Nonfinancial Firms in Latin America: A Source of Vulnerability?

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A weak corporate sector can magnify the adverse impact of macrofinancial shocks. Thus, to assess the resilience of Latin America vis-à-vis global uncertainties, it is important to gauge the financial strength of the region's corporate sector. Our analysis identifies the buildup of vulnerabilities in the corporate financial position of some Latin American countries, led by increased leverage and lower buffers post-Lehman. It also provides evidence that greater exchange rate flexibility can help mitigate corporate vulnerability to a "sudden stop" in financing to firms.
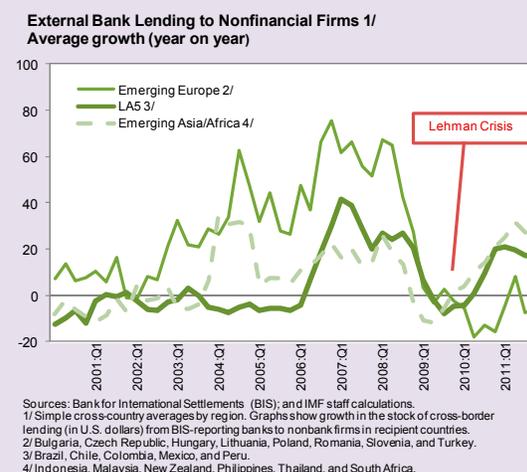
Macroeconomic Shocks and the Nonfinancial Corporate Sector

Robust demand growth and easy external and domestic financing conditions for the corporate sector have been a feature of emerging market economies (EMEs) in Latin America and Asia for much of the past decade—with a brief interruption following the Lehman crisis (Figure 1). In the most financially integrated countries in Latin America (Brazil, Chile, Colombia, Mexico and Peru, hereafter the "LA5"), favorable conditions have gone alongside strong corporate profitability and valuation, contained leverage ratios, and improved maturity exposures vis-à-vis other EMEs (Figure 2).

But how deeply seated is this corporate performance? Would firms in the LA5 countries be able to withstand a change in macroeconomic conditions? Delving deeply into these questions is critical for two reasons. First, *boom* episodes may induce vulnerabilities—for instance, when firms' assets become overvalued, they can borrow based on inflated collateral; further, abundant capital inflows can raise foreign currency exposures in un-hedged firms.[1] A cursory glance at corporate

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[*]Based on González-Miranda (2012).

indicators can fail to detect the buildup of risks, since these may become distorted by asset overvaluation, high leverage, or currency appreciation.[2] Second, a vulnerable corporate sector—that is, one composed of overleveraged firms with large short-term maturity exposures and low buffers—can transmit and/or magnify real or financial shocks, weakening a country's macroeconomic resilience.

Figure 1. External Financing to Firms, 2000–11

External Bank Lending to Nonfinancial Firms 1/
Average growth (year on year)

Sources: Bank for International Settlements (BIS); and IMF staff calculations.
1/ Simple cross-country averages by region. Graphs show growth in the stock of cross-border lending (in U.S. dollars) from BIS-reporting banks to nonbank firms in recipient countries.
2/ Bulgaria, Czech Republic, Hungary, Lithuania, Poland, Romania, Slovenia, and Turkey.
3/ Brazil, Chile, Colombia, Mexico, and Peru.
4/ Indonesia, Malaysia, New Zealand, Philippines, Thailand, and South Africa.

