What Hinders Investment in the Aftermath of Financial Crises: Balance-Sheet Mismatches or Access to Finance? *

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Abstract

We utilize a new firm-level database from six Latin American countries between 1990 and 2005 to study the effect of financial crises on firms' performance. The depreciated currency provides new investment opportunities in the tradeable sector. Yet firms may not exploit these prospects given decreased supply of credit as a result of failing banks and fleeing foreign investors. Firms might also become credit constrained if their reliance on foreign currency denominated debt before the crisis (and the associated currency mismatch on their balance-sheets) reduces their net worth after the depreciation. In contrast to the previous studies, we are able to differentiate between these two main sources of financial constraints. We do so by relying on firm level information not only on the share of debt denominated in foreign currency, but also on the export orientation and the ownership structure of the firm. Using a differences-in-differences methodology, we show that firms who hold short-term foreign currency denominated debt do worse only if they are domestic firms. Foreign owned firms do better both in terms of sales and investment than the domestic firms in the post-crisis period even if they hold foreign currency debt. We conclude that limited access to finance plays a critical role in hindering investment during crises.

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1 Introduction

The emerging-market crises of the 1990s and early 2000s have put firm performance during a credit crunch at the center stage. According to conventional wisdom, large scale depreciations resulting from currency crises should have an expansionary effect on output due to increased competitiveness. The studies that use country-level data produce mixed results ranging from a contraction to an expansion (see Agenor and Montiel (1996), Gupta, Mishra, and Sahay (2000)). Calvo and Reinhart (2002) show that the contractionary effects are more likely to appear in the emerging market countries, since these countries suffer from capital market imperfections. As argued by Diamond and Rajan (2000), in such countries heavy reliance on short-term borrowing by firms not only increase the susceptibility to crisis but financial constraints are themselves the reasons behind the short-term borrowing.

The theoretical literature proposes two different mechanisms through which financial constraints during a financial crises can be aggravated. On the one hand, deteriorating access to liquidity can hinder investment. Liquidity decreases since domestic banks cannot provide credit, especially when the currency crisis is accompanied with a banking crisis. At the same time capital flows come to a halt and foreigners exit from the crisis economy, the so-called "sudden stop," leading to a decline in foreign credit. The liquidity constrained firms decrease investment and production either because they cannot re-finance their short-term debt via domestic or foreign sources and/or they cannot import intermediate inputs which are important for their production (e.g. Aghion, Bacchetta, and Banerjee (2001); Chang and Velasco (2001); Caballero and Krishnamurty (2001); Mendoza and Smith (2006)). On the other hand, foreign currency denominated debt can cause a currency mismatch on firms' balance-sheets. The key idea here is that depreciation inflates the domestic currency value of the foreign currency debt, which causes a weakening of firms balance-sheets and decreases net worth. This, in turn, prevents firms from expanding their production, since they cannot borrow or roll over their debt. As a result, even the non-constrained firms before the crisis may become credit constrained during depreciations, a mechanism that can lead to declines both in investment and in output (e.g. Bernanke and Gertler (1989); Krugman (1999); Cespedes, Chang, and Velasco (2000); Eichengreen and Hausman (1999)).

The empirical literature so far cannot account for these channels simultaneously and hence fails to differentiate among them. The main reason for this is the lack of data on the currency denomination of debt, the ability to generate foreign currency earnings, and good measures of "access to finance." Hence, the literature evolved in two separate tracks testing for the existence

of credit constraints either through searching for weak balance-sheets or investigating the effects of access to finance but not accounting for both simultaneously, which leads to an omitted variables problem.

