

THE DETERMINANTS OF CASH FOR LATIN AMERICAN FIRMS

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ABSTRACT

We examine the levels and determinants of cash in Latin America. Latin American firms, as opposed to U.S. firms, did not hoard cash during the 1995-2006 period. However, we find remarkable similarities with respect to the determinants of cash between U.S. and Latin American firms. Net working capital, capital expenditures and net leverage all decrease the levels of Latin American firms' cash balances while growth opportunities increase them. Contrary to theoretical expectations, firm size and dividend payments seem to increase Latin American firms' need for cash whereas cash flow volatility does not seem to affect cash levels. We provide a possible explanation for these deviations by disaggregating results by countries and industries.

JEL: G3, G32.

KEYWORDS: Finance, Cash Management, Working Capital, Latin American Firms.

INTRODUCTION

Until recent, corporate finance literature had mainly focused on the study of long term financial decisions. However, with the latest market crashes triggered by lack of financing and liquidity, cash management has gained attention among practitioners and researchers, both in the U.S. and worldwide. Previous research on non-U.S. cash holdings has shown that cash management practices vary around the world as financial markets are segmented and financing and corporate governance realities differ among countries. Our article examines the levels and determinants of corporate demand for cash for Latin American firms. Specifically, we study firms from Argentina, Chile, Mexico, and Peru as the typical academic study on foreign cash holdings does not include all these Latin American countries or, if it does, it includes a relatively small number of firms (Gruninger and Hirschvogt (2007); Lins, Servaes and Tufano (2007)) or periods (Dittmar, Mahrt-Smith and Servaes (2003)). To our knowledge, the use of cash by Latin American firms has not been studied in detail before.

We obtain financial and accounting data for 518 firms from the Economatica database. We describe the levels of cash holdings for the 1995-2007 period and compare them to the dramatic increasing cash holdings of U.S. firms documented by Bates, Kahle and Stulz (2009). Levels of cash and net leverage differ considerably between these two groups. Latin American firms hold significantly less cash and rely more heavily on debt than American firms for the same period. When the results across countries are disaggregated, we find consistent cash holdings patterns across most of our sample of Latin American countries. As for the determinants of cash, we based our empirical model on Opler, Pinkowitz, Stulz and Williamson (1999) and Bates, Kahle and Stulz (2009). We had expected interesting results since Latin American firms operate in a mixed financing environment. Chile (222 firms), Peru (173) and México (127 firms) have more developed capital markets than Argentina (89 firms) as measured by the number of equities (stated in parentheses) listed on each country stock exchange, in accordance to Economatica. All these countries have a common legal origin, the French Civil Law. French Civil Law countries have both weak investor protection and less developed capital markets compared to Common Law countries. Such environment is expected to impact Latin American firms' capital structure and thus their financing (La Porta, Lopez-de-Silanes, Shleifer and Vishny (1997)). However, contrary to our expectations, the results show that the determinants of cash for Latin American firms share a remarkable similarity to the

determinants of cash for U.S. firms, which operate in a common law country. Net working capital, capital expenditures, and net leverage all decrease levels of Latin American firms' corporate cash while growth opportunities increase it. In contrast to the case for U.S. companies, firm size and dividend payments increase Latin American firms' need for cash. The influence of idiosyncratic risk as measured by cash flow volatility is inconclusive. We organize the article as follows: In the next section, we provide the literature review and hypotheses development. A description of the sample and methods follows. We then present the empirical results and finally provide concluding remarks.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Corporate managers hold cash for a mixture of reasons. Motivated by legitimate reasons, firms may elect to hold cash to avoid selling non-cash assets under unfavorable conditions (the transaction motive, stated by Keynes (1936) and supported by Baumol (1952)), to deal with adverse shocks when access to capital markets is restricted or too costly (the precautionary motive, in accordance to Keynes (1936) and Myers and Majluf (1984) and supported by Opler, Pinkowitz, Stulz and Williamson (1999), Han and Qiu (2007), Kim, Mauer and Sherman (1998), among others) or to avoid taxes on remitted earnings as it is the case of U.S. multinational corporations (Foley, Hartzell, Titman and Twite (2007)).

But firms may also hold cash to follow entrenched managers' agendas, to the detriment of shareholders (the agency motive, avowed by Jensen (1986)). In the U.S., firms with poor corporate governance mismanage cash by quickly increasing capital expenditures and acquisitions (Harford (1999), Dittmar and Mahrt-Smith (2007), and Harford, Mansi and Maxwell (2008)). Not surprisingly, given the differences in financial systems and corporate governance mechanisms around the world, non-U.S. cash studies have found differences in cash holdings across countries. Firms operating in countries with more developed banking systems tend to hold more cash, as they have more difficulty raising external financing and rely more on bank financing for their short term needs. Likewise, firms in market-based economies tend to obtain financing mainly from capital markets (Pampillón (2000)). Nonetheless, these predictions are not conclusive as empirical results are not consistent across countries. For example, Pinkowitz and Williamson (2001) find that industrial firms in Germany and Japan, both countries characterized as having bank centered systems, differ importantly on their levels of cash holdings.

