Corporate Debt in Latin America and its Macroeconomic Implications

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ABSTRACT

This paper provides an empirical analysis of nonfinancial corporate debt in six large Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico, and Peru), distinguishing between bond-issuing and non-bond-issuing firms, and assessing the debt's macroeconomic implications. The paper uses a sample of 2,241 firms listed on the stock markets of their respective countries, comprising 34 sectors of economic activity for the period 2009–16. On the basis of liquidity, leverage, and profitability indicators, it shows that bond-issuing firms are in a worse financial position relative to non-bond-issuing firms. Using Minsky's hedge/speculative/Ponzi taxonomy for financial fragility, we argue that there is a larger share of firms that are in a speculative or Ponzi position relative to the hedge category. Also, the share of hedge bond-issuing firms declines over time. Finally, the paper presents the results of estimating a nonlinear threshold econometric model, which demonstrates that beyond a leverage threshold, firms' investment contracts while they increase their liquidity positions. This has important macroeconomic implications, since the listed and, in particular, bond-issuing firms (which tend to operate under high leverage levels) represent a significant share of assets and investment. This finding could account, in part, for the retrenchment in investment that the sample of countries included in the paper have experienced in the period under study and highlights the need to incorporate the international bond market in analyses of monetary transmission mechanisms.

KEYWORDS: International Bond Market; Bond-Issuing Firms; Non-Bond-Issuing Firms; Solvency; Hyman P. Minsky; Nonlinear Threshold Model

JEL CLASSIFICATIONS: E32; G15; O11

INTRODUCTION

Following the global financial crisis (GFC) of 2008–09, banks, and in particular global banks, witnessed a process of deleveraging and a decline in profitability that contributed to a great extent to the restriction of bank lending throughout the world. At the same time, the international bond market, which benefited from the impact of quantitative easing (QE) policies on the relative profitability of financial assets, became a major source of funding for developing economies, including for Latin American economies.

This is explained by several factors. The bulk of the real and financial effects of the GFC were concentrated mainly in developed countries. Most developing countries did not experience a contraction in real economic activity and those that did recovered rapidly.[1] Also, developing countries did not experience balance of payments or financial crises. Moreover, exchange rate appreciation and favorable commodity prices gave an important incentive for them to issue debt in international markets.

An analysis of international debt issues by sector and country of origin shows that in the case of Latin America, though its relative importance has declined over time, the government is the main issuer of international debt. Also, the evidence indicates a rapid rise in the importance of the debt of the financial and, more prominently, nonfinancial corporate sector. The countries that are most exposed to corporate debt in the international bond market affect the larger economies of the region, including Brazil, Colombia, Chile, Peru, and Mexico.

This paper analyzes corporate debt in these countries, as well as in Argentina, using a sample of 2,241 firms listed on the stock market of their respective countries, comprising 34 sectors of economic activity for the period 2009–16. The paper focuses on the financial situation of those firms that issue bonds relative to those that do not and on the macroeconomic implications of corporate indebtedness.

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[1] Available evidence shows that out of a sample of 136 developing economies, 33 percent and 8 percent of these registered a contraction in 2009 and 2010, respectively.

The paper is divided into five sections. Section one provides an overall picture of total bond and corporate bond activity in Latin America, gauging its importance and identifying the main issuers. Section two describes the data sample set used in the paper at the country, sector, and firm levels. The section also gives an estimate of the bond-issuing and non-bond-issuing firms in terms of assets and investment. Section three analyzes the financial situation of the firms of the data sample set using indicators of liquidity, solvency, and profitability. The section compares the financial performance of bond-issuing and non-bond-issuing firms. The evidence shows that bond-issuing firms are in a worse position, mainly in terms of solvency and profitability, relative to non-bond-issuing firms. Section four reinforces these conclusions by using Hyman P. Minsky's taxonomy to classify firms into hedge, speculative, and Ponzi categories, showing a larger presence of the latter two categories. Section five addresses the macroeconomic implications of corporate indebtedness and fragility, focusing on the potential impact on investment. Using a nonlinear threshold model, it estimates the relationship between leverage, investment, and liquidity. It shows that beyond a leverage threshold, firms contract investment and increase their liquidity positions. This has important macroeconomic implications for countries in the study. The listed and, in particular, bond-issuing firms, which tend to operate (in the period under consideration) with high leverage levels, represent a significant share of investment. These results may account in part for the decline in investment that the countries included in the sample experienced in the second half of the 2000s. It also underscores the need to include the international bond market in the monetary transmission mechanism linking developed and Latin American economies.

I. LATIN AMERICA AND THE INTERNATIONAL BOND MARKET

Since the adoption of QE policies by the United States, the European Central Bank, and the Bank Japan in response to the GFC, the international bond market has become a major source of funding for emerging market economies, including for those in Latin America.

In the case of Latin America, the total stock of outstanding international debt securities issued, which stood at US$310 billion in the period 2000–07, increased to US$761 billion in 2017. The

share of the stock of debt issued is directly proportional to country size. Argentina, Brazil, Chile, Colombia, Mexico, and Peru account for roughly 89 percent of the total international debt stock (see table 1).

The decomposition of the stock of debt issued by sector (including the government, the central bank, financial corporations, and commercial banks) for the period 2000–17 shows several stylized facts. First, the government is the most important issuer of international debt.[2] However, its importance has declined over time. Between the period 2000–07 and the year 2017, the share of government debt as a percentage of the total declined from 70.8 percent to 39.8 percent at the regional level. In the cases of South America and Central America, the stock of government debt decreased from 71.5 percent to 44.7 percent and from 89 percent to 57.2 percent, respectively.

A second stylized fact is the rapid rise in importance of the debt of the financial and, more prominently, nonfinancial corporate sector. The stock of international debt securities of the financial sector rose, on average, from US$47 billion to US$241 billion between 2000–07 and 2017. The decomposition between the private and public financial sectors shows that the former explains the bulk of the rise in debt (US$41 billion and US$216 billion, respectively; see table 1).

For its part, at the regional level, the stock of debt of the nonfinancial corporate sector expanded from US$49 billion to US$289 billion for the period between 2000 and 2007. The stock of corporate debt is more important for South America than Central America. In the case of the latter, the share of the debt stock of the nonfinancial corporate sector increased from 2.0 percent to 6.8 percent, while the debt stock as a percentage of GDP declined from 1.6 percent to 1.3 percent for the same period. For South America the importance of the debt of the nonfinancial corporate sector is reflected in the rise of both its relative share and as a percentage of GDP (12.2 percent to 25 percent and from 2.4 percent to 4.0 percent between 2000–07 and 2017, respectively).

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[2] The government includes local, central, and regional governments, and social security funds. It excludes the central banks and publicly owned firms; see BIS (2016).

Table 1: Stock of International Debt Securities in US$ Billion, Percentage of Total and Percentage of GDP by Latin American Country (2000–07, 2008, 2009, 2012, 2015, 2016, and first quarter of 2017)

Latin America and the Caribbean	In US$ billions						As percentage of the total						As percentage of GDP			
	2000–07	2009	2012	2015	2016	2017	2000–07	2009	2012	2015	2016	2017	2000–07	2009	2012	2015
Government	235	228	255	287	334	351	70.8	58.8	40.2	36.3	38.8	39.8	9.7	5.7	4.4	6.1
Central Banks	0	0	0	0	0	0	0.1	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0
Financial Corporations	24	43	106	126	121	120	7.3	11.0	16.7	15.9	14.1	13.7	1.1	1.1	1.8	2.7
Commercial Banks	10	21	61	61	57	56	3.0	5.5	9.6	7.7	6.6	6.3	0.9	0.6	1.2	1.4
Other Financial Corporations (Private)	7	18	33	39	40	40	2.2	4.5	5.1	5.0	4.6	4.5	0.3	0.4	0.6	0.8
Public Banks	5	3	11	19	18	18	1.6	0.8	1.7	2.4	2.1	2.1	0.3	0.2	0.4	0.9
Nonfinancial Corporations	49	74	167	254	284	289	14.8	19.1	26.3	32.0	33.0	32.9	2.4	1.9	3.0	5.5
Other Financial Corporations (Public)	1	1	2	6	6	6	0.3	0.2	0.4	0.8	0.7	0.7	0.7	0.2	0.2	0.3
TOTAL	332	387	634	792	860	881	100.0	100.0	100.0	100.0	100.0	100.0	17.0	10.1	11.5	17.7