We use a new panel data set that allow us to identify the effect of financial crises on firms performance accounting for both sources of financing constraints; balance-sheet mismatch and limited access to finance. Our unique hand-collected database has annual accounting information for over 1800 listed non-financial companies in six Latin American countries, spanning the period 1990 to 2005. We have data on the currency denomination of both debt and assets, and firm's export orientation, together with a continuous measure of foreign ownership over time. Our indicator of foreign ownership is based on precise dates of ownership changes, foreigner's share in the firm and the nationality of the parent and global ultimate parent. To the best of our knowledge, our study is the first to identify firms' ownership structure in Latin America based on transaction-level M&A data. In addition, our database encompasses information on the maturity of dollar debt and amount of exports, the variables that are argued to be important for the mismatch channel (Chang and Velasco (2001)).

The panel dimension of our data allows us to condition on banking crisis and exchange rate fluctuations through the use of country-year effects. Given the fact that some of our countries went through both type of crisis whereas some has experienced only exchange rate crisis it is important to control for these events during the sample period. As shown by Kaminsky and Reinhart (1999), currency crisis accompanied by banking crisis can be much more devastating than a single exchange rate crisis. Our identification strategy is differences-in-differences, where we can investigate the differential response of firms to the exchange rate crisis, an exogenous event, accounting for the unobserved firm-level heterogeneity. The differences-in-differences estimation strategy together with firm fixed effects, country-year and sector-year fixed effects should address most of the first-order potential endogeneity concerns.

The existing empirical studies also use a differences-in-differences methodology evolving in two separate tracks. The first group of papers search for financial constraints using measures of "access to finance" to identify the differential response of firms' to the crisis. Desai, Foley and Forbes (2008) investigates the response of sales, assets, and investment for the U.S. multinational affiliates and domestic firms in the aftermath of currency crises from 25 emerging market countries and find that the affiliates perform much better in all these outcomes compared to their local counterparts. Their interpretation is that local firms are constrained due to their limited access to finance. However, as they acknowledge, they are unable to document the exact mechanism by which currency

depreciations differentially intensify financing constraints since they lack data on the currency denomination of the debt. The paper by Blalock, Gertler, and Levine (2007) extend the above analysis by focusing solely on exporting plants and investigate the role of foreign ownership for this group of establishments in Indonesia. This strategy allows identification of the local firms who would benefit most from the currency devaluations.[1] They reinforce the conclusion of Desai, Foley and Forbes (2008) by showing that foreign owned exporters clearly increase investment relative to domestic exporters. Once more this result is consistent with existence of liquidity constraints but the source of the constraint is not clear. It is possible that exporters, foreign owned firms, and foreign exporters may have more dollar denominated debt but they might also have matching revenue or assets.

The second group of papers focus solely on weak balance sheets as the main source of the liquidity constraints again suffering from a similar omitted variables problem.[2] Aguiar (2005) shows that firms with heavy exposure to short-term foreign currency debt before the Mexico crisis decreased investment compared to the firms who were not exposed. He shows an increase in sales for both groups but a decrease in investment for the exposed group. Hence his results supports the idea that weak balance sheets can hinder investment. However in a very similar study using more countries during 1991–1999, instead of only Mexico, Bleakley and Cowan (2008) show the opposite result focusing on total debt, where firms with dollar debt invest more. Bleakley and Cowan (2008) argue that that firms match the currency composition of their liabilities with that of their income streams or assets. That is, those firms holding higher shares of dollar debt are also those companies with higher exports sales or dollar assets. The authors find that following a depreciation, the reduction of investment induced by the increase in leverage is more than offset by the competitiveness effect of higher earnings. Hence these firms do no invest less than their peso indebted counterparts. It is not entirely clear why these firms should invest more though. We argue that both these papers suffer from an identification problem since it is not possible to tell if the firms who hold the dollar debt are also suffering from a credit crunch differentially less than their counterparts due to the possibility of having greater access to global capital markets.[3]

Firm performance might differ across foreign owned and domestic firms, and across firms who

[1]Note that Desai, Foley, and Forbes (2008) also investigate the differential impact of depreciation on multinationals that are export-oriented by proxying exports with foreign sales. They did not find a stronger effect though. Multinational affiliates do better than local firms, regardless of the fact that they are export-oriented.

[2]See Galindo, Panizza, and Schiantarelli (2003) for a survey of the firm-level literature.

