically important in explaining the leverage in our sample of Latin American firms. Firms that are larger, have high-growth opportunities, and are less profitable tend to have more debt in the Latin American region.

We perform three robustness checks: we estimate our regression coefficient using the lag value of the independent variables, we include three macroeconomic variables that could influence firms' leverage decisions, and we estimate our regression using a 2001–2005 subsample. The main results keep their signs and significance levels. Therefore our model seems robust to the heterogeneity of the economic environment of these seven countries.

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Table 1 – Measures of leverage

We define **leverage1_bv** as the ratio of total debt financing (short- and long-term) to total debt financing plus the book value of equity; **leverage2_bv** as the ratio of total debt financing (short- and long-term and negotiable obligations, which are debt instruments such as commercial paper and bonds outstanding) to total debt financing plus the book value of equity; **leverage2_mv** as the ratio of total debt financing (short- and long-term and negotiable obligations) to total debt financing plus the market value of equity. The firm-year observations column represents book value measures and market value measures (in parenthesis). The percentage represents mean values and standard deviation (in parenthesis) across the sample for the period 1996–2005. The last two rows show the leverage ratios for U.S. firms according to Rajan and Zingales (1995) for the period 1987–1991 and Flannery and Rangan (2006). The number of observations for Rajan and Zingales data is cross-sectional for one year (1991), and the number of observations for Flannery and Rangan (2006) represents 12,919 U.S. firms from 1965 to 2001.

	Firm-year observations	leverage1_bv (%)	leverage2_bv (%)	leverage2_mv (%)
Argentina	716 (282)	29.83 (23.52)	34.36 (24.31)	39.24 (26.51)
Brazil	2,822 (1242)	35.86 (25.29)	37.78 (25.80)	84.09 (32.40)
Chile	1,363 (524)	20.84 (17.75)	24.35 (19.40)	30.38 (23.73)
Colombia	174 (24)	14.27 (17.20)	16.23 (18.06)	70.91 (39.13)
Mexico	1,319 (622)	27.70 (23.48)	31.96 (24.25)	29.76 (26.08)
Peru	561 (83)	32.01 (22.27)	32.01 (22.27)	33.32 (24.46)
Venezuela	212 (83)	14.82 (16.14)	14.82 (16.14)	36.37 (30.71)
Full sample	7,167 (2,860)	29.45 (23.77)	32.16 (24.38)	55.04 (38.73)
Rajan and Zingales (1995): U.S. firms	2,580		34.00	24.00
Flannery and Rangan (2006): U.S. firms	111,106		24.85	27.83

Table 2 – Summary statistics

In this table we present summary statistics of our proxies for size (**log_sales**), taxes (**tax_rate**), tangibility (**fxa_ta**), profitability (**ebit_ta**), growth opportunities (**mve_bve** and **capex_ta**), and ownership concentration (**herf_ind**). The first and second number are the mean values and the standard deviation across the sample for the period 1996–2005, respectively, and the third number is the number of firm-year observations.

	log_sales	tax_rate	fxa_ta	ebit_ta	mve_bve	capex_ta	herf_ind
Argentina	11.55	0.26	0.51	0.05	0.89	0.03	0.26
	1.75	0.22	0.24	0.09	0.65	0.07	0.29
	711	201	716	716	274	688	36
Brazil	12.08	0.25	0.43	0.06	0.12	0.04	0.31
	1.85	0.17	0.23	0.09	0.35	0.08	0.27
	2775	999	2822	2822	1194	2660	2188
Chile	11.16	0.16	0.54	0.07	1.20	0.04	0.35
	2.02	0.13	0.24	0.07	0.84	0.07	0.25
	1324	462	1363	1363	514	1341	1031
Colombia	11.05	0.25	0.30	0.04	0.20	0.03	0.24
	2.01	0.18	0.17	0.07	0.35	0.05	0.20
	174	29	174	174	30	164	112
Mexico	12.41	0.28	0.48	0.07	1.24	0.05	0.29
	2.01	0.17	0.23	0.08	0.91	0.07	0.26
	1312	453	1319	1319	545	1274	56
Peru	10.48	0.19	0.53	0.06	0.52	0.04	0.41
	1.38	0.17	0.22	0.08	0.43	0.07	0.30
	559	63	561	561	70	532	449
Venezuela	11.04	0.21	0.54	0.05	0.36	0.06	0.34
	1.93	0.17	0.23	0.08	0.38	0.12	0.24
	210	48	212	212	70	198	80
Full sample	11.73	0.24	0.48	0.06	0.65	0.04	0.33
	1.96	0.17	0.24	0.08	0.82	0.07	0.26
	7065	2255	7167	7167	2697	6857	3952