While German firms' cash holdings are similar to American firms', Japanese firms' cash holdings are significantly higher than American firms'. Thus, Pinkowitz and Williamson's results imply that whether firms are immersed on a bank centered or market centered system is not enough to infer the level of cash holdings in their balances. However, when corporate governance characteristics are incorporated into the analysis, as is the case in Dittmar, Mahrt-Smith and Servaes (2003), firms are found to hold more cash when debt markets are more developed. Researchers have also found that firms in countries with the lowest level of shareholder protection hold more cash than firms in countries with the highest level of shareholder protection and that managerial entrenchment, with its associated agency costs, is linked to higher levels of cash holdings, especially when country's level shareholder protection is weak (Dittmar, Mahrt-Smith and Servaes (2003), Kalcheva and Lins (2007)). In addition, the value of corporate cash holdings is lower in countries with poor investor protection (Pinkowitz, Stulz and Williamson (2006)) and abundant cash bundled with asymmetric information has been found to lead firms to take excessive risks and, in consequence, lower the marginal value of their cash holdings (Gruninger and Hirschvogt (2007)). Thus, overall, the academic literature supports that the differences in corporate governance systems across countries are an important determinant of cash holdings.

In recent studies, as a response to practitioners' concerns, the empirical question of interest has been why firms hold so much cash. Bates, Kahle and Stulz (2009) document that the average cash-to-assets ratio for U.S. industrial firms has more than doubled from 1980 to 2006. They find that cash holdings do not increase for older, established dividend paying firms but they increase dramatically for firms that do not pay dividends. In addition, they document that these high-cash holding firms have reduced their net working capital and experienced an increase in cash volatility, a decline on capital expenditures and an

increase on research and development (R&D) expenditures. By and large, their findings are not explained by agency motives but rather by the precautionary motive of holding cash. In this framework, and consistent with Myers and Majluf (1984) and Myers (1997) we expect that firms with better investment opportunities and higher expected agency costs of debt to hold more cash. Small firms are subject to more information asymmetry than large firms are; hence, small firms face more borrowing constraints, higher costs of external financing and should hold more cash. In addition, firms with more volatile cash flows require larger investments in cash (Kim, Mauer and Sherman (1998)). The level of cash is expected to decrease as leverage increases, since the riskier the firm becomes, the costlier is to borrow liquid funds. Therefore, the level of cash borrowed should decrease (Baskin (1987)).

DATA AND METHODOLOGY

We use financial accounting and market data from Economatica, the largest subscription-based database for Latin American publicly traded firms, for the period 1995 to 2007. Economatica includes firms from Argentina, Brazil, Chile, Colombia, Mexico, Peru, and Venezuela in a standardized format, which allows comparison across firms, countries, and industries. The industry classification provided by this database is similar to a 3-digit Standard Industrial Classification (SIC). In this study, we use information from four selected countries: Argentina, Chile, Mexico, and Peru. Colombian firms were excluded since the variable depreciation, needed to construct some variables in our models (i.e., cash flow and capital expenditures), was not reported in the database. Similarly, dividends were not available for Venezuela. Firms from Brazil were also excluded as they outnumber the firms listed in any of the other countries. As financial statements of firms in financial industries differ from those of the rest of industries this study covers all but financial industries. In order to explore the determinants of cash for Latin American firms, the following empirical model is estimated on a panel data using both pooled OLS and fixed effects,

$$CASH = \alpha + \beta_1 MB + \beta_2 SIZE + \beta_3 CAPEX + \beta_4 NETLEV + \beta_5 CFVOL + \beta_6 NWC + \beta_7 DIV + \beta_8 INDUSTRY + \beta_9 COUNTRY + \varepsilon_i, \quad (1)$$

where variable *CASH* is the ratio of cash to assets net of cash (i.e., the cash ratio). Cash is defined as the sum of cash and short-term investments. *MB* is market to book value, the proxy for growth opportunities, measured as book value of assets minus book value of equity plus market value of equity all divided by assets. Firm size, *SIZE*, is the natural logarithm of the book value of assets. *CAPEX* is the ratio of capital expenditures (i.e., the change of net fixed assets plus depreciation) to book value of assets. *NETLEV* is net leverage, the ratio of net debt (i.e., net of cash) to assets. *CFVOL* is cash flow volatility, the standard deviation of industry cash flow measured as each firm's cash flow standard deviation for the previous 5 years, and then averaged by industry. Cash flow is earnings after interest, dividends, and taxes but before depreciation, all divided by assets. *NWC*, net working capital, is current assets, net of cash, minus current liabilities net of current debt. *DIV* is the ratio of dividend payments to assets net of cash. *INDUSTRY* and *COUNTRY* are dummy variables to control for industry and country effects respectively (e.g., the fixed effects model). We have three country dummy variables.

ARG is equal to one for Argentina; zero otherwise; *CHILE* is equal to one for Chile; zero otherwise; and *PERU* is equal to one for Peru; zero otherwise. The reference level for the country variable is Mexico. Industry dummy variables were set up similarly. Economatica classifies firms into nineteen different industries, although not every country has a representation of every industry. In consequence, there are many observations for some industries but too few for others across countries, which limit the execution of the fixed effects model. To overcome this limitation, we excluded industries with no observations in three or more countries; namely, companies in the electronics, industrial, non-mining, oil, and vehicle sectors. We used the electricity industry as the reference level since it had the lowest mean and median cash holdings across industries.