This note examines a broad range of corporate indicators in the LA5 countries—seeking to establish stylized facts regarding the region's corporate health. To do so, it proposes a simple framework to assess corporate vulnerability to a sudden stop of financing external to firms (from both domestic and foreign sources), taking into
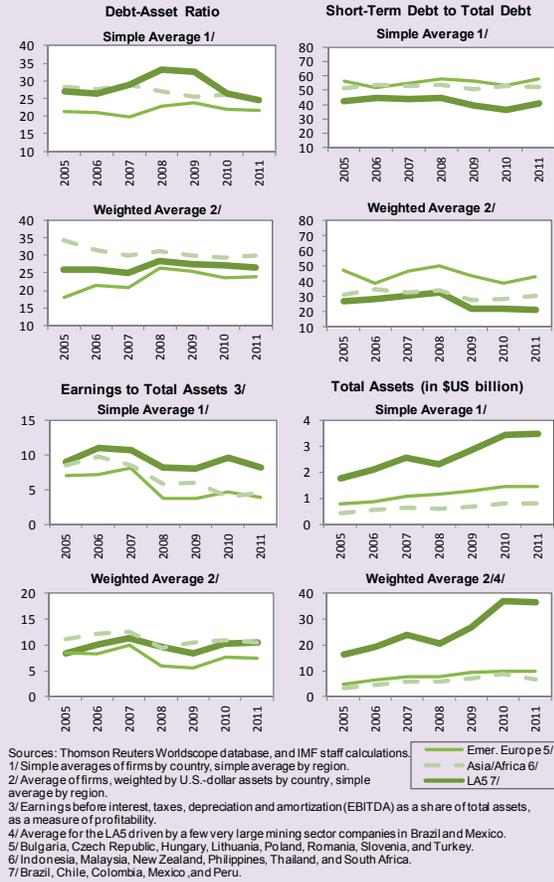
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[1] See Bernanke and Gertler (1995) and Caballero and Krishnamurthy (2000).
[2] The debt-asset ratio may not signal an excessive buildup during booms as asset values trend up; an increase in foreign liabilities may not be reflected as a rise in leverage when the currency appreciates.

**Figure 2. Key Financial Indicators for Firms
(In Percent)**

Sources: Thomson Reuters Worldscope database, and IMF staff calculations.
1/ Simple averages of firms by country, simple average by region.
2/ Average of firms, weighted by U.S.-dollar assets by country, simple average by region.
3/ Earnings before interest, taxes, depreciation and amortization (EBITDA) as a share of total assets, as a measure of profitability.
4/ Average for the LA5 driven by a few very large mining sector companies in Brazil and Mexico.
5/ Bulgaria, Czech Republic, Hungary, Lithuania, Poland, Romania, Slovenia, and Turkey.
6/ Indonesia, Malaysia, New Zealand, Philippines, Thailand, and South Africa.
7/ Brazil, Chile, Colombia, Mexico, and Peru.

account individual firm characteristics, as well as domestic and global macroeconomic conditions.

Some Stylized Facts

We base our analysis on publicly traded firm-level data from the Thomson Reuters Worldscope database (see Appendix). The data have caveats, including that they cover only a fraction of each country's corporate sector. This said, the database is useful for gauging vulnerabilities not only because alternatives are scant, but because publicly traded firms are relatively large—and, hence, of macroeconomic relevance. For LA5 countries, the size of the aggregate assets of firms in the sample ranges from 20 percent of GDP in Peru to over 120 percent of GDP in Chile, on average, during the period 2000–11 (Table 1).

Table 1. LA5 Countries: Sample Characteristics, 2011

	Number of Firms	Assets to GDP 1/	Debt to GDP 1/	Largest Sector in Sample 2/
Brazil	220	57.6	17.2	Mining
Chile	121	126.0	35.2	Transp./Commun./Utilities
Colombia	31	36.6	6.7	Mining
Mexico	77	36.3	10.8	Transp./Commun./Utilities
Peru	66	20.5	5.5	Manufacturing

Source: Thomson Reuters Worldscope; and IMF *World Economic Outlook*.
Note: LA5: Brazil, Chile, Colombia, Mexico, and Peru.
1/ Cumulative values held by group, as a share of GDP.
2/ Defined by the largest aggregate assets to GDP by sector per country.

A View by Sector of Economic Activity

We first review the health of the corporate sector in the region from a sector-wide perspective. To do this, we examine the relative changes in key indicators before and after the Lehman crisis of late October 2008. When possible, we compare against benchmarks from the literature or levels observed in past macroeconomic crises in which a weak corporate sector played an important role.[3]