Table 3 – Univariate correlations

In this table we present pairwise correlation across the full sample for the period 1996–2005 of our proxies for size, taxes, asset tangibility, profitability, growth opportunities, and ownership. Definitions for each variable can be found in Table 2.

	leverage2_bv	mve_bve	capex_ta	fxa_ta	log_sa	ebit_ta	tax_rate	herf_ind
leverage2_bv	1							
mve_bve	0.0621	1						
capex_ta	0.0422	-0.0187	1					
fxa_ta	0.0685	-0.0565	0.2277	1				
log_sa	0.1832	-0.0626	0.0663	0.0757	1			
ebit_ta	-0.1085	-0.0258	0.0363	-0.0234	0.3042	1		
tax_rate	-0.0876	-0.0317	-0.0201	-0.0301	0.2255	0.2137	1	
herf_ind	-0.0721	-0.0335	-0.0121	0.0406	-0.0772	0.0071	-0.0403	1

Table 4 – Determinants of leverage

This table presents OLS regression using panel data with country fixed effects and OLS regression for each country using fixed effect. The dependent variable is **leverage_bv** in Panel A and **leverage_mv** in Panel B. The independent variables are defined in Table 2. The regression includes an intercept whose coefficient is not reported. Robust t-values are in parenthesis.¹³

Panel A: dependent variable: leverage2_bv								
capex_ta	0.11*** (2.89)	0 (0.02)	0.13* (1.82)	0.20** (2.25)	-0.23 (0.67)	-0.09 (0.69)	0.27** (2.18)	-0.02 (0.14)
fxa_ta	0.05*** (4.15)	0.08** (1.98)	0.06** (2.29)	0.11*** (4.67)	0.16 (1.48)	0.08** (2.43)	-0.08* (1.80)	-0.08 (1.10)
log_sales	0.03*** (18.89)	0.05*** (8.89)	0.03*** (7.11)	0.04*** (12.93)	0.03*** (4.90)	0.03*** (8.67)	0.02*** (3.04)	0.03*** (3.71)
ebit_ta	-0.62*** (17.39)	-0.85*** (7.51)	-0.48*** (6.88)	-0.72*** (10.44)	-0.39* (1.73)	-1.04*** (11.02)	-0.55*** (4.30)	-0.42** (2.45)
Observations	6766	684	2620	1304	164	1267	531	196
Country	All	AR	BR	CL	CO	MX	PE	VE
R-squared	0.08	0.17	0.06	0.21	0.15	0.13	0.07	0.13
Fixed-effects dummies	country year	-- year	-- year	-- year	-- year	-- year	-- year	-- year
Panel B: dependent variable: leverage2_mv								
capex_ta	0.21*** (2.89)	-0.2 (0.82)	0.27* (1.96)	0.09 (0.81)	3.04 (1.38)	-0.12 (0.51)	0.35 (0.79)	0.17 (0.43)
fxa_ta	-0.03 (1.28)	0.34*** (4.90)	-0.32*** (6.28)	0.21*** (4.79)	-0.11 (0.15)	0.15*** (2.95)	0.01 (0.05)	0.17 (0.64)
log_sales	0.04*** (11.00)	0.01 (0.84)	0.06*** (8.30)	0.03*** (5.16)	0.16*** (3.17)	0.02*** (2.77)	0.02 (1.09)	0.04 (1.44)
ebit_ta	-0.56*** (8.01)	-0.74*** (4.41)	-0.14 (1.19)	-1.43*** (8.24)	-1.22 (0.76)	-1.36*** (9.20)	-0.77** (2.01)	-0.17 (0.29)
Observations	2780	278	1189	513	22	618	79	81
Country	All	AR	BR	CL	CO	MX	PE	VE
R-squared	0.07	0.25	0.14	0.29	0.68	0.16	0.14	0.17
Fixed-effects dummies	country year	-- year	-- year	-- year	-- year	-- year	-- year	-- year

¹³ * = significant at 10%; ** = significant at 5%; *** = significant at 1%.