South America	In US$ billions						As percentage of the total						As percentage of GDP			
	2000–07	2009	2012	2015	2016	2017	2000–07	2009	2012	2015	2016	2017	2000–07	2009	2012	2015
Government	177	169	187	193	232	244	71.5	59.6	41.5	38.2	43.3	44.7	11.9	5.7	4.3	5.8
Central Banks	0	0	0	0	0	0	0.1	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.0
Financial Corporations	20	34	86	93	84	83	8.2	12.1	19.1	18.4	15.7	15.1	1.5	1.2	2.0	2.9
Commercial Banks	10	18	49	45	40	39	4.0	6.2	11.0	8.9	7.5	7.1	0.9	0.7	1.3	1.4
Other Financial Corporations (Private)	5	13	25	27	24	24	2.0	4.5	5.6	5.4	4.5	4.5	0.4	0.5	0.6	0.9
Public Banks	4	3	11	17	16	16	1.7	1.2	2.3	3.4	3.0	2.9	0.5	0.2	0.4	0.9
Nonfinancial Corporations	30	46	91	126	135	137	12.2	16.2	20.2	25.0	25.3	25.0	2.4	1.6	2.1	4.0
Other Financial Corporations (Public)	1	1	1	3	3	3	0.4	0.2	0.2	0.6	0.6	0.6	0.7	0.2	0.1	0.4
TOTAL	248	283	450	506	535	546	100.0	100.0	100.0	100.0	100.0	100.0	19.9	10.1	10.8	16.3

Central America	In US$ billions						As percentage of the total						As percentage of GDP			
	2000–07	2009	2012	2015	2016	2017	2000–07	2009	2012	2015	2016	2017	2000–07	2009	2012	2015
Government	11	16	19	32	35	37	89.4	79.5	61.0	57.6	56.6	57.2	10.8	9.7	8.5	11.9
Central Banks							0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Financial Corporations	1	1	4	10	11	11	5.0	6.4	14.2	18.3	18.4	18.0	4.1	1.5	3.1	4.5
Commercial Banks	0	0	2	4	4	4	0.0	1.8	7.0	6.9	6.9	6.9	0.0	0.5	2.4	3.2
Other Financial Corporations (Private)	0	1	1	3	4	4	3.6	4.6	3.4	6.1	5.9	5.6	2.9	1.0	1.6	2.5
Public Banks				2	2	2	0.0	0.0	0.0	3.3	3.7	3.6	0.0	0.0	0.0	1.5
Nonfinancial Corporations	0	2	3	3	4	4	2.0	7.7	10.6	5.7	6.6	6.8	1.6	1.1	1.6	1.3
Other Financial Corporations (Public)	0	0	1	1	1	1	0.0	0.0	3.8	2.1	1.9	1.8	0.0	0.0	2.9	2.2
TOTAL	13	20	31	55	61	64	100.0	100.0	100.0	100.0	100.0	100.0	19.5	13.8	20.2	27.2

Mexico	In US$ billions						As percentage of the total						As percentage of GDP			
	2000–07	2009	2012	2015	2016	2017	2000–07	2009	2012	2015	2016	2017	2000–07	2009	2012	2015
Government	46	43	50	62	67	70	65.2	51.2	32.3	27.0	25.5	25.9	5.7	4.8	4.2	5.5
Central Banks									No Data						No Data	
Financial Corporations	3	7	16	23	26	26	4.3	8.6	10.2	9.7	9.9	9.7	0.4	0.8	1.3	2.0
Commercial Banks	0	3	9	12	12	12	0.0	3.9	6.0	5.2	4.6	4.5	0.0	0.4	0.8	1.1
Other Financial Corporations (Private)	2	4	7	9	12	12	2.6	4.7	4.2	3.8	4.5	4.4	0.2	0.4	0.6	0.8
Public Banks	1	0	0	0	0	0	1.5	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Nonfinancial Corporations	19	27	73	124	144	149	26.5	31.7	47.2	53.6	54.7	54.7	2.3	3.0	6.1	10.8
Other Financial Corporations (Public)	0	0	0	2	2	2	0.0	0.0	0.0	0.7	0.7	0.7	0.0	0.0	0.0	0.1
TOTAL	71	84	154	231	264	271	100.0	100.0	100.0	100.0	100.0	100.0	8.7	9.4	13.0	20.2

Source: On the basis of BIS (2017)

The countries that are most exposed to corporate debt in the international bond market include Mexico, Brazil, Chile, Colombia, and Peru. Available data between 2000 and 2015 shows that for Mexico the stock of debt of the nonfinancial corporate sector increased from 3.1 percent to 11.9 percent of GDP. For the same years the stock of debt of the nonfinancial corporate sector expanded in Brazil (2.2 percent to 8.5 percent), Chile (3.3 percent to 16.1 percent), Colombia (1 percent to 6.3 percent), and Peru (0 percent to 4.9 percent)

Other countries in South America, such as Argentina and Paraguay, have, in comparative terms, smaller corporate debt ratios (1.4 percent and 1.1 percent of GDP for 2015, respectively), while Uruguay has no corporate debt.

Table 2: South American Stock of Debt Securities of the Nonfinancial Corporate Sector in US$ Billion, Percentage of Total and Percentage of GDP (2000–07, 2008–17)

Country	In US$ Billions								As Percentage of GDP					
	2000–07	2008	2009	2012	2014	2015	2016	2017	2000–07	2008	2009	2012	2014	2015
Argentina	6,599	2,863	2,593	3,767	6,148	8,189	11,975	13,793	3.2	0.8	0.8	0.7	1.2	1.4
Brazil	21,464	37,002	51,468	114,910	155,654	152,615	156,511	157,634	2.7	2.2	3.1	4.7	6.3	8.5
Chile	4,983	5,999	7,665	17,169	33,543	38,766	39,499	40,028	4.7	3.3	4.5	6.5	13.0	16.1
Colombia	717	2,354	4,754	6,360	17,191	18,415	18,038	17,894	0.6	1.0	2.0	1.7	4.5	6.3
Mexico	31,913	34,614	43,575	89,208	125,699	135,703	158,456	162,619	3.9	3.1	4.9	7.5	9.7	11.9
Paraguay	0	0	0	300	300	300	300	300	0.0	0.0	0.0	1.2	1.0	1.1
Peru	164	14	139	3,332	8,313	8,521	8,523	8,324	0.2	0.0	0.1	1.7	4.1	4.5
Uruguay	0	0	0	0	1	11	10	10	0.0	0.0	0.0	0.0	0.0	0.0
Venezuela	4,180	8,995	13,579	20,393	18,993	17,693	22,518	22,518	3.1	2.9	4.1	5.3	0.0	0.0
Total	70,459	93,346	125,226	257,269	367,782	382,153	418,306	425,596						

Source: BIS and World Bank (2017)

II. DATA SAMPLE AND DESCRIPTION

The analysis in the paper focuses on the public and private nonfinancial corporate sector in six South American countries (Argentina, Brazil, Chile, Colombia, Mexico, and Peru). These countries account for over 85 percent of the regional GDP and the gross formation of fixed capital. Data at the firm level for these countries was obtained from Bloomberg Data Services for the period 2009–16.

Firm-level data are reported on the basis of residence and this provides a key justification for carrying out the analysis at the sector rather than country level. Also the dataset includes parent companies and excludes all subsidiaries. Not all the firms report data on a systematic basis; however we assume that all the firms included in the sample were active during some time in the period.

All the variables correspond to annual values on a calendar-year basis, expressed in current US dollars. All the percentages utilized for a given period/year are expressed in terms of all the firms that report data for that period/year. The data presenting significant/persistent missing value problems were eliminated.

We distinguish between the firms that issue debt in the international bond market from those that do not. We identified the firms that issue debt in the international bond market on the basis of information provided by Latin Finance and Bloomberg.

Our final sample consists of a total of 2,241 listed firms in 34 sectors of economic activity according to the Industry Classification Benchmark (ICB).[3] A large percentage of these firms are located in Brazil and Mexico (57 percent and 10 percent of the total, respectively) and to a lesser extent in Peru and Chile (11 percent of the total for both countries).