The sector-wide view of corporate financial health indicators reveals a mixed picture (Figure 3):
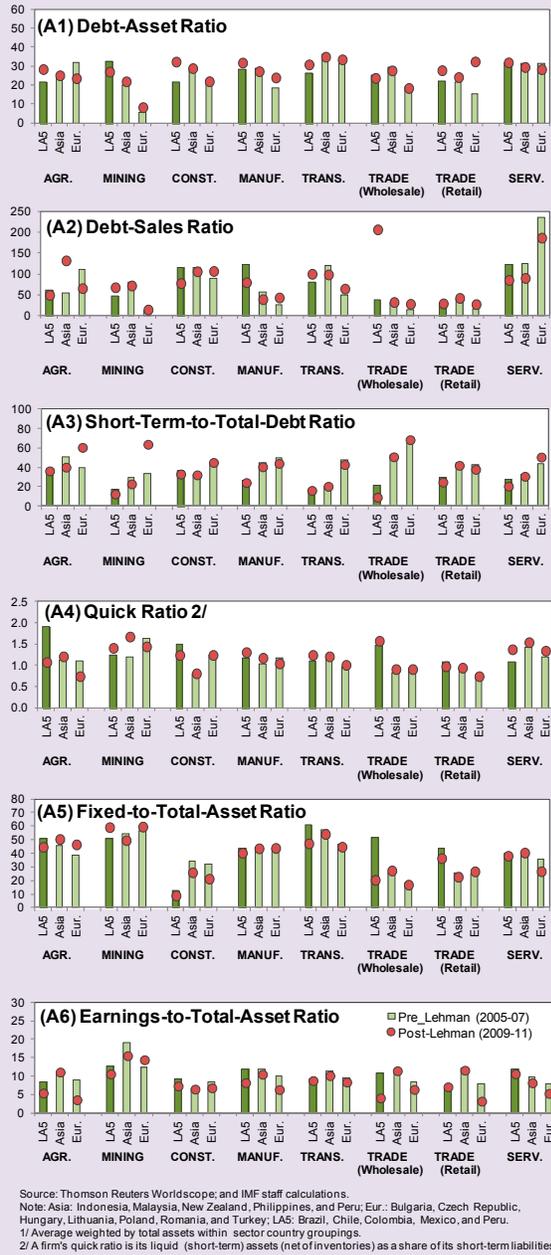
- *Debt-asset ratios are higher in some sectors following the Lehman crisis,* including in agriculture, construction, manufacturing, transport,[4] and retail trade. Overall, leverage in those sectors (as a weighted average at firm level) is higher in the LA5 countries than in other geographical groupings. Debt-sales (weighted) averages show a "spike" for wholesale trade post-Lehman—largely due to the impact of a few large firms in which sales plummeted.[5]

- *Short-term maturity exposures are low.* Maturity exposures have been generally low throughout the period 2000–11, and improved further since the Lehman crisis.

- *Other indicators suggest some weakening in corporate performance in Latin America since the Lehman crisis.* Profitability has moderated across all sectors, and

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[3] The literature generally shies away from providing benchmarks for these indicators, since corporate structures vary across countries, sectors, and firm sizes.

[4] We use the term "transport" henceforth to define a sector comprising firms in transport, communications and/or utilities.

[5] These firms are mostly present in Brazil and Chile.

Figure 3. Corporate Performance by Sector 1/

Source: Thomson Reuters Worldscope; and IMF staff calculations.
Note: Asia: Indonesia, Malaysia, New Zealand, Philippines, and Peru; Eur.: Bulgaria, Czech Republic, Hungary, Lithuania, Poland, Romania, and Turkey; LA5: Brazil, Chile, Colombia, Mexico, and Peru.
1/ Average weighted by total assets within sector country groupings.
2/ A firm's quick ratio is its liquid (short-term) assets (net of inventories) as a share of its short-term liabilities.