Table 5 – Determinants of leverage with ownership

This table presents OLS regression using panel data with country fixed effects and OLS regression for each country using fixed effect. The dependent variable is **leverage2_bv** for columns 1 through 6 and **leverage2_mv** for column 7 in Panel A. Individual country regressions use **leverage2_bv** as the dependent variable in Panel B. The independent variables are defined in Table 2. The regression includes an intercept whose coefficient is not reported. Robust t-values are in parenthesis.¹⁴

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Dep. Variable	leverage2_bv					leverage2_mv	
capex_ta	-0.14 (0.81)	-0.11 (0.66)	-0.11 (0.63)	-0.11 (0.67)	-0.12 (0.71)	0 (0.03)	0.10 (0.61)
fxa_ta	0.11** (1.97)	0.12** (2.26)	0.12** (2.20)	0.12** (2.23)	0.12** (2.32)	0.11** (2.02)	0.06 (1.17)
log_sales	0.03*** (4.94)	0.03*** (4.70)	0.03*** (4.76)	0.03*** (4.78)	0.03*** (4.80)	0.02*** (4.15)	0.01*** (2.61)
ebit_ta	-0.28** (1.98)	-0.29** (2.08)	-0.29** (2.11)	-0.29** (2.10)	-0.29** (2.08)	-0.34** (2.40)	-0.21 (1.62)
tax_rate	-0.28*** (4.30)	-0.27*** (4.18)	-0.26*** (4.10)	-0.27*** (4.19)	-0.27*** (4.26)		-0.23*** (3.81)
herf_ind	-0.02 (0.58)	-0.46*** (3.33)				-0.50*** (3.54)	-0.42*** (3.22)
herf_ind^2		0.47*** (3.30)				0.50*** (3.44)	0.44*** (3.22)
herf_ind<0.4			-0.28*** (2.99)				
herf_ind>0.4			0.18** (2.30)				
herf_ind<0.5				-0.23*** (2.97)			
herf_ind>0.5				0.27*** (2.64)			
herf_ind<0.6					-0.20*** (2.99)		
herf_ind>0.6					0.41*** (3.01)		
Observations	403	403	403	403	403	403	403
Country	All	All	All	All	All	All	All
R ²	0.1	0.13	0.13	0.13	0.13	0.09	0.09

¹⁴ * significant at 10%; ** significant at 5%; *** significant at 1%.

Panel B: Individual country regressions

Dep. Variable	leverage2_bv						
capex_ta	-0.30 (0.38)	0.13* (1.65)	0.29*** (3.13)	0 (0)	-0.64 (1.15)	0.36** (2.38)	0.31** (2.38)
fxa_ta	-0.01 (0.04)	0.06** (2.17)	0.07*** (2.89)	0.08 (0.84)	-0.01 (0.08)	-0.08 (1.62)	0.15 (1.43)
log_sales	0.11*** (4.47)	0.02*** (5.9)	0.04*** (16.38)	0.04*** (4.16)	0.06** (2.73)	0.02*** (3.22)	0 (0.13)
ebit_ta	-1.69*** (5.28)	-0.32*** (4.18)	-0.73*** (9.12)	-0.37 (1.08)	-0.21 (0.44)	-0.41*** (2.96)	-0.18 (1.38)
tax_rate	-0.36** (2.19)	-0.28*** (8.55)	0.05 (0.92)	-0.09 (0.58)	-0.02 (0.11)	-0.13* (1.85)	-0.05 (0.72)
herf_ind	-0.41 (1.18)	-0.29*** (3.92)	-0.21*** (2.82)	-0.01 (0.03)	-0.09 (0.2)	0.10 (0.81)	0.05 (0.27)
herf_ind ²	0.25 (0.68)	0.26*** (3.2)	0.15* (1.94)	-0.15 (0.47)	-0.04 (0.08)	-0.11 (0.85)	-0.17 (0.97)
Observations	21	2079	1017	111	40	436	78
R-squared	0.70	0.09	0.29	0.25	0.22	0.10	0.28
Country	AR	BR	CL	CO	ME	PE	VE
Fixed-effects	--	--	--	--	--	--	--
dummies	year	year	year	year	year	year	year