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[3] The Industry Classification Benchmark (ICB) is a system that classifies both domestic and international stocks. The ICB has a four-tier, hierarchical industry classification structure. It uses a system of 10 industries, partitioned into 18 supersectors, which are further divided into 41 sectors, of which 33 sectors belong to the non-financial corporate sector. The 34th sector included in the paper includes those firms that are not classified in the rest of the sectors.

The available evidence (table 3) shows that the number of firms that issued bonds in the international market represents a small part of the total for Argentina (8.9 percent), Brazil (2.1 percent), Chile (7.9 percent), Colombia (7.6 percent), Mexico (10.5 percent), and Peru (7.3 percent). However, this subset of firms accounts for a large share of total assets and especially of total expenditure on fixed assets and long-term investment. On average, bond-issuing firms represent 33.9 percent of total assets, 35 percent of expenditure on short-term investment, and 40.8 of expenditure on long-term investment.

Table 3: Bond-issuing Firm's Share of Total Assets, Share of Expenditure on Short-term Investment, and on Fixed Assets and Long-term Investment (2016)

County	Bond-issuing firms				Total number of firms and number of firms issuing and not issuing bonds		
	Share of total assets (percent)	Share of expenditure of short-term investment (percent)	Share of expenditure on fixed assets and long-term investment (percent)	Share of total number (percent)	Number of bond-issuing firms	Number of non-issuing firms	Total number of firms
Argentina	38.8	30.5	47.7	8.9	14	142	156
Brazil	35.0	21.9	42.2	2.1	28	1,253	1,281
Chile	30.9	9.7	43.7	7.9	22	257	279
Colombia	39.6	62.6	45.2	7.6	7	85	92
Mexico	34.4	13.4	43.1	10.5	24	204	228
Peru	24.5	71.9	23.0	7.3	15	190	205
Average/total	33.9	35.0	40.8	4.9	110	2,131	2,241

Source: On the basis of Bloomberg (2017)

In line with these results, the analysis at the sector level (table 4) shows that of the 34 sectors considered, 26 sectors (or 76 percent of the total) include firms that issue bonds. The sectors that do not issue bonds include: alternative energy, electronic and electrical equipment, leisure goods, pharmaceutical and biotechnology, software and computer services, support services, technology hardware and equipment, and tobacco.

Also, the number of firms that issue bonds represents a small share of the total for each sector. The largest share of firms issuing bonds is located in the oil and gas industry (12 percent of the total for oil and gas producers and 13.3 percent of the total for oil equipment, services, and distribution) and aerospace and defense (14.3 percent of the total). The lowest share of bond-issuing firms is found in mobile telecommunications (1.3 percent of the total) and general retailers (1.9 percent of the total).

Bond-issuing firms in aerospace and defense (94.5 percent and 93.1 percent), mobile telecommunications (45.9 percent and 48.7 percent), travel and leisure (31.7 percent and 35.5 percent), forestry and paper (31.5 percent and 33.2 percent), electricity (31 percent and 50.9 percent), industrial metals and mining (24.6 percent and 29.2 percent), food and drug retailers (21.0 percent and 28.4 percent), and oil and gas producers (19.4 percent and 17.6 percent) have the largest share of fixed assets and long-term investment, respectively

The lowest shares of fixed assets and long-term investment are respectively found among general retailers (1.6 percent and 1.3 percent of the total) and personal goods (1.0 percent and 0.3 percent of the total).

Table 4: Number of Firms by Sector of Economic Activity, Share of Total Assets, and Expenditure on Short-term and Long-term Investment (2016)

Sector	Number of total firms and number of bond- and non-bond-issuing firms			Bond-issuing firms			
	Total	Bond-issuing firms	Non-bond-issuing firms	Share of total firms (percent)	Share of total assets (percent)	Share of expenditure on short-term investment (percent)	Share of expenditure on long-term investment (percent)
Aerospace and Defense	6	1	5	16.67	94.52	99.96	93.06
Alternative Energy	3	0	3	0.00			
Automobiles and Parts	47	3	44	6.38	17.96	0.00	26.72
Beverages	54	5	49	9.26	3.85	0.03	4.74
Chemicals	111	4	107	3.60	14.40	0.11	17.23
Construction and Materials	165	11	154	6.67	13.42	24.44	15.36
Electricity	198	19	179	9.60	31.00	15.75	50.87
Electronic and Electrical Equipment	23	0	23	0.00			
Fixed Line Telecommunications	54	4	50	7.41	11.53	18.46	9.75
Food and Drug Retailers	54	5	49	9.26	20.98	50.57	28.36
Food Producers	229	11	218	4.80	8.73	3.10	9.36
Forestry and Paper	38	3	35	7.89	31.46	1.51	33.26
Gas, Water, and Multiutilities	45	4	41	8.89	5.95	0.00	10.35
General Industrials	63	2	61	3.17	9.27	0.00	33.53
General Retailers	144	3	141	2.08	1.61	2.90	1.28
Health Care Equipment and Services	36	0	36	0.00			
Household Goods and Home Construction	63	3	60	4.76	4.66	5.52	0.98
Industrial Engineering	52	2	50	3.85	11.35	2.67	11.23
Industrial Metals and Mining	111	6	105	5.41	24.62	17.60	29.18
Industrial Transportation	91	2	89	2.20	6.42	0.00	12.02
Leisure Goods	10	0	10	0.00			
Media	31	2	29	6.45	19.09	17.78	13.62
Mining	44	2	42	4.55	7.74	9.91	8.35
Mobile Telecommunications	32	1	31	3.13	45.93	43.14	48.70
Oil and Gas Producers	46	6	40	13.04	19.37	57.40	17.58
Oil Equipment, Services, and Distribution	21	2	19	9.52	1.76	0.00	2.24
Other	205	6	199	2.93	59.13	5.21	8.24
Personal Goods	79	1	78	1.27	1.02	5.74	0.28
Pharmaceuticals and Biotechnology	27	0	27	0.00			
Software and Computer Services	14	0	14	0.00			
Support Services	41	0	41	0.00			
Technology Hardware, and Equipment	15	0	15	0.00			
Tobacco	9	0	9	0.00			
Travel and Leisure	80	2	78	2.50	31.74	29.83	35.49

Source: Authors' own calculations on the basis of Bloomberg (2017)

III. A FINANCIAL ANALYSIS OF CORPORATE INDEBTEDNESS

In order to gain a general understanding of the financial situation of the nonfinancial corporate sector in those countries that have the greatest exposure to the international bond market, financial indicators that assess the state of liquidity (the quick ratio or QR), solvency (interest coverage ratio, debt-to-equity ratio, and short-term-debt-to-total-debt ratio), profitability (rate of return over equity, $[ROE = \frac{Net\ Income}{Equity}]$), and net profit margin were computed for each of the firms included in the sample, including bond-issuing and non-bond-issuing firms. Table 5 shows the median value of each of the financial ratios on a yearly basis for the period 2009–16. Table 6 shows the percentage of total bond-issuing and non-bond-issuing firms that, depending on the case, are either above or below their average value for the period 2010–16 for each financial ratio.[4] Table 7 shows the results of the same exercise as table 5 but using the established a priori threshold levels found in the literature rather than the indicators' own median values.

The evidence presented in tables 5 through 7 reveals a deteriorating performance of the nonfinancial sector, reflected mainly in a rise in leverage and a decline in profitability. This stylized fact is more prominent among bond-issuing firms relative to non-bond-issuing firms. Bond-issuing firms also exhibit worse performance in terms of the QR. We detail below the findings for the different indicators.

The Liquidity Indicator (QR)

Liquidity indicators reflect the ability of a firm to pay its short-term liabilities.[5] The QR, also known as the acid test ratio, considers only the most liquid assets (assets minus inventories) as a measure of the capacity of a company to confront its short-term obligations. It is traditionally considered that a QR equal to or more than one means that firms are able to meet their short-term obligations, while values of the QR below one are an indicator of the opposite.

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[4] We did not include 2009 since it is the year in which the GFC was felt in Latin America and its inclusion could distort the results.

[5] Other liquidity indicators include the liquidity ratio and the cash ratio. The liquidity ratio measures the ability of a firm to cover its short-term debt obligations with its current assets (i.e., those that can be converted into cash within a short time period). The cash ratio shortens further the period of time by considering only cash and cash equivalents (for example, marketable securities). In this sense the cash ratio is an extreme version of a liquidity ratio, and can reflect the value of a firm under the worst-case scenario (bankruptcy).

