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Capital Structures in Developing Countries: The Latin American case

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Introduction

Most Latin American countries have shifted from a banking-capital market to a public-capital market focus due to the rapid development of private pension fund systems based on individual capitalization. Capital markets based on publicly traded securities were a requirement for the development of the new pension fund system. Argentina, Chile, Mexico and Peru have developed their capital markets along these lines. Chile was the first in adopting this type of pension fund system (1981) and was also the first to shift from a banking-capital market to a public-capital market system. Furthermore, Chile is a special case in the region exhibiting more highly developed capital markets with a higher market capitalization relative to Gross Domestic Product (GDP), a similar ownership concentration compared to other countries of the region, and the lowest country-risk premium (see Djankov, La Porta,

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López-de-Silanes and Shleifer, 2008; Dyck and Zingales, 2004). Moreover, Chile has low corruption levels, a good quality judicial system, and open and regulated financial markets (the Securities Market Law, the Public Offerings Law, and Corporate Governance Law, among others). The ownership concentration is higher than in developed countries and therefore there are incentives for majority shareholders to obtain private rent at the expense of minority shareholders. Regarding ownership concentration in Chile, on average a mean of 48.8% of shares in the hands of the major shareholder has been reported in the last decade (Espinosa, 2009).

Therefore, we anticipate a high probability that Chilean firms make capital structure decisions based on the same variables as the United States (U.S.) companies. However, as we do not want to exclude ex-ante other Latin American countries, we investigate whether firms' capital-structure decisions in Latin American countries are consistent with highly developed public-capital markets such as the United States because of the need to provide information to investors in the market. Secondly, since La Porta *et al.* (1999) classify Argentina, Chile, Mexico and Peru among the French-civil law countries, it is natural to ask whether the capital structure is related to the same determinants found for common law countries such as the United States, since minority shareholder protection differs between the two groups. Finally, to our knowledge, no previous studies employ the model proposed originally by Rajan and Zingales (1995) to observe if the determinants for U.S. companies are also present in Latin American firms.

In this study, we employ a different sample with a large number of years of data for U.S. firms, and we test if the previous results reported by Rajan and Zingales (1995) are still in place. We can compare these updated results with the Latin American countries for the same time period. To do so, we use data from 1998 to 2007 and improve the econometric estimates by using panel data with generalized method of moments (GMM) and also solve the endogeneity problem reported by Rajan and Zingales (1995) in their article.

This study is organized into four sections. Section II reviews the international evidence on this topic. Section III explains the methodology and describes the sample. Section IV reports the most important results. The final section concludes the study.

International evidence

Hundreds of papers about corporate capital-structure[1] decisions exist, however only three articles shed light on the common determinants of capital structures for different countries. The seminal study by Rajan and Zingales (1995) considers a sample of 3 569 firms from the United States, Japan, Germany, France, Italy, United Kingdom and Canada during 1987-1991. It analyzes four common determinants of the capital structure of firms in the sample countries: tangible assets (tangibility), market-to-book ratio (growth opportunities), log sales (size), and return on assets (performance). The study also incorporates two measures of leverage (book leverage and market leverage).

Tangibility is always positively related to leverage in all countries. The market-to-book ratio shows a negative coefficient in all countries. Size is positively related to leverage and profitability is negatively related to leverage in all countries, except in Germany for both cases.

Booth, Aivazian, Demirguc-Kunt, and Masksimovic (2001) study a sample of 631 firms from ten emerging markets in the time period 1980-1990. Among those countries are Brazil and Mexico; however, due to a lack of stock market data, they are not able to compute both market leverage and market-to-book ratios. That study includes only a few firms for some countries and time periods; thus the study uses panel data techniques within each country and runs an unbalanced panel with fixed effects. Unfortunately, that method does not solve the endogeneity problem, because it considers the explanatory variables to be exogenous. The authors solve the problem by using a different econometric method (that uses dynamic panel data). Furthermore, average tax rate and business risk are included as explanatory variables, which do not make the results comparable with those in Rajan

[1] Capital structure is more general than financial leverage; the latter is included in the first concept. Actually capital structure may include an internal mix of different types of debt and equity. However, since Modigliani and Miller (1958) we can refer to capital structure to talk about the leverage level of the firm (debt/asset value).

and Zingales (1995). Apart from the profitability proxy, the regression coefficients differ across countries, both in size and sign.