Financial statements data in U.S. dollars as of the end of each year were used. To estimate the market value of equity we multiplied stock prices as of the end of the year by the number of shares outstanding. Thus, we retrieved data from the financial statements and stock prices modules in Economatica. Files available up to 2008 were retrieved. As some of our variables required the estimation of changes from year $t-1$ to year t , our sample covers the 1995-2007 period. The final sample includes 4,440 firm-year observations as shown in Panel B of Table 1. Observations by country are shown in Table 2.

RESULTS

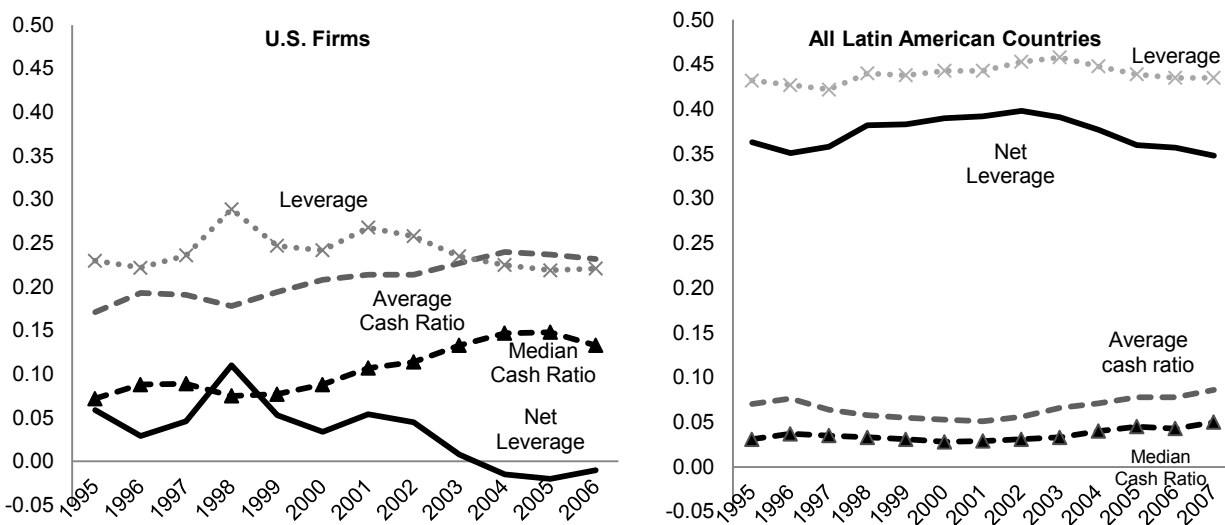
Table 1 provides descriptive statistics comparing the cash ratio, leverage, and net leverage (a measure more commonly used by practitioners than by scholars) for U.S. and Latin American companies. Figure 1 illustrates the trends and differences between U.S. and aggregated Latin American firms. While Bates, Kahle and Stulz (2009) document a secular increase in cash holdings for U.S. firms, cash for Latin American firms has barely increased in the period (i.e., in a regression of the cash ratio on a constant and time, the slope of the estimated parameter is statistically significant at 1% but the coefficient is only 0.001). In addition, while net leverage for U.S. firms has a downward trend, and is negative since 2004, net leverage for Latin American firms has been around 35% to 40% in the last decade.

Table 1: Descriptive Statistics of Cash and Leverage Ratios for U.S. and Latin American Firms

Panel A- U.S. Firms									
	N	Cash ratio		Leverage		Net leverage			
		Mean	Median	Mean	Median	Mean	Median		
1995	5,165	0.171	0.072	0.230	0.187	0.059	0.105		
1996	5,568	0.193	0.088	0.222	0.170	0.029	0.077		
1997	5,605	0.191	0.089	0.236	0.180	0.046	0.085		
1998	5,263	0.178	0.075	0.289	0.205	0.110	0.119		
1999	4,971	0.194	0.077	0.247	0.198	0.053	0.104		
2000	4,947	0.208	0.088	0.242	0.173	0.034	0.075		
2001	4,540	0.214	0.107	0.268	0.173	0.054	0.062		
2002	4,233	0.214	0.114	0.258	0.172	0.045	0.054		
2003	3,992	0.227	0.133	0.235	0.160	0.008	0.016		
2004	3,693	0.240	0.147	0.225	0.145	-0.015	-0.003		
2005	3,549	0.237	0.148	0.219	0.136	-0.020	-0.005		
2006	3,297	0.232	0.133	0.221	0.146	-0.010	0.015		
Panel B- Latin American Firms									
1995	283	0.070	0.031	0.432	0.437	0.363	0.378		
1996	304	0.076	0.037	0.427	0.420	0.351	0.366		
1997	313	0.064	0.035	0.422	0.413	0.358	0.363		
1998	325	0.058	0.033	0.440	0.433	0.382	0.398		
1999	332	0.055	0.031	0.438	0.427	0.383	0.385		
2000	351	0.053	0.028	0.443	0.428	0.390	0.388		
2001	371	0.051	0.029	0.443	0.430	0.392	0.387		
2002	369	0.056	0.031	0.453	0.440	0.398	0.387		
2003	364	0.066	0.033	0.458	0.436	0.391	0.389		
2004	363	0.071	0.040	0.448	0.420	0.377	0.365		
2005	357	0.078	0.045	0.439	0.409	0.360	0.360		
2006	356	0.078	0.043	0.435	0.412	0.357	0.350		
2007	352	0.086	0.050	0.435	0.418	0.348	0.356		