The evidence for the period running from 2009 to 2016 shows that firms (whether bond-issuing or non-bond-issuing firms) have maintained, on average, a QR that is equal to one (table 5). The percentage of firms whose QRs are below the median is practically the same for bond-issuing and non-bond-issuing firms.

The percentage of total firms whose QR is below one remained at roughly 50 percent of the total throughout the period; a similar evolution is recorded for non-bond-issuing firms. In the case of bond-issuing firms, the percentage of firms whose QR is below one increased from 44 percent to 52 percent of the total.

Debt-to-Equity Ratio

Solvency ratios, such as the debt-to-equity ratio, measure the ability of a company to cover its long-term obligations. Solvency ratios show the extent to which a firm depends on borrowing to finance its productive activity. Borrowing is compared to assets and/or equity. There is no absolute threshold for the debt-to-equity ratio

These can vary widely depending on the phase of the business cycle, country size, levels of development, and the type of productive activity a firm undertakes (debt-to-equity ratios tend to be higher for manufacturing and industry than for, say, services). The evidence in the case of Europe shows that the ratio of total assets to debt reached 36.2 percent in 1999, peaking at 46.2 percent in 2009 (during the GFC) and decreased to 43 percent in 2011 (ECB 2012).[6] A more recent study that includes a set of 618,000 firms operating in Italy, Spain, Portugal, Greece, and Slovenia for the period 2005–14 finds that the debt-to-financial-assets ratio averages 0.48 (0.45 for the median) with a standard deviation of 0.3 (Gebauer, Setzer, and Westphal 2017).

Gebauer, Setzer, and Westphal (2017) identify thresholds for the debt-to-asset ratio of 80–85 percent, which they term overleveraging. Overleveraging refers to a situation where indebtedness has a statistically significant negative effect on investment. The study also finds that moderate leverage does not impact investment adversely. However, the analysis of subperiods within the

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[6] Debt and assets exclude inter-company loans. Debt includes loans, securities, and insurance technical reserves.

sample considered (2005–08 and 2009–14) shows that: (i) in the precrisis period (2005–08) overindebtedness does not affect investment; (ii) in the postcrisis period (which is the focus of this paper) both high and low levels of indebtedness have a negative impact on investment. The authors explain the difference in the results obtained for the precrisis and postcrisis period on the basis of stronger financial constraints and higher levels of risk aversion.

In the case of Latin America, the available evidence indicates the debt-to-equity or debt-to - assets ratios tend to be higher than those obtained for European economies. A study undertaken for the period 1990–2002 for the same set of countries that we use in this paper (i.e., Argentina, Brazil, Chile, Colombia, Mexico, and Peru) shows that the average debt-to-asset ratio is 0.96, 1.70, 0.33, 0.47, 0.69, and 1.04, respectively, for each of these countries. The evidence also shows that the standard deviation is much higher than that found for European firms, with an average of 11.8 for the above set of Latin American countries.

A more recent study (Caceres and Bastos 2016), using a sample of over five hundred nonfinancial firms from seven Latin American countries—Argentina, Brazil, Chile, Colombia, Mexico, Panama, and Peru for the period covering the period 2005–15—finds that the debt-to-asset and debt-to-equity ratios stand at 58 percent on average. Another study (Alfaro et al. 2017) undertaken for 26 countries for the period 1992–2014 with a maximum of 8,286 firms, including the six Latin American countries contemplated in the present study, finds that the debt-to-equity ratio in Argentina, Brazil, Colombia, Mexico, and Peru hovers around 50 percent, while for Chile it is close to 80 percent.

Table 5: Selected Financial Firm Ratios (Medians), 2009–16

Firm ratios	2009	2010	2012	2013	2014	2015	2016
Liquidity	QR						
Total firms	1.00	1.08	1.05	1.04	1.06	1.04	1.00
Non-bond-issuing firms	1.00	1.08	1.05	1.03	1.06	1.05	1.00
Bond-issuing firms	1.15	1.04	1.04	1.07	1.01	1.00	0.99
Solvency	Interest coverage ratio						
Total firms	1.78	2.68	2.37	2.50	2.10	1.98	2.13
Non-bond-issuing firms	1.75	2.70	2.42	2.60	2.10	2.03	2.15
Bond-issuing firms	2.39	2.58	2.11	2.12	2.13	1.70	1.93
	Debt-to-equity ratio						
Total firms	40.32	52.77	55.74	58.29	62.59	67.39	63.81
Non-bond-issuing firms	38.19	51.26	52.29	55.59	59.09	64.70	62.03
Bond-issuing firms	69.21	76.01	94.70	82.64	85.25	87.29	80.68
	Short-term-debt-to-total-debt ratio						
Total firms	0.56	0.52	0.46	0.45	0.49	0.49	0.47
Non-bond-issuing firms	0.58	0.53	0.48	0.46	0.51	0.50	0.48
Bond-issuing firms	0.36	0.37	0.35	0.35	0.35	0.33	0.33
Profitability	Return on equity						
Total firms	9.66	11.67	7.99	7.47	6.67	5.95	7.78
Non-bond-issuing firms	9.48	11.69	7.67	7.43	6.67	6.03	7.71
Bond-issuing firms	12.73	11.58	9.28	7.51	6.79	5.57	8.59
	Net profit margin						
Total firms	5.16	6.05	5.17	4.75	4.39	3.28	4.35
Non-bond-issuing firms	4.98	5.84	5.17	4.81	4.31	3.31	4.35
Bond-issuing firms	9.50	8.41	4.85	3.77	5.39	2.66	4.02

Source: Authors' own estimates on the basis of Bloomberg (2018).

Table 6: Percentage of Firms that Deviate from the Respective Medians of Financial Firm Ratios, 2009–16

Firm ratios	2010	2011	2012	2013	2014	2015	2016
Liquidity	QR*						
Total firms	0.28	0.31	0.35	0.38	0.39	0.37	0.37
Non-bond-issuing firms	0.27	0.30	0.34	0.38	0.39	0.38	0.37
Bond-issuing firms	0.37	0.46	0.42	0.35	0.40	0.35	0.36
Solvency	Interest coverage ratio						
Total firms	0.36	0.38	0.41	0.39	0.39	0.39	0.39
Non-bond-issuing firms	0.36	0.37	0.39	0.39	0.39	0.38	0.39
Bond-issuing firms	0.38	0.41	0.52	0.47	0.40	0.42	0.32
	Debt-to-equity ratio**						
Total firms	0.45	0.47	0.47	0.48	0.48	0.48	0.48
Non-bond-issuing firms	0.44	0.44	0.45	0.46	0.45	0.46	0.46
Bond-issuing firms	0.49	0.67	0.69	0.67	0.74	0.66	0.58
	Short-term-debt-to-total-debt ratio***						
Total firms	0.44	0.48	0.47	0.48	0.48	0.48	0.48
Non-bond-issuing firms	0.47	0.51	0.50	0.51	0.50	0.50	0.52
Bond-issuing firms	0.17	0.25	0.20	0.20	0.22	0.20	0.12
Asset Structure	Current-assets-to-total-assets ratio						
Total firms	0.46	0.46	0.46	0.47	0.46	0.47	0.48
Non-bond-issuing firms	0.44	0.45	0.44	0.46	0.45	0.45	0.46
Bond-issuing firms	0.60	0.58	0.60	0.64	0.64	0.67	0.63
Profitability	Return on equity (ROE)****						
Total firms	0.49	0.49	0.50	0.49	0.49	0.49	0.50
Non-bond-issuing firms	0.49	0.50	0.51	0.49	0.49	0.48	0.50
Bond-issuing firms	0.50	0.42	0.43	0.49	0.49	0.57	0.46
	Net profit margin						
Total firms	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Non-bond-issuing firms	0.51	0.50	0.50	0.50	0.51	0.49	0.49
Bond-issuing firms	0.44	0.46	0.48	0.49	0.44	0.55	0.56

Note: * Percentage of total firms whose QR and interest coverage ratio are below the median; ** Percentage of firms whose debt-to-equity ratios are above the median; ***Percentage of firms that have a ratio of short-term to total debt and current assets to total assets above the median; ****Percentage of firms that have a ROE and a net profit margin below their respective medians. The percentages were obtained on the basis of firms that have the required data.
Source: Authors' own estimates on the basis of Bloomberg (2017).