Chen (2004) concentrates on 88 Chinese-listed companies for the period 1995-2000. A sample of Chinese firms was not previously considered in the literature. Chen uses panel data with random effects, which is quite appropriate from a statistical viewpoint. However, that study works just with book leverage, which is one limitation of its methods. Chen finds that book leverage is positively related to growth opportunities, size, and tangibility. On the other hand, the study also finds that book leverage is negatively related to profitability. The relation between leverage and growth opportunities turns out to be positive, an unexpected result considering most of the Western empirical literature in this area. The exception is Wald (1999), which is more consistent with the Ross (1977) signaling hypothesis. Ross suggests that firms with higher expected cash flows due to high-growth opportunities should have higher leverage in order to signal the higher future cash flows. High market capitalization in China, for example, may indicate that the capital markets have recognized the growth opportunities associated to listed firms, so banks are willing to assign higher valuations to highly leveraged firms. Chen claims that the capital-structure decisions of Chinese companies seem to follow a "new pecking order": retained profit, equity, and long-term debt. Institutional factors in China are more important than firm-specific factors at explaining the capital-structure decisions of firms.

In the case of Latin America, Chang and Maquieira (2001) analyze the same determinants of capital structure proposed by Rajan and Zingales (1995) for a sample of 32 Latin American companies (Argentinean, Brazilian, Chilean, Mexican, and Venezuelan) that issued ADRs (American Depositary Receipt) between 1990 and 1994 on the New York Stock Exchange. For three of the four determinants the authors find results similar to those reported by Rajan and Zingales (1995). However, the tangibility coefficient is statistically significant but has an unexpectedly negative relationship with leverage.[2]

[2] However, this study fails in not using more advanced econometric techniques to solve the endogeneity problem. On the other hand, the sample size demands using panel data rather than cross-sectional analysis.

Maquieira, Olavarrieta and Zutta (2007) study the determinants of capital structure for Chilean firms using the Linear Structural Relations (LISREL)[3] methodology based on the determinants proposed by Titman and Wessels (1988). Maquieira, Olavarrieta and Zutta (2007) use a sample of 113 firms listed on the Santiago Stock Exchange (Bolsa de Comercio) in the period 1990-1998. They consider 10 exogenous variables to explain the capital structure of Chilean firms and two endogenous variables, namely total-debt ratio and short-term debt ratio. The exogenous variables are: growth opportunities through six proxies, tangibility using two proxies, size, and profitability measured through three proxies, debt-tax shield, regulation, firm quality, volatility, industrial classification, and uniqueness. They report a negative relationship between leverage and profitability and a positive relationship between tangibility and leverage. Because tangibility and profitability have statistically significant coefficients, we have empirical support to include at least two of the determinants proposed by Rajan and Zingales (1995) to explain the capital structure in Chile.

Data and methodology

Most of the data in this study comes from *Economática*. The study also relies on information from Bloomberg regarding the number of outstanding shares and stock prices. We analyze the 1998-2007 period for the most important countries in Latin America (Argentina, Chile, Mexico and Peru). The reason for choosing these countries is based on the fact that they are the most developed capital markets in Latin America. The firms traded on those markets should be more concerned with giving better information to the markets in terms of financial leverage. This database does not include firms from Colombia and Venezuela because very few exist, nor from Brazil

3 LISREL is a multivariate statistical technique which allows working with factors that are built around proxies related to them. It actually allows minimizing the measurement error of an unobserved factor. For example in Corporate Finance we may measure growth opportunities (factor) throughout different proxies such as: Tobin's Q; changes in sales/sales; Capital expenditures/sales; Research and development expenses/sales; change in total assets/total assets.

due to the lack of market information. Our selection criteria also include companies with stocks that were actively traded during the year 2007 and that had market and accounting information available for at least eight of the ten years analyzed. We eliminate firms in the financial and investment sectors because they have very different financial statements (different accounting standards), and finally firms with ratios that are undefined or almost undefined.

The final sample also includes U.S. firms in order to compare the results with Rajan and Zingales (1995). Table 1 shows the descriptive statistics of the final sample, which includes companies of very different sizes in order to avoid size bias. Peru is the least represented (19 firms), and the U.S. the most (466 firms). In terms of total assets and stock exchange listing, the study provides relatively good country representation. The final sample represents 29, 39, and 58 percent of total assets for companies in U.S., Chile and Mexico, respectively. The sample also represents 29% of listed companies in the United States, 23% in Chile, and 33% in Mexico.