[3]Bleakley and Cowan (2008) attempt to proxy foreign ownership by constructing a variable that indicates whether the firm's shares were listed in a foreign stock exchange in the form of American depositary receipts (ADRs).

have a currency or maturity mismatch on their balance-sheets. Our results show that having short-term dollar liabilities hurt domestic firms only. Foreign owned firms do better than the domestic firms in the post-crisis period both in terms of sales and investment, in spite of the fact that they might have short-term dollar debt. Hence having dollar denominated liabilities stops being a source of financial constraint if you are foreign owned and have access to global capital markets. A recent paper by Kolasa et al. (2009) documents that intra-group financing of multinationals help to smooth out the effects of the 2007–2008 crisis on Polish foreign owned firms.

Our results can bridge the studies that evolved separately so far, where one set of papers test the existence of financial constraints using foreign ownership as the key identifier and the other group of studies examine the financial constraints created by the currency mismatch of debt and assets on the firms' balance-sheets. Our findings provide an explanation for the conflicting results found in the balance-sheet mismatch studies. Failing to control for the ownership structure when assessing balance-sheet effects might deliver a positive effect of dollar debt on firms' performance since foreign owned firms hold more dollar debt.

Our paper also relates to the literature on financial constraints, investment and growth. The empirical literature mostly finds a negative effect of financial constraints on investment (e.g. Fazzari, Hubbard, and Peterson (1998, 2000); Kaplan and Zingales (1997, 2000); Lamont (1997)), however this literature suffers from the standard identification problem since the basic approach is to test if there is a relationship between cash flow and investment and interpret this as the evidence of financing constraints. We follow the work by Aguiar (2005), Blalock, Gertler and Levine (2007) and Desai, Foley and Forbes (2008) and use the crisis episodes as an exogenous determinant of financial constraints and document a fall in investment as in those papers. We argue that without knowing the exact mechanism through which the financial crises affect credit constraints, it is hard to link these crises to output collapses, which has utmost policy priority given the current global crisis.

We proceed as follows. Section 2 presents our data. Section 3 discusses the identification strategy. Section 4 presents the empirical results. Section 5 concludes.

2 Data and Construction of Regression Variables

The empirical analysis draws on a unique database with accounting information for over 1,200 companies in six Latin American countries, spanning the period 1990 to 2005. The countries covered

are: Argentina, Brazil, Chile, Colombia, Mexico and Peru. A distinct feature of this dataset is that it contains detailed firm-specific information on the currency and maturity composition of firms' balance sheets, the breakdown of sales into domestic and export revenues, firms' access to international capital markets and companies' foreign-ownership structure. The data was assembled from different sources.[4] Financial statement data was obtained from annual balance sheet reports drawn from local stock markets or regulatory agencies in each country. Data on foreign currency liabilities and assets (and their maturity structure) was hand-collected from the financial explanatory notes of firms' balance sheets.[5] These include all assets or liabilities outstanding which are denominated in-or indexed to-foreign currency, issued domestically or abroad[6]. While firms in many cases report both consolidated and unconsolidated financial statements, we use unconsolidated figures, to reduce variations arising from changes in subsidiaries' ownership and to avoid double counting. Information on firms' export revenues was obtained from income statement data. When this was not available, we used countries' customs office records or Central Bank's Balance of Payments trade registries. In the latter case, we merged balance sheet information with firms' export sales using their fiscal code identifier and/or name.

2.1 Firm-Level Sales and Investment

Our main indicators of firm performance are sales and investment in fixed capital. Sales is defined as gross sales and other operating revenues from main activities. The measure of investment used in the empirical analysis is the annual change in the stock of physical capital scaled by total assets to control for the firm size. This investment to asset ratio is windsorized at the lower and upper 5% level to control for outliers before used in the regression. The stock of physical capital, in turn, is defined as the sum of property, plant, equipment, plus technical reappraisal (valuation change), minus cumulated depreciation. Although it might be better to consider the capital stock series at replacement cost instead of book value since in periods of financial crisis with large swings in exchange rates, the book value and replacement cost of assets can diverge significantly, data on

[4]Further details on the data are provided in Kamil (2009).