collateral buffers have generally narrowed, while liquidity has fallen slightly relative to pre-Lehman levels, dropping significantly in wholesale trade and—more moderately—in agriculture.[6]
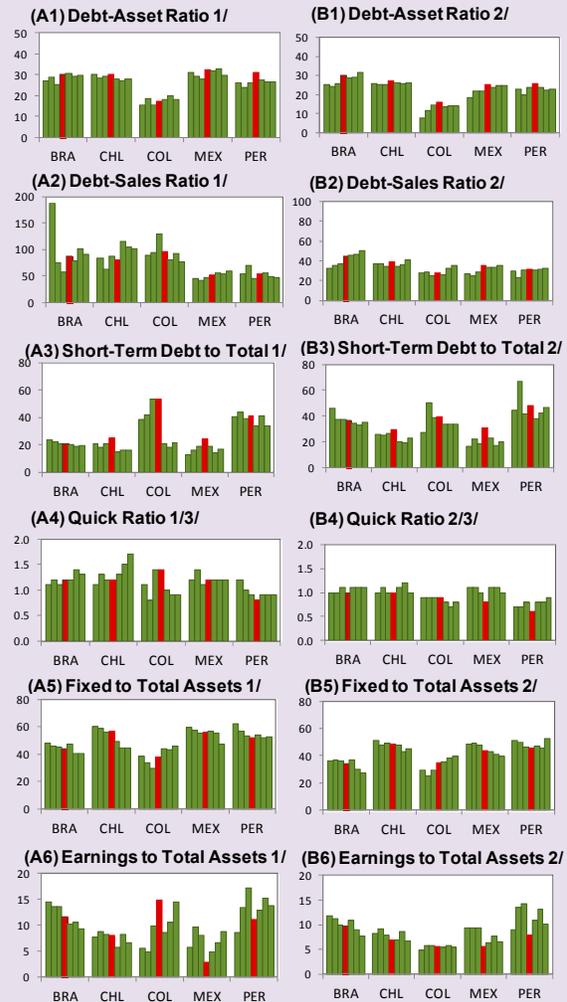
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[6] Trends broadly carry through for indicators at median level.

A View by Individual Country

An analysis of corporate indicators by country also reveals some vulnerabilities (Figure 4):

- *Leverage is higher in some countries following the Lehman crisis.* This is the case in Brazil, where weighted average debt exceeds pre-Lehman levels at about 30 percent of assets, and weighted average debt-sales nears 100 percent (panels A1–A2). Moreover, debt-sales ratios in Brazil have increased also for the median firm, although they remain at more manageable levels (panel B2).

Figure 4. Corporate Performance by Country, 2005-11

Sources: Thomson Reuters Worldscope; and IMF staff calculations.
Note: BRA: Brazil; CHL: Chile; COL: Colombia; MEX: Mexico; PER: Peru.
1/ Weighted average by total assets by firms within country; 2008 (Lehman) marked in red.
2/ Median of firms by country; 2008 (Lehman) marked in red.
3/ Ratio of short-term assets (net of inventories) to short-term liabilities.

Leverage has risen in Colombia and Mexico as well, but to lower levels, especially relative to sales. As a benchmark, firms in South Korea had (weighted) average debt-asset ratios of around 50 percent and debt-sales ratios of 100 percent in the 1997–98 crisis.[7]

- *Short-term debt exposures declined in all LA5 countries following the Lehman crisis.* However, these exposures rebounded somewhat for the median firm in 2011—markedly in Peru, and more moderately in Brazil, Chile, and Mexico. In contrast, they have continued to decline in Colombia.

- *Profitability performance has been mixed.* Earnings to total assets have fallen in Brazil and Chile, but have grown strongly in Colombia, Mexico, and Peru, especially for the largest firms (Panels A6–B6).

- *Buffer trends have been mixed.* Liquidity—measured by the *quick ratio*—improved in most countries after Lehman for both the largest and median firms, except in Colombia (panels A4–B4). Collateral (with the fixed-to-total-asset ratio as a proxy) fell in most countries, both for the weighted average and the median firm (panels A5–B5).[8]

Assessing Corporate Exposures to Sudden Stops

While indicators point at rising leverage and reduced buffers in some LA5 countries, they cannot—by themselves—answer whether those trends are strong enough to make the corporate sector vulnerable to a sudden stop of financing external to the firm (be it from foreign or domestic sources). To address this question, we use a simple panel probit model, estimated on data for 3,100 nonfinancial

firms in 18 EMEs and small advanced economies (including the LA5 countries), for 2000–11. The model seeks to identify firms that are more likely to be vulnerable to interruptions in financing availability; its dependent variable is a dummy equal to one whenever a firm's cash flow falls below its short-term debt obligations (the sum of short-term debt plus long-term debt falling due within a year)—an event that would require the firm to roll over its debt, exposing it to a worsening in financing conditions.[9]

The regressors of the equation belong to one of six categories (Appendix): (i) *individual firm characteristics*, such as size, leverage burden, maturity exposure, collateral, and liquidity buffers; (ii) *domestic and external demand*; (iii) *financing*; (iv) *global conditions*; (v) *corporate currency exposures*; and (vi) *fiscal and exchange rate policies.*

We estimate a "base model" (Table 2, Panels 1A–2A) based on two measures of leverage: the debt-asset ratio and the debt-sales ratio. The results suggest that:

- *Leverage and maturity exposures raise a firm's probability of becoming vulnerable to a sudden stop,* whereas larger buffers reduce this probability.[10] Also, in line with the literature, there is evidence that larger firms tend to be more resilient to financing shocks.