What theory explains the capital structure? Unfortunately, there is no agreement on this. Myers (2001) states that potential explanations for the capital structure can be organized as follows; trade-off theory, pecking order theory, and free cash flow theory. Trade off theory indicates that firms seek debt levels that weigh the tax advantages of additional debt against the costs of possible financial distress. Meanwhile, the pecking order theory indicates that a firm will choose to borrow, rather than issuing equity, only when internal cash flow is not enough to finance capital expenditures. Finally, according to Myers, "the free cash flow theory indicates that dangerously high debt levels will increase value, despite the threat of financial distress, when a firm's operating cash flow significantly exceeds its profitable investment opportunities" (page 81).

Shyam-Sunder and Myers (1999) test the trade-off theory against the pecking order theory but they are not able to reject one hypothesis with the other, both can partially explain the capital structure of firms. On the other hand, the free cash flow theory is unable to explain the observed capital structure levels since managers do not voluntarily move to high debt

Table 1 ***Descriptive statistics*** (in thousands of dollars)

Country	*Time period*		*Total assets*	*Equity*	EBITDA	*Fixed assets*	*Net sales*
U.S.	1998-2007	Total	50 623 522 003	16 475 800 795	6 165 724 311	16 612 794 618	31 141 270 717
		Mean	10 924 368	3 555 417	1 344 467	3 564 977	6 725 976
		Mediana	2 966 834	1 212 796	359 526	724 992	1 741 922
	2003-2006	Total	23 455 156 338	7 864 001 430	3 006 518 810	7 462 734 930	14 777 162 274
		Mean	12 583 238	4 218 885	1 623 390	4 003 613	7 927 662
		Mediana	3 510 839	1 439 499	436 944	806 559	2 137 657
Argentina	1998-2007	Total	372 046 762	186 070 846	75 452 055	246 096 544	189 096 226
		Mean	1 617 595	809 004	333 859	1 069 985	825 748
		Mediana	629 099	291 263	63 571	380 838	244 439
	2003-2006	Total	131 503 140	65 814 274	30 547 165	84 089 365	81 119 170
		Mean	1 429 382	715 373	335 683	914 015	881 730
		Mediana	550 897	264 939	56 772	341 268	217 384
Chile	1998-2007	Total	719 205 619	311 028 163	76 412 598	464 123 640	366 546 524
		Mean	1 438 411	622 056	152 825	928 247	734 562
		Mediana	514 705	281 471	41 795	235 178	281 174
	2003-2006	Total	305 846 964	141 954 461	35 271 974	194 237 024	173 531 649
		Mean	1 529 235	709 772	176 360	971 185	867 658
		Mediana	533 833	296 591	51 785	230 280	330 179
Mexico	1998-2007	Total	1 460 794 349	552 746 348	269 003 977	780 190 227	973 515 351
		Mean	3 562 913	1 348 162	656 107	1 902 903	2 386 067
		Mediana	1 576 847	667 211	177 540	678 024	1 193 614
	2003-2006	Total	651 114 080	248 531 564	119 678 038	328 889 671	412 257 092
		Mean	3 970 208	1 515 436	729 744	2 005 425	2 513 763
		Mediana	1 775 613	719 488	185 088	676 216	1 371 933
Peru	1998-2007	Total	96 594 814	52 298 165	15 581 596	57 810 039	39 196 557
		Mean	508 394	275 254	88 532	304 263	209 607
		Mediana	306 164	185 456	40 643	159 716	93 755
	2003-2006	Total	38 755 284	21 293 289	7 491 643	22 362 539	16 914 608
		Mean	509 938	280 175	98 574	294 244	225 528
		Mediana	303 636	190 471	56 368	183 613	132 674

Note: Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) stands for Earnings Before Interest, Taxes, Depreciation and Amortization. This is equal to Net Operating Income (excluding depreciation and amortization).

ratios. This may also explain why companies do not fully exploit the tax advantages of borrowing.

Rajan and Zingales (1995) are very practical and after an extensive review of the empirical results on capital structure they consider four determinants: tangibility (book value of fixed assets divided by book value of total assets), growth opportunity (market value of assets divided by book value of assets), size (log of net sales), and performance (EBITDA divided by book value of assets). Despite the existence of other variables that explain capital structure, according to the literature, these four determinants are statistically significant in most of the studies and insufficient data exists to build other determinants for each country.