Panel A shows selected statistics for U.S. firms by Bates, Kahle and Stulz (2009), and Panel B shows estimations for Latin America firms by authors. The Latin America sample was obtained from Economatica, the largest subscription-based database for Latin America publicly traded firms. The sample includes non-financial firms from Argentina, Chile, Mexico, and Peru, with 4,440 firms-years observations. The cash ratio is estimated as cash plus short term investments divided by total assets net of cash; Leverage is long term debt plus debt in current liabilities divided by total assets, and Net leverage is net debt (i.e., net of cash) to assets.

Figure 1: Cash and Leverage Ratios for U.S. and Latin American Firms



Plotted with data from Table 1. The first graph shows selected statistics for U.S. firms by Bates, Kahle and Stulz (2009), and the second graph shows estimations for Latin America firms by authors. The Latin America sample was obtained from Economatica, the largest subscription-based database for Latin America publicly traded firms. The sample includes non-financial firms from Argentina, Chile, Mexico, and Peru, with 4,440 firms-years observations. The cash ratio is estimated as cash plus short term investments divided by total assets net of cash; Leverage is long term debt plus debt in current liabilities divided by total assets, and Net leverage is net debt (i.e., net of cash) to assets.

Table 2 provides statistics disaggregated by Latin American countries and years. The median cash holdings for Argentina, Chile, Mexico, and Peru are 4.28%, 2.38%, 5.07%, and 2.84% respectively. These figures are similar to results in Dittmar, Mahrt-Smith and Servaes (2003) for all the countries, but Argentina. In addition, the statistics indicate that the cash holdings in each country have remained without significant changes in the period of study. In the current financial environment, this difference between U.S. and Latin American firms could be of economic importance as increase in cash could hurt a country's economy. In this regard, a recent article in The Economist states: "For the recovery to proceed smoothly [U.S.] firms must stop hoarding cash...If cautious firms pile up more savings, the prospects for recovery are poor. With interest rates so low, this cash might be put to work more profitably" (Economist (2010)). Pair-wise Pearson correlation coefficients for the determinants of cash are presented in Table 3.

The signs of correlation coefficients in the first row show that with the exception of dividends, all relationships are as expected by theory or according to previous findings (further discussion on these relationships is provided in the regression results section). In addition, all coefficients are small in magnitude (with absolute correlation coefficients of less than 0.25, with the exception of net leverage, which is viewed as negative cash) suggesting that multicollinearity should not be a problem for the analysis. Table 4 provides the regression results. Model 1a is the pooled regression, model 1b is the panel model with country fixed effects, and model 1c is the complete model as described in the "data and methodology" section. As results of the three models are in general consistent and model 1c explains better the cash holdings than the other models (i.e., the Adjusted R-squared is higher, parameters remain significant, and the significance level increase when the dummy variables are included), we discuss the results of model 1c.

Table 2: Cash and Leverage Ratios for U.S. and Latin American Firms by Countries and Years