Table 7: Percentage of Firms that Deviate from Specified Criteria for Financial Firm Ratios, 2009–16

Firm ratios	2009	2010	2012	2013	2014	2015	2016
Liquidity	QR*						
Total firms	49.67	43.98	45.19	47.12	46.83	48.13	50.18
Non-bond-issuing firms	50.00	43.87	45.02	47.33	46.59	48.02	50.00
Bond-issuing firms	44.05	45.35	46.91	45.00	49.33	49.30	52.05
Solvency	Interest coverage ratio						
Total firms	37.81	27.68	28.44	27.90	30.98	33.75	31.07
Non-bond-issuing firms	38.54	28.07	28.55	27.97	30.98	33.99	31.28
Bond-issuing firms	27.03	23.46	27.27	27.27	30.99	30.88	28.99
	Debt-to-equity ratio**						
Total firms	29.20	35.34	37.25	36.67	38.83	42.93	41.70
Non-bond-issuing firms	28.56	34.24	35.18	35.25	37.63	41.44	40.66
Bond-issuing firms	39.53	47.19	58.02	51.32	51.39	59.38	52.17
	Short-term-debt-to-total-debt ratio***						
Total firms	57.71	51.72	44.73	44.08	48.88	48.48	46.38
Non-bond-issuing firms	59.38	53.97	47.29	46.30	51.07	50.38	48.30
Bond-issuing firms	28.74	23.08	15.48	19.05	16.88	21.62	20.00
Profitability	Return on equity (ROE)****						
Total firms	47.67			61.56			
Non-bond-issuing firms	47.71			61.47			
Bond-issuing firms	47.14			62.50			
	Net profit margin						
Total firms	47.67			59.77			
Non-bond-issuing firms	47.27			59.75			
Bond-issuing firms	53.16			60.00			

Note: *Percentage of total firms whose QR and interest coverage ratio are below one; **Percentage of firms whose debt-to-equity ratios are above 0.8; ***Percentage of firms that have a ratio of short-term to total debt above 0.5; ****Percentage of firms that have experienced a decline in ROE and the net profit margin between 2009–10 and 2011–16. The percentages were obtained on the basis of firms that have the required data.
Source: Authors' own estimates on the basis of Bloomberg (2017).

The distinction between bond-issuing and non-bond-issuing firms shows that the latter have much higher debt-to-equity ratios. For the period 2009–16, the median debt-to-equity ratio for non-bond-issuing firms was 55 percent whereas for bond-issuing firms it was 82 percent. The percentage of bond-issuing firms that are above the median values tends to be always higher than that of non-bond-issuing firms (on average 67 percent and 45 percent respectively, for the period 2010–16).

We applied the 80 percent debt-to-assets criterion used by Gebauer, Setzer, and Westphal (2017) to determine whether a firm can be classified in the overleveraged category, which roughly coincides with the median for bond-issuing firms and also with our threshold estimate described in section four (Nonfinancial Corporate Debt and Financial Fragility).

The results show that over the period 2009–16, the percentage of non-bond-issuing firms whose debt-to-equity ratios are above 80 percent and that as a consequence are overleveraged increased from 28.6 percent to 40.7 percent. A similar trend is found for bond-issuing firms (39.5 percent in 2009 and 52 percent in 2016) and the percentage of bond-issuing firms whose debt-to-equity ratios are higher than 80 percent is higher than that of the non-bond-issuing firms for all years.

Interest Coverage Ratio

Another indicator considered is the interest coverage ratio (i.e., earnings before interest and tax divided by interest), which is an indicator of the facility with which a company can pay interest on its outstanding debt, and the extent to which a firm relies on short-term debt to pay its obligations.[7] As with the debt-to-equity ratio there is no absolute threshold for the interest coverage ratio. Similarly, we think a useful benchmark is to determine whether the ratio is above or below one. Values below one may be an indication of a weaker financial position.

The data shows (table 5) that, on average, the interest coverage ratio is above two for the period under consideration for both the non-bond-issuing and bond-issuing firms (2.2 and 2.1, respectively) (table 3). The percentage of bond-issuing firms that are below the median tends to

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[7] The interest coverage ratio can also be used as an indicator of liquidity risk.

be somewhat higher than in the case of non-bond-issuing firms (42 percent and 39 percent, respectively, on average for 2010–16).

The comparison with the interest coverage ratio threshold shows that, on average, roughly 30 percent of firms, both bond-issuing and non-bond-issuing, have an interest coverage ratio that is below one for the period under consideration and that this percentage has declined over time for non-bond-issuing firms (38.5 percent of the total for 2009 and 31.3 percent of the total for 2016). In the case of bond-issuing firms the percentage of firms whose coverage ratio is below one increased slightly from 27 percent to 29 percent of the total during the same period.

Profitability

Turning to profitability, the results show that bond-issuing firms have, on average, a higher return on equity (ROE) and net profit margin (8.22 percent and 7.87 percent, respectively) than non-bond-issuing firms (4.85 percent and 4.65 percent, respectively).

The evidence also shows a fall in profitability for both non-bond-issuing and bond-issuing firms. In the period 2009–10, 47.1 percent of bond-issuing firms experienced a decline in their ROE. In the period 2011–16, 62.5 percent of bond-issuing firms registered a fall in their ROE. Non-bond-issuing firms show a similar behavior.

At a more detailed level the sectors that exhibit the highest percentage of firms simultaneously showing a QR below one, a debt-to-equity ratio above 80 percent, and a decline in ROE include, among others, retailers, automobiles, energy, construction, food and beverages, and industry (see table 8). These sectors account for roughly 50 percent of expenditures on fixed assets and long-term investment.

Table 8: Sectors Ranked According to Different Financial Ratio Criteria, 2011–16 (Averages)

	Sector	QR (percent)	Debt-to-equity(percent)	Profitability (percent)
1	Food and Drug Retailers	73.9	35.3	66.7
2	Other	66.7	66.7	53.3
3	Leisure Goods	66.7	0.0	0.0
4	Automobiles and Parts	62.5	61.9	66.7
5	Mobile Telecommunications	62.5	16.7	92.9
6	Oil and Gas Producers	55.0	40.0	64.0
7	Oil Equipment, Services, and Distribution	54.5	58.3	0.0
8	Household Goods and Home Construction	54.1	35.7	73.3
9	Food Producers	53.7	38.6	81.8
10	Gas, Water, and Multiutilities	53.6	42.3	50.0
11	Travel and Leisure	52.6	36.1	54.1
12	Beverages	52.6	12.5	40.0
13	Personal Goods	52.3	29.0	100.0
14	Alternative Energy	50.0	100.0	42.5
15	Aerospace and Defense	50.0	50.0	70.0
16	General Industrials	50.0	40.0	100.0
17	Industrial Engineering	46.7	50.0	61.4
18	Construction and Materials	45.3	35.7	75.0
19	Chemicals	45.2	41.7	85.7
20	Mining	45.0	7.1	50.0
21	Support Services	44.4	18.2	70.0
22	Fixed Line Telecommunications	42.9	43.8	66.7
23	Industrial Transportation	42.2	51.0	56.3
24	Electricity	40.3	48.4	66.7
25	Industrial Metals and Mining	40.0	22.2	61.5
26	Media	40.0	20.0	38.5
27	General Retailers	39.1	37.8	66.7
28	Healthcare Equipment and Services	35.0	33.3	66.7
29	Forestry and Paper	31.3	35.7	83.3
30	Technology Hardware and Equipment	25.0	42.9	62.3
31	Tobacco	25.0	0.0	100.0
32	Electronic and Electrical Equipment	20.0	40.0	63.6
33	Pharmaceuticals and Biotechnology	20.0	20.0	31.6
34	Software and Computer Services	0.0	0.0	75.0

Source: Authors' own calculations on the basis of Bloomberg (2017).

IV. NONFINANCIAL CORPORATE DEBT AND FINANCIAL FRAGILITY

The results based on financial ratios were complemented with a Minskyan analysis of financial fragility. According to Minsky, the scale of financial robustness or fragility depends on the mixture of hedge, speculative, and Ponzi finance. As the proportion of hedge financing decreases and that of speculative and Ponzi finance increase, the financial structure becomes more fragile (Minsky 1986, 44). Financial fragility can characterize any economic sector or agent, including the household, financial, and nonfinancial corporate sectors (Minsky 1986, 221).