We expect a positive relationship between tangibility and financial leverage because fixed assets serve as collateral, reducing debt agency costs. Furthermore, in case of liquidation, most fixed assets can be sold more easily than intangible assets (trade-off theory). On the other hand, the higher the growth opportunities are, the lower the financial leverage is, according to the underinvestment hypothesis proposed by Myers (1977). A firm with high-growth opportunities will prefer to first use internal cash flows to finance them. In the literature, growth opportunities have been measured with different proxies, one of them being Tobin's Q. The idea is the following: when a firm has high growth opportunities, to avoid underinvestment it will prefer to have a low leverage level (Myers, 1977). Therefore, the higher the growth opportunities, the lower the leverage will be.

The relationship between size and leverage is more ambiguous. A bigger firm is normally more diversified and thus carries a lower asset risk, which implies a lower bankruptcy risk and therefore an ability to take on more debt (trade-off theory). On the other hand, a bigger firm will provide more public information to minority shareholders and thus create a preference for equity (lower information asymmetry). However, previous studies show a positive relationship between size and leverage.

Finally, performance is measured by profitability. This may either be positively or negatively related to leverage. According to Myers and Majluf (1984), one would expect a negative relationship between both variables (pecking-order theory). On the other hand, Modigliani and Miller (1963) would predict a positive relationship between performance and leverage because of the value associated to the debt-tax shield (trade-off theory).

In summary, the model to estimate is as follows:

$$\begin{aligned} Lev_i &= \alpha + \beta_1 Tang.\ Assets_i + \beta_2 Market\ to\ Book_i \\ &\quad + \beta_3 Log(Sales)_i + \beta_4 Ret.\ on\ Assets_i + \varepsilon_i \end{aligned} \qquad [1]$$

where, *Lev* corresponds to either debt over book value of total assets (book capital or book leverage) or debt over market value of equity plus book value of debt (market capital or market leverage); *Tang. Assets* corresponds to book value of tangible assets over book value of total assets; *Market to Book* is measured as book value of debt plus market value of equity over book value of total assets; *Log(Sales)* corresponds to the natural logarithm of net sales; *Return on assets* corresponds to EBITDA over book value of total assets.[4]

Analysis of results

Descriptive statistics

Table 2 presents descriptive statistics for each country. Regardless of whether the mean or median is considered, the U.S. ratios are generally very similar for the Latin American countries. The only exception is Peru, where the mean and median market-to-book ratios are 2.22 and 0.93 respectively for the 1998-2007 period. The highest and the lowest means of book capital come from Mexico (54 percent) and Chile (43 percent) respectively. The highest mean market-capital comes from Argentina (52 percent) and the lowest is from Chile (34 percent).

Peru has the highest mean in tangible asset ratio (57 percent), and Mexico the lowest (47 percent). In general, the Latin American countries show

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[4] To estimate the Tobit model we compute the average values for four years (2003-2006) for each of the explanatory variables, while leverage is adjusted by capitalization in 2007. More details can be found in Rajan and Zingales (1995).

higher levels of tangible assets (mean and median) compared to U.S. This might be explained by the fact that debt holders are less protected in Latin American firms (French-civil law), and therefore they require more collateral to lend money to companies. Peru reports the highest market-to-book (or growth-opportunity) ratio (2.22), and Argentina has the lowest (1.03). As measured by the log of sales, Mexico has the biggest firms (5.98) and Peru the smallest ones (5.03). The most profitable firms (as measured by return on assets) are in Peru (17 percent), and the least profitable in Chile (12 percent). In terms of leverage, the Latin American countries do not exhibit major differences with respect to U.S.

Table **2**

Mean and median of variables

Country	*Time period*		*Tangible assets*	*Market to book*	*Log (sales)*	*Return on assets*	*Book leverage*	*Market leverage*
U.S.	1998-2007	Mean	0.31	2.05	6.22	0.12	0.55	0.41
		Median	0.24	1.43	6.25	0.13	0.57	0.39
	2003-2006	Mean	0.30	1.96	6.34	0.13	0.55	0.38
		Median	0.23	1.55	6.33	0.13	0.56	0.35
Argentina	1998-2007	Mean	0.55	1.03	5.35	0.15	0.49	0.52
		Median	0.59	0.95	5.42	0.13	0.51	0.53
	2003-2006	Mean	0.53	1.15	5.32	0.17	0.48	0.46
		Median	0.59	1.06	5.34	0.14	0.48	0.47
Chile	1998-2007	Mean	0.53	1.30	5.42	0.12	0.44	0.43
		Median	0.51	1.08	5.45	0.11	0.44	0.42
	2003-2006	Mean	0.52	1.53	5.53	0.13	0.43	0.34
		Median	0.49	1.26	5.52	0.11	0.45	0.32
Mexico	1998-2007	Mean	0.47	1.41	5.98	0.14	0.54	0.52
		Median	0.52	1.07	6.08	0.13	0.55	0.51
	2003-2006	Mean	0.44	1.30	6.01	0.14	0.55	0.50
		Median	0.49	1.13	6.14	0.13	0.55	0.50
Peru	1998-2007	Mean	0.57	2.22	5.03	0.17	0.43	0.46
		Median	0.61	0.93	4.98	0.13	0.42	0.44
	2003-2006	Mean	0.57	2.37	5.10	0.20	0.44	0.42
		Median	0.60	1.09	5.14	0.16	0.43	0.42