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Panel A- Argentina													
Observations	47	50	49	61	61	63	58	60	58	61	60	61	60
Cash ratio mean	0.059	0.070	0.052	0.038	0.041	0.043	0.046	0.064	0.070	0.076	0.075	0.068	0.082
Cash ratio median	0.037	0.027	0.031	0.020	0.025	0.026	0.031	0.052	0.049	0.050	0.055	0.055	0.066
Leverage mean	0.476	0.464	0.492	0.474	0.486	0.507	0.506	0.567	0.602	0.586	0.544	0.532	0.532
Leverage median	0.464	0.438	0.444	0.497	0.496	0.504	0.513	0.534	0.540	0.492	0.521	0.521	0.502
NetLev mean	0.417	0.394	0.440	0.436	0.446	0.464	0.460	0.502	0.532	0.510	0.469	0.464	0.450
NetLev median	0.403	0.380	0.412	0.473	0.464	0.473	0.461	0.465	0.479	0.450	0.465	0.424	0.444
Panel B- Chile													
Observations	102	101	112	115	111	113	109	101	102	101	98	98	96
Cash ratio mean	0.058	0.062	0.057	0.059	0.053	0.052	0.043	0.044	0.067	0.064	0.072	0.074	0.079
Cash ratio median	0.024	0.030	0.025	0.020	0.021	0.019	0.016	0.018	0.023	0.025	0.033	0.026	0.027
Leverage mean	0.383	0.399	0.394	0.405	0.411	0.419	0.423	0.417	0.419	0.404	0.416	0.419	0.410
Leverage median	0.382	0.402	0.387	0.406	0.401	0.414	0.390	0.415	0.405	0.390	0.394	0.402	0.411
NetLev mean	0.325	0.337	0.337	0.346	0.358	0.366	0.380	0.374	0.352	0.340	0.344	0.344	0.332
NetLev median	0.340	0.349	0.330	0.352	0.378	0.365	0.361	0.367	0.362	0.360	0.362	0.366	0.356
Panel C- Mexico													
Observations	118	133	134	137	138	134	133	138	133	130	124	126	117
Cash ratio mean	0.074	0.079	0.076	0.065	0.064	0.060	0.064	0.070	0.073	0.077	0.085	0.080	0.084
Cash ratio median	0.037	0.048	0.048	0.042	0.043	0.045	0.038	0.042	0.047	0.050	0.056	0.057	0.058
Leverage mean	0.459	0.446	0.431	0.457	0.448	0.428	0.433	0.437	0.434	0.433	0.421	0.417	0.424
Leverage median	0.469	0.434	0.416	0.445	0.425	0.416	0.416	0.437	0.445	0.420	0.393	0.395	0.393
NetLev mean	0.385	0.367	0.355	0.392	0.384	0.368	0.368	0.367	0.361	0.357	0.337	0.338	0.340
NetLev median	0.421	0.373	0.365	0.396	0.370	0.357	0.373	0.381	0.381	0.355	0.338	0.339	0.347
Panel D- Peru													
Observations	16	20	18	12	22	41	71	70	71	71	75	71	79
Cash ratio mean	0.145	0.145	0.064	0.075	0.046	0.045	0.041	0.034	0.049	0.065	0.079	0.089	0.103
Cash ratio median	0.044	0.032	0.043	0.044	0.025	0.019	0.026	0.016	0.020	0.019	0.033	0.031	0.047
Leverage mean	0.422	0.355	0.349	0.412	0.377	0.464	0.440	0.441	0.443	0.417	0.415	0.408	0.407
Leverage median	0.431	0.377	0.328	0.354	0.365	0.469	0.418	0.427	0.417	0.399	0.395	0.397	0.409
NetLev mean	0.277	0.211	0.285	0.337	0.331	0.419	0.399	0.401	0.393	0.352	0.335	0.319	0.304
NetLev median	0.382	0.302	0.248	0.314	0.335	0.427	0.390	0.398	0.374	0.347	0.325	0.310	0.326

Table 2 provides selected statistics for Latin America firms by countries and years. The Latin America sample was obtained from *Economática*, the largest subscription-based database for Latin America publicly traded firms. The sample includes non-financial firms from Argentina, Chile, Mexico, and Peru, with 4,440 firms-years observations. The **cash ratio** is estimated as cash plus short term investments divided by total assets net of cash; **Leverage** is long term debt plus debt in current liabilities divided by total assets, and **Net leverage** is net debt (i.e., net of cash) to assets.

All parameters but cash flow volatility are statistically significant at the 1% level. With the exception of size and dividends, the sign of the estimated parameters for Latin American firms are as predicted according to theory or previous empirical results. As expected by the precautionary motive (Myers and Majluf (1984) and Myers (1997)), the coefficient of market to book value, the proxy for firm’s growth opportunities, is positive (i.e., firms increase their cash holdings to avoid missing growth opportunities). In relation to capital expenditures, the negative coefficient could be explained by the precautionary motive as well. Firms that acquire fixed assets can use them as collaterals for loans, which reduces the need of cash holdings. As expected, net leverage has the highest estimated coefficient. This result is consistent with the view that variables that affect cash holdings are also variables that affect leverage but in the opposite direction. However, this does not imply that firms are indifferent between having one more \$ of cash or one more \$ of debt (i.e., leverage coefficient is statistically different from negative 1.0). Finally, the estimated parameter for net working capital is negative, consistent with the idea that cash and liquid working capital items, for instance inventories and account receivables, could be used as substitutes.

Table 3: Pair-wise Pearson Correlation Coefficients of the Determinants of Cash for Latin American Firms

	MB	SIZE	CAPEX	NETLEV	CFVOL	NWC	DIV
CASH	0.124***	-0.015	-0.037**	-0.495***	0.023	-0.003	0.130***
MB		-0.050***	-0.005	-0.032	-0.078***	-0.001	0.076***
SIZE			0.103***	0.094***	-0.132***	-0.166***	-0.025
CAPEX				-0.049***	-0.083***	-0.019	-0.246***
NETLEV					0.061***	-0.157***	-0.082***
CFVOL						-0.026*	0.116***
NWC							0.010

Table 3 presents Pearson correlations for the determinants of cash for Latin American Firms. The Latin America sample was obtained from *Economica*, the largest subscription-based database for Latin America publicly traded firms. The sample includes non-financial firms from Argentina, Chile, Mexico, and Peru, with 4,440 firms-years observations. CASH is the ratio of cash to assets net of cash. Cash is defined as the sum of cash and short-term investments. MB is market to book value, measured as book value of assets minus book value of equity plus market value of equity all divided by assets. Firm size, SIZE, is the natural logarithm of the book value of assets. CAPEX is the ratio of capital expenditures to book value of assets. NETLEV is net leverage, the ratio of net debt (i.e., net of cash) to assets. CFVOL is cash flow volatility, the standard deviation of industry cash flow measured as each firm’s cash flow standard deviation for the previous 5 years, and then averaged by industry. NWC, net working capital, is current assets, net of cash, minus current liabilities net of current debt. DIV is the ratio of dividend payments to assets net of cash. ***, **, and *, indicate 1%, 5%, and 10% statistical significance respectively.