Table 9: Methodologies and Criteria for Computing Hedge, Speculative, and Ponzi Financial Regimes According to Different Authors, (2010–17)

Author(Year)	Objective	Database and Time Domain	Definition and Threshold for Hedge, Speculative, and Ponzi Financing Regimes	Measurement
Tymoigne (2010)	Test the existence of Ponzi financing regimes for US residential households	1987Q1–2009Q1 Uses data from the Federal Reserve Board (flow-of-funds), Freddie Mac, and the Federal Housing Financing Agency.	Uses three indices 1. $I = 1 \text{ if } g_p > 0, g_D > 0, \text{ and } g_{CC} > 0; I = 0 \text{ otherwise}$ 2. $I = 1 \text{ if } g_p > 0, g_D > 0, g_{CC} > 0, \text{ and } g_{M/D}; I = 0 \text{ otherwise}$ 3. A third index includes the effect of refinancing operations.	$g_p = growth\ of\ home\ prices$ $g_D =$ the growth of mortgage debt $g_{CC} =$ growth of the mortgage-financial-obligation ratio $g_{M/D} =$ growth of the ratio of monetary assets to mortgage debts
Mulligan (2013)		Publicly traded firms on North American exchanges (8,707), for 2002–09	Uses the interest coverage ratio (IC) $$IC \geq 4.0 \Rightarrow Hedge$$ $$0 \leq IC \leq 4 \Rightarrow Speculative$$ $$0 < IC \Rightarrow Ponzi$$	$$IC = \frac{(Net\ Income + Interest\ Expenses)}{Interest\ expense}$$
Nishi (2016)	Detect financial fragility and its determinants in the nonfinancial corporate sector in Japan	Financial statements, statistics of corporations by industry for all industries with the exception of finance and insurance. The data are divided into manufacturing and nonmanufacturing sectors. Each has 16 subsectors for 1975–2014.	Cash flow and balance sheet accounting to measure financial fragility Cash flow $$r - g - i_D - d \geq 0 \Rightarrow Hedge$$ $$\left\{\begin{matrix} r - g - i_D - d < 0 \\ r - i_D - d \geq 0 \end{matrix}\right\} \Rightarrow Speculative$$ $$\left\{\begin{matrix} r - g - i_D - d < 0 \\ r - i_D - d < 0 \end{matrix}\right\} \Rightarrow Ponzi$$ $$r = profit\ rate$$ $$g = capital\ accumulation\ rate$$ $$i_D = Debt\ service\ per\ capital$$ $$d = Dividends\ payments\ per\ capital$$ Balance sheet $$\mu > 1\ and\ \eta > 1 \Rightarrow Hedge$$ $$\mu \geq 1\ and\ 0 < \eta \leq 1 \Rightarrow Speculative$$ $$\mu < 1 \Rightarrow Ponzi$$ $$\mu = capital\ value\ margin$$ $$\eta = liquid\ asset\ kicker$$ $$\mu = \frac{K(Q - \lambda\sigma_Q^2)}{K(CC)}$$ $$\eta = \frac{K(CC) + Eq - P_K K}{K(CC)}$$ $$Q = Quasi - rents$$ $$\sigma_Q^2 = Variance\ of\ quasi - rents$$ $$CC = Contractual\ cash\ payments$$ $$P_k K = Capital\ assets$$ $$K(CC) = Debt$$ $$Eq = Equity$$	$r = Operating\ profits\ divided\ by\ capital\ stock$ $g = investment\ divided\ by\ capital\ stock$ $i_D = interest\ expense\ divided\ by\ capital\ stock$ $d = cash\ dividends\ divided\ by\ capital\ stock$ $Q = Operating\ profits$ $\sigma_Q^2 = Variance\ of\ operating\ profits$ $CC = Interest\ expense\ plus\ cash\ dividends$ $P_k K = Fixed\ assets$ $K(CC) = Liabilities$ $Eq = Net\ assets$

Author(Year)	Objective	Database and Time Domain	Definition and Threshold for Hedge, Speculative, and Ponzi Financing Regimes	Measurement
Davis, Souza, and Hernandez (2017)	Analyze Minskyan dynamics in the US economy via an empirical application of Minsky's financing regime classifications to a panel of nonfinancial corporations	Firm-level panel of publicly traded US corporations drawn from Standard & Poor's Compustat Database for 1970–2014	$Sources\ of\ cash - interest\ payments - principal\ payments > 0$ $\Rightarrow Hedge$ $\begin{Bmatrix} Sources\ of\ cash - interest\ payments > 0 \\ Sources\ of\ cash - interest\ payments - principal\ payments < 0 \end{Bmatrix}$ $\Rightarrow Speculative$ $Sources\ of\ cash - interest\ payments < 0 \Rightarrow Ponzi$	Sources of cash includes sum of operating and nonoperating income, other funds from current activities, and funds from investment activities (includes net cash flows from the sale of property, plant and equipment, and the sale of other investments). Principal payments are defined as of the sum of short-term (current) liabilities (accounts payable, other current liabilities, and notes payable) and the portion of long-term debt due in that year
Torres Filho, Marins, and Miaguti (2017)	Assess financial fragility using Minskyan categories in electricity distribution companies in Brazil	Dataset on electricity distribution companies developed by the Study Group on the Electric Sector (GESEL) from Federal University of Rio de Janeiro based on regulatory information made publicly available by ANEEL The database includes more than 64 firms from 2007–15.	Uses a cash-flow approach $$y_{it} - e_{it} > 0 \Rightarrow Hedge$$ $\begin{Bmatrix} y_{it} - e_{it} < 0 \\ e_{it}^{interest} < y_{it} \end{Bmatrix} \Rightarrow Speculative$ $\begin{Bmatrix} y_{it} - e_{it} < 0 \\ e_{it}^{interest} > y_{it} \end{Bmatrix} \Rightarrow Ponzi$ $y_{it} = current\ financial\ inflows$ $e_{it} = current\ financial\ outflows$ $e_{it}^{interest} = interest\ payments$	$y_{it} = EBITDA_{it} + OE_{it}$ $e_{it} = DS_{it} + OE_{it}$ $e_{it}^{interest} = FO_{it}$ $DS_{it} = FO_{it} + STD_{it}$ $OE_{it} = operational\ expenditures$ $FO_{it} = financial\ obligations$ $STD_{it} = stock\ of\ short-term\ debt$ $DS_{it} = debt\ service$ $FFI_{it} = \dfrac{DS_{it}}{EBITDA_{it}} = \dfrac{FO_{it} + STD_{it}}{EBITDA_{it}}$ $FFI_{it} = financial\ fragility\ index$ $FFI \leq 1 \Rightarrow Hedge$ $\begin{Bmatrix} FFI > 1 \\ FO < EBITDA \end{Bmatrix} \Rightarrow Speculative$ $\begin{Bmatrix} FFI > 1 \\ FO < EBITDA \\ STD > EBITDA \end{Bmatrix} \Rightarrow Ponzi$

Source: Authors' own calculations on the basis of each of the authors' papers.

Hedge finance refers to a situation where the gross capital income of an economic unit (defined as gross profits before taxes minus interest paid on business debts) "exceeds by some margin the payment commitments due to debts in every relevant period over the horizon given by the debts now on the books and the borrowings that must be made if expected gross capital income is to be earned" (Minsky 1982, 38). Speculative finance refers to a situation where cash payment commitments on debts are greater for some periods than the expected gross capital income. Speculative units can face the payments of interest on debt but not the principal. Ponzi finance refers to "speculative units with the special characteristics that for some if not for all near term periods cash payment commitments to pay interest are not covered by the income portion of the expected excess of receipts over current labor and material costs" (Minsky 1982, 40). A Ponzi unit must "renegotiate its liabilities, restructure debt with longer maturities and lower costs, sell assets, or issue stocks in financial markets" (Torres Filho, Marins, and Miaguti 2017) to survive and transit from a Ponzi to a speculative financing regime.

There are a few studies that provide measurable criteria and a threshold for distinguishing between the hedge, speculative, and Ponzi categories. These include Mulligan (2013), Nishi (2016), Davis, Souza, and Hernandez (2017), and Torres Filho, Marins, and Miaguti (2017), as summarized in table 4 by highlighting the objective, data, time domain, definition, thresholds for financing regimes (hedge, speculative, and Ponzi), and measurement for each.[8]

We use the first and the last available of these studies (Mulligan [2013] and Torres Filho, Marins, and Miaguti [2017]) to classify our sample of non-bond-issuing and bond-issuing firms for the years 2010 and 2015 into hedge, speculative, and Ponzi categories according to the criteria and thresholds provided by the authors.