Note: this table reports the mean and median of each variable for two different time periods (2003-2006, 1998-2007). These ratios are reported for Argentina, Chile, Mexico, Peru, and the U.S.

In table 3 we report the correlation among the variables for each country. The U.S. shows similar results in both magnitude and sign to the results reported by Rajan and Zingales (1995). This similarity indicates that the results reported by Rajan and Zingales (1995) have not changed after ten years.

United States and Chile share similar correlations between the variables, except for the correlation between book leverage and tangible assets. It is positive (0.15) in the U.S. and negative in Chile (–0.013), although the latter is not significant. Regarding the other Latin American countries the pattern is unclear when we look at the correlations between book leverage and the variables that may explain capital structure. As such, it is difficult to find similar results between U.S. and the other Latin American countries when employing book leverage as a proxy for financial leverage. When evaluating market leverage, the correlation signs are similar for the U.S. and Latin American countries, except for Mexico. In the latter case, the correlation between leverage and tangible assets is negative (–0.17) and the same happens when we look at the correlation between leverage and size (–0.25). These are quite different from what we observe for the other Latin American countries and U.S. Once we replicate the model of Rajan and Zingales (1995) we should observe very different results for Mexico compared to the other countries.

Econometric analysis

We first employ the estimation procedure proposed by Rajan and Zingales (1995) to compare the Latin American results with the United States. The regression is estimated using maximum likelihood and the censored Tobit model. The leverage is computed for 2007, and for the rest of the variables we use the average measurements of four years (2003-2006). As in Rajan and Zingales (1995), Panel A of table 4 shows the results using book capital and Panel B shows the results using market capital. We also report Rajan and Zingales' (1995) results to compare with the updated estimates. All the coefficients are statistically significant in the U.S. case, but some of them show changes in magnitude. In the case of the *Market-to-Book* variable

TABLE 3
Simple correlation matrix for variables employed in the study, using a ten-year time period (1998-2007)

U.S.	*Tangible assets*	*Market to book*	*Log (sale)*	*Return on assets*	*Book leverage*	*Market leverage*
Tangible assets	1					
Market to book	–0.353	1				
Log (sale)	0.140	–0.189	1			
Return on assets	0.176	0.020	0.229	1		
Book leverage	0.150	–0.176	0.289	–0.286	1	
Market leverage	0.252	–0.500	0.370	–0.251	0.686	1
Argentina						
Tangible assets	1					
Market to book	0.216	1				
Log (sale)	0.548	0.620	1			
Return on assets	0.036	0.695	0.534	1		
Book leverage	0.360	0.086	0.394	–0.241	1	
Market leverage	0.272	–0.474	0.003	–0.552	0.664	1
Chile						
Tangibleassets	1					
Market to book	–0.133	1				
Log (sale)	0.195	–0.039	1			
Return on assets	0.116	0.351	–0.043	1		
Book leverage	–0.013	–0.169	0.461	–0.036	1	
Market leverage	0.039	–0.421	0.191	–0.405	0.723	1
Mexico						
Tangible assets	1					
Market to book	0.104	1				
Log (sale)	0.284	0.456	1			
Return on assets	0.367	0.285	0.306	1		
Book leverage	–0.244	0.028	–0.097	–0.133	1	
Market leverage	–0.171	–0.550	–0.253	–0.379	0.564	1
Peru						
Tangible assets	1					
Market to book	–0.372	1				
Log (sale)	–0.155	0.052	1			
Return on assets	–0.426	0.606	0.036	1		
Book leverage	0.230	–0.319	0.267	0.015	1	
Market leverage	0.536	–0.701	0.106	–0.538	0.631	1