Model 1c in Table 4 also provides estimates for the industry and country variables, having Mexico and the electricity industry as benchmarks. The cash holdings for Argentina, Chile, and Peru are statistically different to Mexico’s, with Chilean firms holding the lowest cash levels. If it is true that economies of scale for large firms reduce their need for cash (Vogel and Maddala (1967) and Beltz and Frank (1996)), the positive relationship between firm size and cash holdings could be explained by the relative small size of the average Latin American firm compared to the average U.S. firm. The sign of the coefficient for dividends is explained below. To gain additional insights on the determinants of cash holdings, Table 5 provides industry fixed effect regression results per country (to avoid redundancy with Table 4 results, industry parameters are not tabulated). In general, results are consistent with results in Table 4. Coefficient signs for market to book, size, capital expenditures, net leverage, and net working capital are consistent with theory and across Latin American countries. Estimated parameters for dividends across countries are revealing. The coefficient is both positive and statistically significant for Chile only (0.088 at the 10% significance level). The explanation could be that in Chile, unlike in any of the other countries in our sample, firms are required to pay out certain fraction of their income as dividends (Dittmar, Mahrt-

Smith and Servaes (2003)). Thus, by the precautionary motive, it is plausible that Chilean firms hold more cash than they otherwise would hold due to the fact that they have to pay dividends.

Table 4: Pooled and Fixed-Effects Regressions for the Determinants of Cash Holdings for Latin American Firms

Variable	Model 1a		Model 1b		Model 1c	
	Estimate	t-statistic	Estimate	t-statistic	Estimate	t-statistic
intercept	0.047***	3.79	0.062***	4.21	0.045***	3.15
mb	0.008***	7.45	0.009***	7.43	0.009***	7.67
size	0.005***	6.18	0.004***	5.22	0.005***	4.95
capex	-0.043***	-4.20	-0.041***	-4.11	-0.039***	-3.95
netlev	-0.167***	-27.29	-0.166***	-26.65	-0.165***	-26.41
cfvol	0.044	1.18	0.024	0.99	-0.015	-0.33
nwc	-0.000***	-4.24	-0.000***	-3.94	-0.000***	-4.68
div	0.036	1.57	0.053**	2.38	0.066***	2.93
argentina			0.007	1.55	0.010**	2.37
chile			-0.013***	-3.69	-0.010***	-2.75
peru			0.040***	3.57	0.038***	3.37
agriculture					0.004	0.49
basic					0.024***	3.54
chemical					0.019**	2.26
construction					0.057***	7.99
trade					0.018***	3.36
food					-0.003	-0.59
mining					0.034***	3.04
other					0.005	0.96
paper					0.004	0.26
telecom					0.001	0.13
textile					0.007	0.72
transportation					0.065***	6.87
adj r-sq.	0.28		0.29		0.33	

*Regression results for the determinants of cash for Latin American Firms. The Latin America sample was obtained from Economica, the largest subscription-based database for Latin America publicly traded firms. The sample includes non-financial firms from Argentina, Chile, Mexico, and Peru, with 4,440 firms-years observations. The dependent variable is the ratio of cash to assets net of cash (the cash ratio). MB is market to book value, measured as book value of assets minus book value of equity plus market value of equity all divided by assets. Firm size, SIZE, is the natural logarithm of the book value of assets. CAPEX is the ratio of capital expenditures to book value of assets. NETLEV is net leverage, the ratio of net debt (i.e., net of cash) to assets. CFVOL is cash flow volatility, the standard deviation of industry cash flow measured as each firm's cash flow standard deviation for the previous 5 years, and then averaged by industry. NWC, net working capital, is current assets, net of cash, minus current liabilities net of current debt. DIV is the ratio of dividend payments to assets net of cash. Model 1a is the pooled regression, model 1b is the panel model with country fixed effects, and model 1c is the complete model as described in the "data and methodology" section. ***, **, and *, indicate 1%, 5%, and 10% statistical significance respectively.*