- *Buoyant demand conditions lessen a firm's exposure to a sudden stop, whereas adverse global shocks increase it.* Greater domestic demand growth significantly reduces vulnerability; terms-of-trade growth (external demand) has the expected negative sign but is not statistically significant—suggesting, perhaps, that the average firm in the sample is *not* a net exporter. Adverse global shocks—rising

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[7] Coricelli and others (2010) and Medina (2012) derive thresholds for the debt-asset ratios above which growth/recovery from a crisis becomes more difficult; these range from 40 to 48 percent.

[8] A firm's *quick ratio* is the ratio of its liquid (short-term) assets (net of inventories) to its short-term liabilities.

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[9] This measure has been used in corporate liquidity stress tests (Hviding and Papi, 2002), identifying the risk that a firm may not cover its debt falling due if financing stops. The measure is stricter than the commonly used index of ability to pay, known as the *coverage ratio* (earnings before taxes and depreciation and amortization of assets as a share of interest expense due), which assumes principal can be rolled over (Rajan and Zingales, 1995).

[10] Results are in line with those by Medina (2012) and Coricelli and others (2010).

Table 2. Main Results: Probit Model Estimation

Explanatory Variable	Leverage Burden Definition			
	(1) Debt-Asset Ratio		(2) Debt-Sales Ratio	
	(A) Variable	(B) Percentile	(A) Variable	(B) Percentile
Firm-Specific				
Size (lag)	-0.10 ***	-0.03 ***	-0.07 ***	-0.03 ***
Leverage Ratio (lag)	0.02 ***	0.11 ***	0.00	0.12 ***
Short-Term Debt to Total (lag)	0.01 ***	0.03 ***	0.00 ***	0.04 ***
Quick Ratio (lag)	-0.01 ***	-0.05 ***	-0.03 ***	-0.05 ***
Fixed-to-Total Assets (lag)	0.00	-0.03 ***	0.00 *	-0.03 ***
Dom. and Ext. Demand				
Dom. Demand Growth (real, lag, %)	-0.01 *	0.00	-0.01 *	0.00
Terms-of-Trade Growth (%)	0.00	-0.01 **	0.00	-0.01 **
Financing Availability				
Priv. Sect. Cred. (%GDP, lag, chg.)	0.00	-0.01 **	-0.01 **	-0.01 **
Ext. Finan. Growth (USD, lag, %)	0.00 **	0.00 **	0.00	0.00 **
Global Economy				
VIX	0.01 ***	0.01 **	0.01 **	0.01 *
World Oil Price Growth (%)	0.00	0.00 **	0.00	0.00
Currency Exposure				
Nom. Exch. Rate (% chg., +=deprec.)	0.00 **	0.00 **	0.00 **	0.00
Policies				
Countercyc. Fisc. Pol. Dummy	-0.04	-0.03	-0.03	0.00
Exch. Rate Flex (Dummy= 1-4)	-0.06 ***	-0.09 ***	-0.06 ***	-0.09 ***
Other Controls				
Random Effects	√	√	√	√
Sector Dummies	√	√	√	√
Lehman Crisis Dummy	√	√	√	√
Key Statistics				
Observations	18,678	18,678	18,576	18,576
Wald Chi-Squared	1,071 ***	1,852 ***	414 ***	1,868 ***

Source: IMF staff calculations
Note: Robust standard errors; ***p <0.01, **p <0.05, *p <0.1. VIX: Chicago Board Options Exchange Market Volatility Index.

global risk aversion (measured by the Chicago Board Options Exchange Market Volatility Index, or VIX) and higher oil prices—add to the probability of a firm's becoming vulnerable to a funding shock.