Table 4
Variables related to book capital and market capital
Panel A: book capital dependent variable

		Tangible assets	*Market to book*	*Log (sales)*	*Return on assets*	*Number observations*	*Pseudo R2*
	U.S.	0.15*** (5.14)	–0.02** (–2.08)	0.12*** (9.69)	–0.78*** (–6.23)	466	0.23
	Argentina	–0.02 (–0.17)	0.06 (0.70)	0.12*** (3.08)	–1.08*** (–3.04)	23	0.45
	Chile	–0.12 (–1.03)	–0.32*** (–2.65)	0.14*** (3.49)	0.14*** (2.47)	50	0.26
	Mexico	–0.21 (–1.28)	0.03 (0.79)	–0.02 (–0.37)	–0.19 (–0.32)	41	0.07
	Peru	0.20 (1.04)	–0.03* (–1.70)	0.12** (2.85)	0.60* (1.75)	19	0.31
Rajan and Zingales (1995)	U.S.	0.50*** (0.04)	–0.17*** (0.01)	0.06*** (0.01)	–0.41*** (0.10)	2 079	0.21
Rajan and Zingales (1995)	Japan	1.41*** (0.18)	–0.04 (0.04)	0.11*** (0.02)	–4.26** (0.60)	316	0.29
Rajan and Zingales (1995)	Germany	0.42** (0.19)	–0.20*** (0.07)	–0.07*** (0.02)	0.15 (0.52)	175	0.12
Rajan and Zingales (1995)	France	0.53** (0.26)	–0.17** (0.08)	0.02 (0.02)	–0.02 (0.72)	117	0.12
Rajan and Zingales (1995)	Italy	0.36 (0.23)	–0.19 (0.14)	0.02 (0.03)	–0.16 (0.85)	96	0.05
Rajan and Zingales (1995)	United Kingdom	0.41*** (0.07)	–0.13*** (0.03)	0.026*** (0.01)	–0.34 (0.30)	522	0.18
Rajan and Zingales (1995)	Canada	0.26*** (0.10)	–0.11*** (0.04)	0.08*** (0.01)	–0.46** (0.22)	264	0.19

Table 4, continuation…
Panel B: market capital dependent variable

		Tangible assests	*Market to book*	*Log (sales)*	*Return on assets*	*Number observations*	*Pseudo R2*
	U.S.	0.11*** (3.24)	–0.06*** (–6.63)	0.10*** (9.15)	–0.70*** (–7.05)	466	0.23
	Argentina	0.08 (0.83)	–0.18 (–1.71)	0.08*** (3.31)	–0.76** (–2.34)	23	0.45
	Chile	–0.002 (–0.02)	–0.05*** (–3.42)	0.045 (1.21)	–0.57* (–1.81)	50	0.26
	Mexico	–0.05 (–0.43)	–0.16*** (–4.05)	0.02 (0.50)	–0.69 (–1.53)	41	0.07
	Peru	0.20** (2.16)	–0.03*** (–3.83)	0.06 (1.26)	–0.09 (–0.56)	19	0.31
Rajan and Zingales (1995)	U.S.	0.33*** (0.03)	–0.08*** (0.01)	0.03*** (0.00)	–0.60*** (0.07)	2 207	0.19
	Japan	0.58*** (0.09)	–0.07*** (0.02)	0.07*** (0.01)	–2.25*** (0.32)	313	0.15
	Germany	0.28* (0.17)	–0.21*** (0.06)	–0.06*** (0.02)	0.17 (0.47)	176	0.14
	France	0.18 (0.19)	–0.15** (0.06)	–0.00 (0.02)	–0.22 (0.53)	126	0.28
	Italy	0.48** (0.22)	–0.18* (0.11)	0.04 (0.03)	–0.95 (0.77)	98	0.12
	United Kingdom	0.27*** (0.06)	–0.06** (0.03)	0.01 (0.01)	–0.47** (0.24)	544	0.19
	Canada	0.11 (0.07)	–0.13*** (0.03)	0.05*** (0.01)	–0.48*** (0.17)	275	0.30

Notes: (*), (**), and (***), significant at the 10, 5, and 1 percent level, respectively. Rajan and Zingales (1995) report standard errors in parentheses.