[5]Information on the exact currency composition of foreign-currency denominated debt or assets for all countries is not available. For countries for which we do have a detailed breakdown of currency denomination (Chile and Peru), we find that, on average, 95 percent is denominated in dollars. Thus, we assume throughout that all foreign currency debt is denominated or indexed to the US dollar.

[6]These include bank loans, commercial debt, trade credit and foreign securities. Short-term foreign currency liabilities are those coming due in the upcoming year. This measure includes foreign currency denominated debt issued at short maturities as well as long term issues whose terminal date falls over the next 12-months.

capital stock at replacement costs was not available for most countries. Given the fact that we have country-year effects, the exchange rate fluctuations and valuation effects that are common will be absorbed. As in Blalock, Gertler and Levine (2008), we try to minimize the effects of reporting bias in the value of capital stock by estimating the models with firm-level fixed effects.

2.2 Dollar Liabilities and Export Revenue

We measure dollar liabilities as the ratio of total dollar liabilities to total liabilities and short term dollar liabilities as the ratio of short term dollar liabilities to total short term liabilities. Short-term liabilities refer to outstanding debt that must be satisfied within 12 months.

The firm's export to sales ratio captures the degree to which a company is well-positioned to benefit from an exchange rate depreciation, or has natural currency buffers to hedge dollar debt risk. We also define two exporter dummy variables, one that takes the value of one if the firm reported export revenue and zero otherwise. The second one aims to identify exporters with a high exports to sales ratio, so that it takes the value of one if the firm export revenue represents more than 10% of the sales value and zero otherwise. This is a substantial improvement over previous studies in the literature that typically used aggregate variables to proxy for firms' access to foreign currency: binary tradable/non-tradable classification or sectoral export shares.

2.3 Foreign Ownership

One of the contributions of our paper is to construct a continuous measure of foreign ownership for each firm in our sample.

To identify the ownership structure of each firm in our sample and track their changes over time, we proceed in two steps. We first gather data on all Mergers and Acquisitions (M&A) from two different databases during 1981 to 2005 were the target involved a Latin American firm in our sample (while the acquiror could be either a foreign or domestic firm).[7] The databases for the M&As are SDC Platinum from Thompson (from 1981 to 2001) and Zephyr from Bureau Van Dijk (from 1997 to 2005). Examining M&As from the 1980s onwards ensures that we capture any change in ownership relationships that predates the firm's first appearance in our sample.[8] For each deal,

[7]Given that there was no common firm-identifier across databases, we used a search algorithm based on firms' names and economic sectors to match M&A transactions to firms in our sample. We took into account possible changes in firms' names drawing on a list of company name changes from the Economatica database.

[8]In addition we doubled check with various internet resources like the information provided by the

both databases provide the date on which the transaction became effective and characteristics of the target and acquiring firms, in particular, the nationality of the target and acquiring firm, and that of the acquiror's ultimate parent. The database also includes transaction-specific information on percent of shares acquired and the percent of shares owned before and after the transaction was completed. In total, we consider 4,406 completed deals that resulted in a change in majority control in the target firm as well as acquisitions of minority stakes. Of the firms in our sample, 28 percent were involved in at least one M&A during the period (some of which involve multiple acquisitions of the same target). For each firm involved in an M&A, we constructed a continuous, time-varying measure of foreign ownership based on the fraction of shares held by foreign and domestic investors in each year.[9] We then merged this information with the annual balance sheet data.[10]

Of course there might be ways other than M&As for foreign investors to invest in firms. First, foreign ownership acquisitions can arise by means of IPOs, venture capital activity, or private equity deals, which are not covered in M&As hence in our procedure. Second, several foreign-owned firms could have been established before 1980, and not involved in a M&A since then. For these purposes we used the *Corporations Affiliations* database to identify Latin American firms in our sample that are affiliates, subsidiaries and/or divisions of global firms.[11]