The criterion used by Mulligan (2013) is the interest coverage ratio (IC), defined as:

$$IC = \frac{(Net\ income\ + interest\ expense)}{Interest\ expense} \qquad (1)$$

---

[8] We also included Tymoigne (2010) in table 4 because he provides an index for Ponzi finance at the sector level. Other studies (i.e., Schroder 2009) focus on the economy in the aggregate.

Mulligan establishes the following thresholds:

$$
\begin{aligned}
IC \geq 4.0 &\quad \Rightarrow \quad Hedge \\
0 \leq IC \leq 4.0 &\quad \Rightarrow \quad Speculative \\
0 < IC &\quad \Rightarrow \quad Ponzi
\end{aligned}
\tag{2}
$$

Due to the lack of availability of the net income variable, we used instead earnings before interest and taxes (EBITDA), to which we added interest expenses when available. Our estimates may give an upward bias to the interest coverage criterion, therefore underestimating the percentage of firms that are classified as speculative or Ponzi.

The criterion proposed by Torres Filho, Marins, and Miaguti (2017) is the financial fragility index (FFI) and it is defined as:

$$
FFI_{it} = \frac{FO_{it} + STD_{it}}{EBITDA_{it}}
\tag{3}
$$

Where,

$FO_{it} = financial\ obligations$

$STD_{it} = stock\ of\ short - term\ debt$

$EBITDA_{it} = earnings\ before\ interest, taxes, depreciation, and\ amortization.$

On this basis the thresholds for hedge, speculative, and Ponzi financial positions are established as follows,

$$
\begin{aligned}
FFI \leq 1 &\quad \Rightarrow \quad Hedge \\
\left\{ \begin{matrix} FFI > 1 \\ FO < EBITDA \end{matrix} \right\} &\quad \Rightarrow \quad Speculative \\
\left\{ \begin{matrix} FFI > 1 \\ FO < EBITDA \\ STD > EBITDA \end{matrix} \right\} &\quad \Rightarrow \quad Ponzi
\end{aligned}
\tag{4}
$$

The overall results using both the interest coverage and the financial fragility index criteria show a prevalence of firms in the non-hedge category, while the financial fragility index criterion

alone shows a decline in the percentage of hedge firms. This makes the nonfinancial corporate sector of the countries under study vulnerable to changes in the existing conditions in financial markets.

More specifically the computations of the interest coverage criterion show that, in the case of non-bond-issuing firms, the percentage of hedge finance firms is smaller than that of speculative or Ponzi finance (18.7 percent and 17.3 percent for hedge; 44.7 percent and 44.4 percent for speculative; and 36.6 percent and 38.2 percent for Ponzi for 2010 and 2015, respectively). By comparison, bond-issuing firms show a much higher percentage of Ponzi situations (73.6 percent and 69.4 percent of the total for 2010 and 2015, respectively) relative to non-bond-issuing firms (36.6 percent and 38.2 percent of the total for 2010 and 2015, respectively).

Table 10: Classification of Firms for Selected Latin American Economies in Hedge, Speculative, and Ponzi Categories for 2010 and 2015 According to the Interest Coverage and Financial Fragility Index Criteria (percentages of the total)

	Hedge	**Speculative**	**Ponzi**
IC criterion			
Non-bond-issuing firms			
2010	18.7	44.7	36.6
2015	17.3	44.4	38.2
Bond-issuing firms			
2010	14.8	11.6	73.6
2015	19.0	11.6	69.4
FFI criterion			
Non-bond-issuing firms			
2010	33.7	46.1	20.2
2015	33.1	45.9	21.0
Bond-issuing firms			
2010	51.9	15.9	32.3
2015	44.1	25.8	30.1

Note: IC = interest coverage ratio; FFI (financial fragility index) = the ratio of debt service to earnings before interest, taxes, depreciation, and amortization (EBITDA).
Source: Authors' own estimations on the basis of Mulligan (2012) and Torres Filho, Marins, and Miaguti (2017).

The computations for the financial fragility index criterion reveal that for 2010 and 2015, non-bond-issuing firms barely experienced changes in their financial position. Contrarily, bond-issuing firms witnessed a decline in firms characterized by a hedge regime (51.9 percent and 44.1 percent of the total, respectively, for 2010 and 2015) and a large increase in the percentage of speculative-type firms (15.9 percent and 25.8 percent of the total, respectively, for 2010 and 2015).

V. THE FINANCIAL SITUATION OF THE NONFINANCIAL CORPORATE SECTOR AND ITS MACROECONOMIC IMPLICATIONS

The deterioration in the financial situation of the nonfinancial corporate sector and, in particular, of the segment consisting of bond-issuing firms can have significant macroeconomic implications via overleveraging and also through changes in external financial conditions, as these firms represent a large percentage of total assets for the whole spectrum of firms, whether considered at the country level or by sector of economic activity. These firms are among those that have the highest capitalization ratios for all countries considered. Moreover, these firms also account for an important share of fixed tangible assets and long-term investment and this has increased in the period 2010–16.

Overleveraging can result in a negative relationship between debt and investment. The factors that can account for this negative relationship include: higher interest payments, which subtract resources from being used for investment; a higher risk profile, which increases the difficulty of obtaining funding; and the desire to repair weak balance sheets and to build a buffer against illiquidity or possible default.

Firms finance their capital expenditure and investment from internal (retained earnings) and external funds. To the extent that firms use external sources of funding, debt and leverage should expand with higher levels of capital expenditure and funding. If firms do not face constraints on their external financing there should not be a relationship between their cash flow, liquid

holdings (determined in part by retained earnings), and investment.[9] However, when firms pass a certain debt threshold they may feel more financially constrained and as a result may increase their retained earnings and cash holdings to protect themselves against illiquidity and ultimately insolvency. As a result, beyond a certain leverage threshold the relation between cash flow and investment should be negative.

Changes in external interest rates can also affect investment plans. When international interest rates rise, thus increasing the differential with domestic rates, the local monetary authorities will feel tempted, and in fact may be forced, to increase the cost of borrowing for firms that obtain mainly local funding.

The firms that borrow in the international capital markets (i.e., bond-issuing firms) may also see their external funding options curtailed. Due to the inverse relationship between interest rates and the present value of a bond, an increase in interest rates translates into a fall in the price of a bond. Thus, any expectation of an increase in interest rates will lead to a reduction in the holdings of bonds to avoid a capital loss. This can translate into a reduction of lending via the bond market. Both transmission mechanisms may be at work to contract firms' expenditures on long-term fixed assets and capital investment.

Recent evidence provided by Avdjiev et al. (2017) shows that bond flows are much more sensitive to changes in external interest rates than bank loans. According to their estimations for the period 2009–15, a 25-basis-point increase in the federal funds rate translates into 57-basis-point drop in the growth rate of cross-border loans to the nonbank sector and 125-basis-point drop in the rate of growth of bond issues in the international market. This indicates that to the extent that firms that seek finance in international capital markets represent a large share of assets and expenditure in fixed assets and capital equipment, a change in the composition of financial flows toward debt may have rendered the economies of Latin America more vulnerable to changes in international lending conditions.

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[9] See Fazzari et al. (1988).

The importance of these effects can also depend on the composition of the financial account of the balance of payments. In the case of Latin America, the greater reliance on the international capital market (and more precisely the bond market) as a source of funding after 2009 is reflected in the change in the composition of the portfolio flows of the balance of payments of Latin American countries. Data available between 2001Q1 and 2015Q4 for Argentina, Brazil, Chile, Colombia, Peru, and Mexico show two important trends.