- *Greater availability of domestic bank financing tends to dampen the exposure to a sudden stop, whereas easy access to external financing may magnify it.* This result is in line with the crisis literature, which suggests that abundant foreign inflows can facilitate the buildup of foreign liability exposures,[11] especially when there are credit constraints in the domestic market.

- *The average firm in the sample seems not to be export-oriented and has net exposures in foreign currency.* Lacking firm-level data on foreign currency exposures, we include the nominal exchange rate depreciation in the model to capture its impact

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[11] See Caballero and Krishnamurthy (2000).

on firms' balance sheets and cash flows. The estimated coefficient is significant and positive, implying that firms are, on average, vulnerable to large exchange rate changes—due to the cost effect on their imported inputs, or the high net foreign currency liability exposures.

- *Exchange rate flexibility helps reduce corporate vulnerabilities.* We include two policy variables: a dummy that equals one when countercyclical fiscal policies are pursued, and an index of exchange rate regime flexibility.[12] Estimates show that *greater* exchange rate flexibility is a relevant *mitigating* factor of corporate vulnerability—consistent with the literature that argues that greater exchange rate flexibility induces firms to hedge to reduce their net currency exposures.[13] The fiscal policy dummy is not statistically significant.

A second specification of the model draws from the early warning indicators literature and replaces the value of each firm-level variable with its ordering in the country-specific distribution for such variable in 2000–11.[14] With this, a large firm from a small country is still treated as a large firm in the full panel, and specific countries' greater or lower "tolerance" to corporate leverage or maturity exposures is accounted for. Our results are robust to this specification (Table 2, Panels 1B/2B).[15]

We use the model results to construct a measure of the degree of corporate vulnerability in the LA5 countries. A "vulnerable" firm is defined as one for which the predicted probability of being exposed to a sudden stop is greater than or equal to 50 percent. The number of vulnerable firms (estimated in each specification of the model) as a share of the total
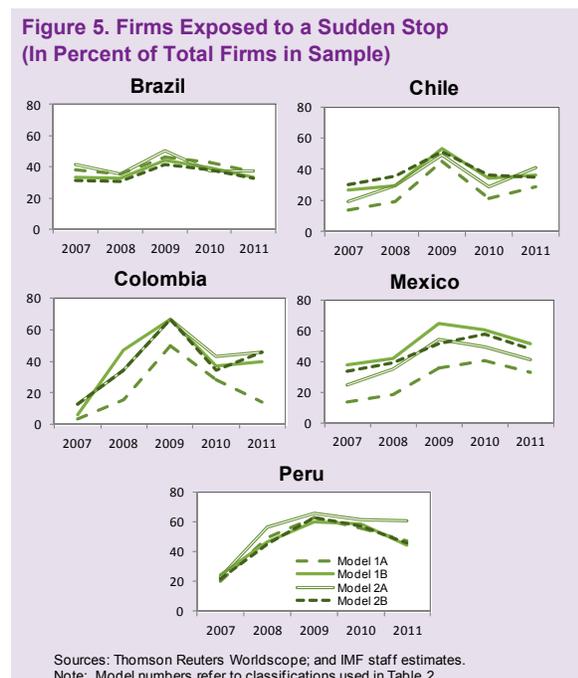
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[12] The index ranges from 1 to 4 depending on the IMF's classification of the country in the *Annual Report on Exchange Arrangements and Exchange Restrictions* (AREAER).
[13] See Kamil (2012).
[14] See Kaminsky, Lizondo and Reinhardt (1998), and Berg and Pattillo (1998).
[15] Results are robust under a Heckman selection model that controls for built-in survivorship bias (Gonzalez-Miranda, 2012).

number of firms in the country sample in every year is plotted in Figure 5.

Figure 5. Firms Exposed to a Sudden Stop
(In Percent of Total Firms in Sample)

Sources: Thomson Reuters Worldscope; and IMF staff estimates.
Note: Model numbers refer to classifications used in Table 2.

All countries registered an increase in the share of vulnerable firms in the year following the Lehman crisis (2009). The share of "vulnerable" firms has trended down since then; however, by end-2011, it remained higher than in 2007 in the case of Chile, Colombia, Mexico, and Peru. Brazil had a relatively low increase at the time of the Lehman crisis, although the share of vulnerable firms has been relatively high throughout the period under analysis.