Results for cash flow volatility are difficult to explain. Table 4 shows that cash flow volatility is not statistically significant for the whole Latin America group (but with the expected negative sign, -0.015), and Table 5 shows that cash flow volatility varies across countries (positive and statistically significant for Argentina and Chile, and negative, but not significant for Mexico and Peru). Empirical research has shown that U.S. firms with riskier cash flows are expected to hold more cash (for instance, Campbell, Lettau, Malkiel and Xu (2001) document that idiosyncratic risk has increased in the U.S.; Irvine and Pontiff (2008) show that an increase in risk mirrors and increase in cash flow volatility; and Bates, Kahle and Stulz (2009) model cash flow volatility as a determinant of cash). Given this inconsistency in our results, we investigated more closely the influence of cash flow volatility on cash holdings. We ranked industries by cash flow volatility and compared those volatilities with cash holdings and other selected statistics. Table 6 provides medians of cash flow volatility, the cash ratio, cash flow relative to assets, and market to book by industries (e.g., plotted in Figure 2). The positive relation between cash flow volatility and cash holdings is only clear for the group of industries with the lowest cash flow volatility (i.e.,

electricity, trade, food, and mining). While this relationship is also observable for other sectors such as telecommunications and construction, the positive relationship is not clear for the rest of Latin American industries. The group of industries with the lowest cash flow volatilities referred to above also reports the highest market to book values, meaning that investors perceive growth opportunities on industries with steady or high cash flows. In general, with the exception of size and dividends, regression results for the determinants of cash for Latin American firms are consistent with previous findings according to the signs of estimated coefficients, the level of statistical significance, and the level of explanatory power (adjusted R-square of 32% in our model compared to 22% in the model by Opler, Pinkowitz, Stulz and Williamson (1999), and 45% by Bates, Kahle and Stulz (2009) for U.S. firms). Cash flow volatility does not seem to affect cash levels.

Table 5: Fixed Effect Regression Results for the Determinants of Cash Holdings Across Latin American Countries

Variable	Argentina		Chile		Mexico		Peru	
	estimate	t-statistic	estimate	t-statistic	estimate	t-statistic	estimate	t-statistic
INTERCEPT	0.093***	2.800	-0.038*	-1.67	0.067***	3.40	0.486*	1.88
MB	0.047***	5.400	0.004***	4.14	0.025***	6.89	0.010	1.21
SIZE	-0.006**	-2.290	0.013***	7.52	0.003**	2.46	0.007	0.58
CAPEX	-0.007	-0.530	-0.005	-0.29	-0.033**	-2.22	-0.405**	-2.10
NETLEV	-0.072***	-6.610	-0.224***	-18.84	-0.206***	-22.27	-0.463***	-6.39
CFVOL	0.130*	1.670	-0.235***	-2.66	0.011	0.17	-10.119	-1.70
NWC	-0.000***	-5.770	-0.000***	-3.78	-0.000***	-4.41	0.000	0.61
DIV	0.122	1.080	0.088**	2.01	0.036	1.43	-0.983	-1.69

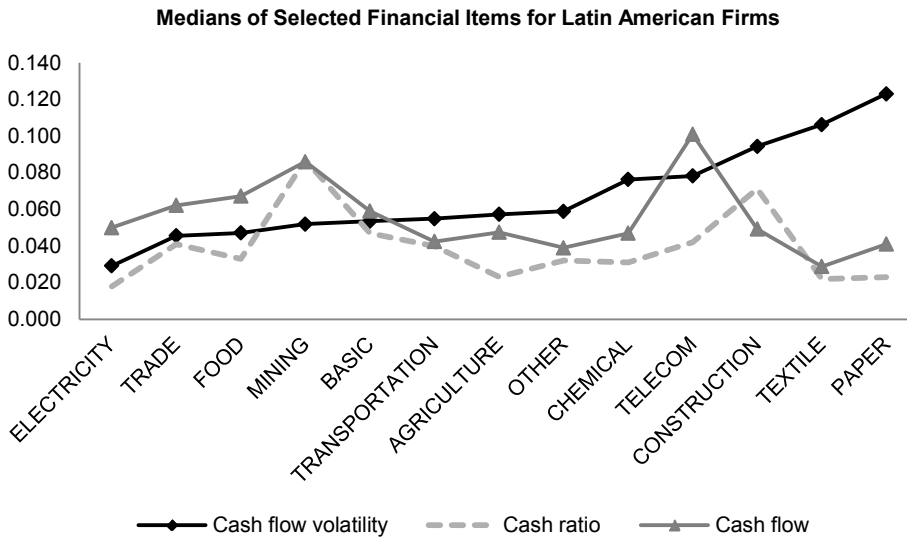
Industry fixed effect regression results for the determinants of cash across Latin American countries (industry coefficients are not included in the table to avoid redundancy). Model as described in the "data and methodology" section. The Latin America sample was obtained from *Economática*, the largest subscription-based database for Latin America publicly traded firms. The sample includes non-financial firms from Argentina, Chile, Mexico, and Peru, with 4,440 firms-years observations. The dependent variable is the ratio of cash to assets net of cash (the cash ratio). MB is market to book value, measured as book value of assets minus book value of equity plus market value of equity all divided by assets. Firm size, SIZE, is the natural logarithm of the book value of assets. CAPEX is the ratio of capital expenditures to book value of assets. NETLEV is net leverage, the ratio of net debt (i.e., net of cash) to assets. CFVOL is cash flow volatility, the standard deviation of industry cash flow measured as each firm's cash flow standard deviation for the previous 5 years, and then averaged by industry. NWC, net working capital, is current assets, net of cash, minus current liabilities net of current debt. DIV is the ratio of dividend payments to assets net of cash. ***, **, and *, indicate 1%, 5%, and 10% statistical significance respectively.