As a result, the foreign ownership measure can take any value between 0 and 100 and represents the percentage of capital owned by foreign investors. Figure 1 shows the evolution of *average* foreign ownership over time in our sample, in a balanced panel. Many Latin American countries underwent massive privatization processes during the 90s. Therefore, as expected, foreign ownership has steadily grown over time. Figure 2 shows a similar pattern country by country. Most of our sampled firms are domestic and hence the distribution of foreign ownership has a high concentration

company on its owned web page under the Company History rubric and the Funding Universe website (www.fundinguniverse.com/company-histories/) that provides information on companies' history.

[9]For example, the M&A databases would identify an M&A transaction where a foreign company that already owned 50 percent of a company in a target country, buys 10 percent more of that company. Our foreign ownership variable would be 50 until the time of the transaction and 60 thereafter. In the case where we had more than one foreign investor in the same year we faced the problem of not knowing if the foreign companies were buying from each other or rather directly from the target company. In those cases we checked the company history profile, the Funding Universe website and other specialized newspaper information. In the rare case that information was not available, we decided on a conservative measure of foreign ownership and assumed that the foreign companies bought from each other.

[10]In the few cases of target firms being renamed after the acquisition, we kept the old id number rather than creating a new company after the M&A.

[11]This database contains international public and private business profiles and corporate linkage ("who owns whom") for approximately 184,000 public and private companies worldwide.

of firms around zero as shown in Figure 3.[12] Figure 4 shows that among those firms with positive foreign ownership, 40% of the observations are between 85% and 100% foreign owned. Hence foreign investors prefer to have a controlling stake in general. These distributions are looking similar if we do them by country.

2.4 Depreciation Episodes

Finally, we need to define the depreciation episodes. We say a depreciation takes place if the real exchange rate increased by more than 25% compared to the value of the exchange rate the year earlier. Using data on CPI, the real exchange rates were obtained as the deflated end-of period exchange rates. We identify three depreciation episodes in our sample: Mexico (1995), Brazil (1999) and Argentina (2002).[13]

In addition, following Reinhart and Rogoff (2008) we identify the following banking crises: Argentina (1995), Brazil (1995), Mexico (1994), Colombia (1998) and Peru (1999). The advantage of our dataset is that we can compare countries that suffer simultaneous banking and exchange rate crises, countries with only exchange rate crises and those that underwent only a banking crisis.

2.5 Sample Selection

All firms in the sample are non-financial, publicly-traded companies. Following previous research, we excluded financial firms, as well as diversified holding firms with zero operating revenues and with stakes in financial companies, as their investment decisions may reflect special factors and their accounting statements are not comparable. Focusing solely on publicly listed firms was dictated by data availability, and has the disadvantage that the patterns observed for publicly traded firms might not be representative of the corporate sector as a whole. Yet it has the advantage that financial statistics are typically more accurate and comprehensive. Moreover, relative to other available databases, such as Worldscope, the coverage of small and medium-sized publicly traded firms is superior, thus providing ample cross-firm variation in size and exchange rate exposures.[14]

Most of our variables are expressed as ratios; where this is not the case, we deflate the nominal

[12] We choose 2000 for being an intermediate year but similar figures are obtained using any other year.

[13] Notice Mexico abandoned the peg in December 1994, Brazil in January 1999 and finally, Argentina in January 2002.