(panel A), the coefficient changes from –0.17 to –0.02 and in panel B from –0.08 to –0.06. If the same analysis is performed on *Log(Sales)*, in panel A the coefficient increases from 0.06 to 0.12 and in panel B from 0.03 to 0.10. Finally, *Return on assets* changes from –0.41 to –0.78 (panel A) and from –0.60 to –0.70 (panel B). We can conclude that the positive impact of *Tang. Assets* and the negative impact of *Market-to-Book* on the dependent variables (Book to Capital and Market to Capital) decrease across these years. On the other hand, size (*Log(sales)*) and performance (*Return on assets*) have a higher impact on both financial leverage measures (Book to Capital and Market to Capital).

In the case of Latin America the results are mixed. Using book capital, Chile and Peru have three of the four determinants with coefficients similar to Rajan and Zingales (1995). The only exception is tangible assets which is not statistically significant in these countries. In the case of Argentina, only *Log(sales)* and *Return on assets* have the same sign and are statistically significant. In the case of Mexico, none of the coefficients are statistically significant.

Using market capital (panel B), in most of the countries, only two coefficients are statistically significant and with the same sign reported by Rajan and Zingales (1995). This is the case of Chile (*Market-to-book* and *Return on assets*), Argentina (*Log(Sales)* and *Return on assets)* and Peru (tangible assets and *Market–to-Book*). In the case of Mexico only the Market-to-Book coefficient is statistically significant and has a negative relationship with leverage.

In panel A the dependent variable is book capital, which is adjusted debt divided by adjusted debt plus book value of adjusted equity in 2007. In panel B the dependent variable is market capitalization, which is adjusted debt divided by adjusted debt plus the market value of adjusted equity in 2007. All the explanatory variables are four-year averages (2003-2006). The t-test results are in parentheses. In the case of Rajan and Zingales (1995) standard errors are in parentheses. The regression includes an intercept whose coefficient is not reported. The regression is estimated using maximum likelihood and a censored Tobit model in equation [1]. Additionally we also describe the results of Rajan and Zingales (1995).

There are two potential explanations for the results obtained for Latin America. First, the samples in each country are small compared to U.S. Second, Rajan and Zingales (1995) solve the endogeneity problem using four-year averages of data for the explanatory variables. However, an average may not be a good proxy in an emerging market because of greater economic instability which might generate different results. We solve this problem using dynamic panel data with GMM methodology in two steps for the time period 1998–2007. Also Arellano and Bond (1991), based on an application to employment, present specification tests that are applicable after estimating a dynamic model from panel data by the GMM and propose GMM using the lags of the variables to solve the endogeneity problems. According to Azofra, Saona and Vallelado (2004), GMM can control for correlation among the errors over time, the heteroscedasticity among companies, and the simultaneity and measurement errors driven by the orthogonal condition of the variance matrix. Table 5 describes the results of the dynamic panel data estimation using GMM in two steps.

Using the GMM methodology (table 5) and comparing the results with table 4, one observes that Chile's results are very similar to those for the United States. In fact, when using market leverage, every single coefficient is statistically significant at 1 percent. Mexico reports similar results except for the coefficient of size, which is not statistically significant. For Argentina and Peru, only two coefficients are statistically significant. A common result among the countries is that the higher the growth opportunities the lower the leverage, except for Peru when considering book leverage. This may be due to the difference between the mean (2.22) and the median (0.93) for the proxy of growth opportunities in that country. A similar result is obtained for the return-on-asset measure. The coefficients are negative and statistically significant for each country, except for Peru, using both measures for leverage.

We concentrate our attention on Chile's results since all the coefficients are significant for both measures of leverage (book capital and market capital). Compared to the U.S. results, the leverage (market capital) of Chilean firms depends more on size and performance. In an emerging market such as Chile where the major shareholder holds on average 48% of company

Table 5
Variables related to book capital and market capital

Panel A: book to capital dependent variable

	Tangible assets	*Market to book*	*Log (sales)*	*Return on assets*	*Number observations*	*Sargam test*
U.S.	0.67** (2.14)	–0.02* (–1.84)	0.35*** (5.61)	–0.18** (–2.18)	466	36.07**
Argentina	0.12*** (4.11)	–0.03* (–1.86)	0.05 (0.88)	–0.14** (–2.02)	23	19.26**
Chile	0.28** (2.39)	–0.006*** (–3.74)	0.22*** (7.46)	–0.21* (–1.95)	50	24.80**
Mexico	0.02 (0.61)	–0.01*** (–2.73)	0.08*** (10.53)	–1.39*** (–27.5)	41	36.40**
Peru	0.37** (2.62)	–0.003 (–0.18)	0.88 (0.87)	–0.14 (–1.22)	19	7.12**