Table 6: Cash Flow Volatility and other Selected Items by Industries for Latin American Firms

Industry	Cash Flow Volatility	Cash Ratio	Cash Flow	Market To Book
Electricity	0.029	0.018	0.050	1.058
Trade	0.046	0.041	0.062	1.284
Food	0.047	0.033	0.067	1.205
Mining	0.052	0.087	0.086	1.338
Basic	0.053	0.047	0.059	0.906
Transportation	0.055	0.040	0.042	0.976
Agriculture	0.057	0.023	0.047	0.776
Other	0.059	0.032	0.039	0.994
Chemical	0.076	0.031	0.047	1.174
Telecom	0.078	0.042	0.101	1.443
Construction	0.094	0.071	0.049	1.058
Textile	0.106	0.022	0.029	0.813
Paper	0.123	0.023	0.041	0.978

Medians of cash flow volatility, the cash ratio, cash flow relative to assets, and market to book by industries. Cash ratio is cash to assets net of cash. Cash flow volatility is the standard deviation of industry cash flow measured as each firm's cash flow standard deviation for the previous 5 years, and then averaged by industry. Cash flow is earnings after interest, dividends, and taxes but before depreciation, all divided by assets. Market to book is measured as book value of assets minus book value of equity plus market value of equity all divided by assets. Industries are ranked according to cash flow volatility medians.

Figure 2: Cash Flow Volatility and Other Selected Items by Industries for Latin American Firms



Plotted with results in Table 6. Medians of cash flow volatility, the cash ratio, and cash flow relative to assets by industries. Cash ratio is cash to assets net of cash. Cash flow volatility is the standard deviation of industry cash flow measured as each firm's cash flow standard deviation for the previous 5 years, and then averaged by industry. Cash flow is earnings after interest, dividends, and taxes but before depreciation, all divided by assets.

CONCLUDING REMARKS

Given the economic importance of the increase in cash hoardings by U.S. corporations and from other developed economies, we investigate the levels and determinants of corporate demand for cash for Latin American firms. Specifically, we study non-financial firms from Argentina, Chile, Mexico, and Peru during the 1995-2007 period. The typical academic study on foreign cash holdings does not include all these Latin American countries or, if it does, it includes a relatively small number of firms. Following Opler, Pinkowitz, Stulz and Williamson (1999) and Bates, Kahle and Stulz (2009) we modeled the determinants of cash holding by regression analysis with country and industry fixed effects.

Latin American firms, as opposed to U.S. firms, did not hoard cash during the period of study. While Bates, Kahle and Stulz (2009) document a secular increase in cash holdings for U.S. firms, the level of cash for Latin American firms has barely increased in the period (i.e., in a regression of the cash ratio on a constant and time, the slope of the estimated parameter is statistically significant at 1% but the coefficient is only 0.001). In addition, while net leverage for U.S. firms has a downward trend, and is negative since 2004, net leverage for Latin American firms has been around 35% to 40% in the last decade. However, we find remarkable similarities with respect to the determinants of cash between U.S. firms and Latin American firms. Net working capital, capital expenditures and net leverage all decrease the levels of Latin American firms' cash balances while growth opportunities increase them. However, contrary to theoretical expectations and previous findings for U.S. firms, firm size and dividend payments seem to increase Latin American firms' need for cash whereas cash flow volatility does not seem to affect cash levels. If it is true that economies of scale for large firms reduce their need for cash (Vogel and Maddala (1967) and Beltz and Frank (1996)), the positive relationship between firm size and cash holdings could be explained by the relative small size of the average Latin American firm compared to the average U.S. firm. Results disaggregated show consistency across Latin American countries. However, estimated parameters for dividends across countries provide a new insight. The coefficient is positive and statistically significant for Chile only (0.088 at the 10% significance level). Chilean firms (but not in other countries from the sample in this study) are required to pay out certain fraction of their income as

dividends (Dittmar, Mahrt-Smith and Servaes (2003)). Thus, it is possible that by the precautionary motive, Chilean firms that have to pay dividends tend to hold higher levels of cash than they otherwise would hold. While empirical research has shown that U.S. firms with riskier cash flows are expected to hold more cash in their balance sheets, cash flow volatility does not seem to affect cash holdings for Latin American firms according to our regression results. However, when we ranked industries by cash flow volatility, we observe a positive relation between cash flow volatility and cash holdings for the group of industries with the lowest cash flow volatility (i.e., electricity, trade, food, and mining). While this trend is also observable for other industries such as telecommunications and construction, this is not a generality for Latin American industries. This group of industries with the lowest cash flow volatilities also reports the highest market to book values, meaning that investors perceive growth opportunities on industries with steady or high cash flows, as is the case of the telecommunications industry

This article provides several avenues for future research. For example, a natural extension of this work would be to analyze the effects of macroeconomic and capital market factors (e.g., interest rate levels, capital market activities such as IPOs, mergers and acquisitions, etc.) on Latin American cash balances. In addition, control variables for differences in corporate governance characteristics could be included.

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