From 2001Q1 to 2008Q4 (the year prior to that during which the effects of the GFC were felt in Latin America), the volume of loans exceeded bond flows by a two-to-one margin. In the case of the nonfinancial corporate sector the differences between bank loans and bond flows were even greater. In the period running from 2001Q1 to 2007Q4, the volume of bank loans represented five times the value of bond flows. Between 2008Q1–2008Q4 the volume of bank loans represented eight times the value of bond flows. After the fallout from the GFC, which was reflected in a sharp drop in both bond flows and bank loans, the former expanded more rapidly than the latter. At the end of 2009, the value of bank loans was more than double that of bonds (US$12 billion and US$5 billion dollars). Between 2010Q1 and 2015Q4, bond flows expanded from US$0.5 billion to US$111.9 billion, reaching a maximum of US$152 billion in 2015Q3. For the same period, bank loans grew from US$0.27 billion to US$59.7 billion, with a maximum of US$61 billion in 2014Q3. In the case of the nonfinancial corporate sector, bond flows increased from US$4.9 billion to US$31.6 billion, while bank loans expanded from US$19.2 billion to US$33.5 billion for the same period.

To capture the relationships between cash flow (for different levels of threshold), external interest rates, and investment we use a panel threshold regression model developed by Hansen (1999). The regression postulates a nonlinear relationship between cash flow (proxied by the variable cash flow and cash equivalents)[10] and investment, and a linear relationship between external interest rates and investment. The leverage threshold level is determined through a

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[10]Cash and near-cash items (cash and cash equivalents) includes cash in vaults and deposits in banks, as well as short-term investments with maturities of less than 90 days; they can include marketable securities and short-term investments with maturities of more than 90 days if not disclosed separately.

bootstrap method that computes the n-quintiles levels of thresholds to obtain the level that minimizes the quadratic error of the regression.[11]

The equation also includes as explanatory variables the external interest rate and ratios that capture the composition of assets and liabilities (the ratio of current assets to total assets, and the ratio of current liabilities to total liabilities). As mentioned above, the ratio of current to total liabilities is a proxy for the structure of debt (i.e., short- to long-term debt).

Our estimated equation is,

$$I_{it} = C + B_1 CF_{it-1} I_{(D_{it-1}<\gamma)} + B_2 CF_{it-1} I_{(\gamma<D_{it-1})} + \varphi z_{it-1} + e_{it} \qquad (5)$$

Where,

C = constant;

I_{it} = investment (total investment in assets) for firm i and time t;

CF_{it-1} = cash flow and cash equivalents for firm i at time t-1;

D_{it-1} = total debt divided by total shareholders' equity (leverage);

γ = leverage threshold;

$CF_{it-1} I_{(D_{it-1}<\gamma)}$ = cash flow and cash equivalents for firm i at time t-1 below the leverage threshold;

$CF_{it-1} I_{(\gamma<D_{it-1})}$ = cash flow and cash equivalents for firm i at time t-1 above the leverage threshold;

r_{t-1}^{ext} = international real interest rates at time t-1;

$CATA_{t-1}$ = current assets to total assets at time t-1; and

$CLTL_{t-1}$ = current liabilities to total liabilities at time t-1.

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[11] The regression to obtain the threshold can be divided in two parts:

$$y_{it} = \begin{cases} \mu_i + \beta'_1 x_{it} + e_{it} & q_{it} \leq \gamma \\ \mu_i + \beta'_2 x_{it} + e_{it} & q_{it} > \gamma \end{cases}$$

The model allows us to measure both coefficients β'_1 and β'_2, that is to say the impact of x_{it} for values under the threshold and above the threshold, respectively.

The regression was estimated using data from a balanced panel consisting of 1,925 records of 275 firms in the nonfinancial corporate sector of Argentina, Peru, Brazil, Chile, Colombia, and Mexico for the years 2013–16, which mark a definite decline in investment in the countries under study, as well as for the median expenditure on fixed assets and long-term investment. Investment, cash, and cash equivalents are expressed in US$ million and the rest of the variables are expressed as percentages. All variables were expressed in real terms using the GDP deflator. The leverage threshold was estimated at 0.83 (83 percent) with a 99 percent degree of confidence interval (table 11). This is consistent with the threshold used in section three on the financial analysis of corporate indebtedness.

Table 11: Leverage Threshold Estimation Results

	Threshold	99 percent confidence interval
Threshold level	0.83	[0.82; 0.84]
Test for threshold	F1 p-value	483.1 0.00

The results (table 12) for our equation estimation indicate that when the leverage threshold is below 0.83, the relationship between investment, cash, and cash equivalents, although positive, is not statistically significant. In line with Fazzari et al. (1988) this can be interpreted as meaning that below this threshold firms do not face a financing constraint on external financing.

However, over the threshold leverage of 0.83 there is a statistically significant negative relationship between a firm's cash holdings and investment. That is, when firms are overleveraged they restrict their investment, while at the same time they increase their cash holdings to protect themselves against potential situations of illiquidity and insolvency. This result is particularly relevant for bond-issuing firms, as more than 50 percent of these firms have a leverage over 0.80 (see table 5 above) and it is these firms that account for a large share of total assets and investment.[12]

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[12] Using the same methodology, Hansen (1999) finds a positive and significant relationship between cash flow and investment at different threshold levels in the case of the United States for a sample of 565 firms for the period 1973–87. Hansen's results may be explained by the fact that his thresholds levels are much smaller than those of this paper. Hansen finds three leverage thresholds: 4.2 percent, 25.8 percent, and 32.6 percent.

Also, as expected, the evidence postulates a statically significant negative relationship between international real interest rates and investment. A 100-basis-point increase in the international real interest rate produces a decline in investment of US$40 million. To obtain a more precise notion of the impact of the interest rate on investment, we obtained the average annual level of investment per firm (US$185 million). On the basis of this information we can conclude that an increase in real interest rates by 100 basis points results in an average decline in investment by 21 percent.

Finally, the results also show that, as expected, an increase in the ratio of current to total liabilities has a negative effect on investment. An increase in current liabilities relative to total liabilities shortens the obligation payments horizon and firms will feel pressure to increase their liquidity rather than invest. At the same time, this makes firms' financial situation more vulnerable to changes in financial markets. According to our specific estimate, an increase in 1 percent of current total liabilities at time t results in a decline of US$70,000 in investment expenditures at time t+1.

Table 12: Investment Equation Estimation Results with Total Investment in Assets as the Dependent Variable, 2013–16

Independent variables	Coefficient	Robust standard errors
C	0.14***	0.02
$CF_{it-1}I_{(D_{it-1}<\gamma)}$	0.16	0.10
$CF_{it-1}I_{(\gamma<D_{it-1})}$	-0.15*	0.08
r_{t-1}^{ext}	-0.04***	0.01
$CATA_{t-1}$	0.10*	0.06
$CLTL_{t-1}$	-0.07**	0.02
Number of observations	1,950	
Adjusted R squared	0.38	

Note: The independent variable is expenditure on fixed capital assets and long-term investment. All variables are expressed in real terms.
*** p<0.01, ** p<0.05, * p<0.1

Contrarily, the ratio of current to total assets has a positive relationship with investment. When current assets increase relative to total assets, the liquidity position of firms increases and as a result these firms will be willing to increase their levels of investment. According to the estimate provided in table 12, a 1 percent rise in current assets to total assets (i.e., the variable "current

total assets" in table 12) at time t results in an increase in investment expenditures of US$100,000 at time t+1.

CONCLUSION

The international bond market has become an increasingly important source of finance for Latin American economies, in particular for the nonfinancial corporate sector. A financial analysis of a set of 5,469 firms for six Latin American countries (Argentina, Brazil, Chile, Colombia, Mexico, and Peru) shows that bond-issuing firms are in a weaker financial position in terms of liquidity, solvency, and profitability relative to non-bond-issuing firms. A further analysis using Minsky's well-known taxonomy finds that the majority of bond-issuing firms are characterized by either speculative or Ponzi financing regimes and that, according to one of the criteria employed, the percentage of hedge firms has declined for the period under study (2010–16), pointing to a process of increasing financial fragility.

The deterioration in the financial situation of the nonfinancial corporate sector, and in particular of the segment of firms issuing bonds, can have significant macroeconomic implications via overleveraging and also through changes in external financial conditions. The application of a nonlinear threshold model to a subset of the firms considered in this study shows a negative relation between cash flow and investment beyond a leverage threshold of 0.83 and also a negative relationship between international real interest rates and investment.

The financial aspect of investment has not been duly analyzed in the case of Latin America. Our results may explain in part why the countries included in this sample have witnessed declines in the rate of growth of investment since 2012–13, which is part of the reason why they have also registered low growth. The analysis provided in the paper also shows the need to include the international bond market in the transmission mechanisms that analyze the monetary and financial impulses from developed economies to Latin American economies.

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