Panel B: market capital dependent variable

	Tangible assets	*Market to book*	*Log (sales)*	*Return on assets*	*Number observations*	*Sargam test*
U.S.	0.92*** (3.84)	–0.03*** (–6.10)	0.19*** (3.27)	–0.11** (–2.30)	466	37.28**
Argentina	0.21 (0.69)	–0.15*** (–2.95)	–0.01 (–0.09)	–0.58** (–2.30)	23	14.35**
Chile	0.25*** (3.04)	–0.01*** (–3.98)	0.33*** (11.43)	–0.58*** (–4.44)	50	17.40**
Mexico	0.10*** (2.81)	–0.13*** (–10.17)	0.01 (0.53)	–1.99*** (–16.35)	41	30.56**
Peru	1.30** (0.23)	–0.03** (–2.01)	0.07 (0.28)	–0.04 (–0.09)	19	6.45**

Notes: (*), (**), and (***), significant at the 10, 5, and 1 percent level, respectively.

stocks, we would expect internal cash flows (return on assets) to be more important as a funding source. Firms in emerging markets face higher financial constraints and therefore the cost of debt and equity are higher compared to U.S. On the other hand, the bigger the company, the lower the cost of financing with debt will be. This is specifically true for big firms in Chile since they can sell corporate bonds to institutional investors (pension funds, banks, and insurance companies) who are the main demanders of them. Smaller firms will not have this alternative and therefore the cost of financing with debt is much higher for them. In this sense, size becomes very important in having access to a much lower cost of debt.

Finally, the Sargan test indicates that the instrumental variables are well chosen and the model is well specified. The results are robust from a statistical point of view.

In panel A the dependent variable is book capital, which is computed for each firm and for each year over ten years (1998-2007). In panel B the dependent variable is market capital, which is computed for each firm and for each year over ten years (1998-2007). All explanatory variables are computed for each firm and year in the ten-year period. The t-tests results are in parentheses. The regression includes an intercept whose coefficient is not reported. The dynamic panel data is estimated using GMM in two steps. White correction for heteroscedasticity and autocorrelation is employed.

Concluding remarks

This study analyzes the determinants of capital structure for Latin American countries following the original work done by Rajan and Zingales (1995). In doing so, this study contains a sample of 133 Latin American firms with accounting and stock exchange information for the time period 1998-2007. Argentina, Chile, Mexico, and Peru are included. Furthermore, this study includes a sample of 486 U.S. firms for the same period in order to compare if the findings of Rajan and Zingales (1995) continue to be valid today.

For the case of U.S. companies, this study obtains very similar results (in signs and significance) to those reported by Rajan and Zingales(1995). However, the value of the coefficients changes, meaning that the impact of each determinant on leverage changed over time. In the case of Latin America, the results are mixed. Using dynamic panel data and two-step GMM methodology, we report similar results for Chile compared to U.S. In the case of Argentina, three of four coefficients are statistically significant when using book leverage while only two coefficients are statistically significant using market leverage. This is also true for Peru, but only for market-to-book ratio and tangible assets.

In summary, by using panel data to correct for endogeneity and for a longer time period (ten years) this study finds that Chile is the only Latin

American country that has the same determinants of capital structure as U.S. In the case of Argentina, Mexico, and Peru only some determinants are relevant for explaining the capital structure.

The capital structure of Chilean firms is: positively related to tangible assets; negatively related to growth opportunities; positively related to size, and negatively related to performance. This is not only true for book leverage but also for market leverage. The remaining Latin American countries show mixed results. In any case, we find two or three determinants to be statistically significant. Nevertheless, those determinants are not the same when we use book leverage versus market leverage.

As expected, the capital structure of Chilean firms depends on the same determinants as U.S. firms. This is because Chile has the most developed capital market in the Latin American sample considered in this study.

We should be careful when interpreting the results because some institutional characteristics could be playing a role, and especially for Peru the sample size of 19 companies could be too small to get reliable results, considering the total of 248 companies listed in the Lima stock market.

In future research, it would be interesting to include data from Brazil, the most important stock market in Latin America, which also has a different cultural background, to test if its results are similar and also to use other variables related to bankruptcy costs, operational risk, and long versus short-term debt for a better understanding of the determinants of capital structure in Latin American countries.

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