In sum, the results suggest that the interplay of firm-level indicators and macroeconomic conditions has been such that, by end-2011, the number of firms in the LA5 countries that had a high probability of facing difficulties in securing financing in the case of a dry up in funding availability was higher than in 2007. Firms more likely to require market access are also relatively more vulnerable to a sharp reversal in financing conditions.

Policy Implications

An in-depth look at financial corporate indicators in LA5 countries suggests that leverage may be building up in Brazil, Colombia, and Mexico—albeit from manageable starting points and with improving maturity structures. A probit model also suggests that, although vulnerabilities have fallen since the peak of the 2008–09 crisis, they persist throughout the region and are possibly higher than in 2007. Results suggest the presence of foreign currency liability exposures and illustrate the risks that may be posed by abundant external financing. From a broader perspective, these results provide support to the advice of using macro-prudential policies to limit the effects of strong capital inflows. They also show that more flexible exchange rate regimes help reduce corporate vulnerabilities.

Appendix: Data

We use firm-level balance sheet and cash flow data for some 3,100 publicly traded companies, available from the Thomson Reuters Worldscope database. The sample selected includes firms from 18 countries from nonfinancial sectors, for the period 2000–11 (Table A1). A number of adjustments are made to the data:

- *Timing correction.* For firms ending their fiscal year on or after January 15, Thomson Reuters Worldscope assigns their data to the current calendar year. We reassign data for firms reporting on or before June 30 to the previous calendar year, to better align those data with the timing of macroeconomic data.

- *Treatment of outliers.* Outliers are defined as observations at eight or more standard deviations, based on the country-specific distribution.

- *Varying sample.* The firm sample varies by country and year; the analysis provides for a robustness check vis-à-vis built-in survivorship bias via a Heckman selection model (see Gonzalez-Miranda, 2012).

Macroeconomic data (Table A2) are derived from several databases, including the IMF's *World Economic Outlook* database, *International Financial Statistics* database, and *Annual Report on Exchange Rate Arrangements and Exchange Rate Restrictions* (AREAER).

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Additional databases used include Haver (for the VIX) and the Bank for International Settlements (BIS) locational statistics on cross-border inflows by country.

Table A1. Country Sample and Number of Firms

		2000	2005	2011
1	Brazil	164	223	238
2	Bulgaria	0	139	149
3	Chile	107	145	138
4	Colombia	12	31	34
5	Czech Republic	6	10	9
6	Hungary	13	17	20
7	Indonesia	185	229	295
8	Lithuania	0	12	20
9	Malaysia	427	757	830
10	Mexico	73	85	85
11	New Zealand	44	90	109
12	Peru	37	73	68
13	Philippines	82	102	116
14	Poland	42	244	318
15	Romania	0	80	84
16	Slovenia	1	12	22
17	South Africa	159	217	258
18	Thailand	238	381	414
19	Turkey	123	222	244

Source: Thomson Reuters Worldscope.

Table A2. Explanatory Variables and Sources

Individual Firm Characteristics	Source
Size (lag, natural log of total assets in U.S. dollars)	
Debt-asset ratio (lag)	
Debt-sales ratio (lag)	Thomson Reuters
Short-term debt ratio (lag)	Worldscope
Quick ratio (lag)	
Fixed-to-total-asset ratio (lag)	
Demand	
Real domestic demand growth (lag, %)	WEO
Real GDP growth (lag, %)	WEO
Terms-of-trade (%, change)	WEO
Real growth in advanced economies (lag, %)	WEO
Global Conditions	
World oil price (index, % change)	WEO
VIX (average)	Haver
Financing Availability	
Domestic credit (% of GDP, lag, change)	IFS
Cross-border loans (lag, U.S. dollars, % change)	Bank for International Settlements
FX Exposure	
Nominal exchange rate (% change, deprec.=+)	Worldscope
Policies and Institutional Variables	
Dummy, Exchange Rate Regime Flexibility (1–4, 4=max. flexibility)	AREAER data
Dummy, fiscal counter-cyclical policies	WEO

Note: AREAR: *Annual Report on Exchange Arrangements and Exchange Restrictions* ; IFS: *International Financial Statistics* ; WEO: *World Economic Outlook* database.

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