[14] The database covers all firms that are listed-or have been listed- in the six countries' stock exchanges, rather than just the most liquid or with the biggest market capitalization, as has been common in other cross-country studies (see, for example, Allayanis, Brown and Klapper, 2003).

magnitudes to 2000 values using December-to-December changes in the consumer price index and converting them to U.S. dollars using December 2000 market exchange rates.[15] Since we identify of off time variation we exclude all firms that appear, disappear and reappear in the sample, which constitute 10% of the sampled firms. We drop all firm year observations in which the accounting data are not self-consistent.[16] To ensure that results are not driven by outliers, we dropped all firm/year observations for explanatory variables that exceeded the sample mean by more than five standard deviations.[17] Finally, we dropped those firms that as a result of the cleaning procedure had missing years in between. These exclusions leave us with complete information for an unbalanced panel of 8,673 firm-year observations, which consist of 1102 firms with an average of around 8 years each. Due to data access constraints we were only able to recover information on physical capital, and therefore investment, for a relatively smaller set of firms. The sample of firms for which we can compute investment data consists of 5,934 firm-year observations, which represent 863 firms with an average of around 7 years each.[18]

Table 1 shows the number of observations in the final sample per country and year, distinguishing between the number of firms according to whether data on investment was available or not. The size of the sample changes as new firms enter and exit the sample. Although we do not allow firms to disappear and then reappear in the sample, we might have new firms starting later. Attrition is mostly due to the fact that non-public firms are in the sample only in years they are issuing corporate bonds, or public firms that are privatized, merged or acquired and are subsequently delisted. At this time we are not able to say whether firms that disappear from the sample simply delisted or whether these firms went bankrupt. However, we believe we do not have a serious case of survivorship bias since even if we conservatively assumed all firms dropping out of the sample during the crisis period went belly-up, these would still constitute a small fraction

[15]Data on CPI and exchange rates are from the International Financial Statistics of the International Monetary Fund.

[16]In particular, we drop observations if dollar liabilities (assets) exceed total liabilities (assets) or if the ratio of exports to sales is greater than one. We drop firm-year observations with zero or missing sales. Finally, we drop firm-year observations in the top (low) 1 percent of the distribution of the ratio of sales to total assets and total liabilities to total assets. These adjustments led to dropping 13% of the remaining firm-year observations.

[17]We compute the change in total assets, sales and physical capital stock and construct a Z-score using the sample mean and standard deviation for each country/year. We drop firm/year observations that have absolute value of $Z > 5$. We drop firm-year observations for which the ratio of investment over assets is greater than one or less than minus one. These controls for outliers (either because of inadequate accounting, typing errors or extreme values). These adjustments led to dropping 9% of the remaining firm-year observations.

[18]Notice investment is constructed as the difference between physical capital stock today and lagged physical capital and therefore, we loose one year in this sample compared to the total sample of firms.

of the whole sample. In particular, in Argentina, first year of crisis, there are 4 firms that delisted in 2002 of which 3 are domestic and 1 foreign. In Brazil, there are 9 firms that delisted in 1999 of which 6 are domestic and 3 foreign. Finally, in Mexico there are 25 firms that delisted in 1995 of which 17 are domestic and 8 foreign.

2.6 Descriptive Statistics

Although our sample is restricted to listed companies there is nevertheless great heterogeneity across firms regarding whether a firm exports or not, foreign versus domestic and those holding dollar liabilities versus those firms with no foreign currency debt. Table 2 reports the percentage of observations by type of firm. Regarding foreign ownership, 17% of observations correspond to firms where the majority shareholder is a foreign company. This percentage varies across countries. In Argentina 40% of the sampled firms are foreign owned while in Colombia only 8% would be considered foreign. Another important variable in our analysis is export status. Around 50% of the observations report some export revenue although only a third of the observations report a ratio of export revenue to sales greater than 10%. Regarding dollar assets and liabilities, 70% of the sample reports some positive debt holding denominated in foreign currency while only 47% of the sample reports positive dollar assets. Again these figures vary by country and in this case it is in Argentina and Peru where we have a greater number of observations with positive values of dollar debt and assets. The data patterns in the investment sample are similar, though in the investment sample we have a slightly higher number of observations reporting dollar debt and asset holdings.

The is also extensive variation in the main variables used in the analysis both at the firm and at the country level. Table 3 reports summary statistics for these variables. On average firms hold 30% of their total debt denominated in foreign currency. This figure varies across countries, in Argentina and Peru, firms hold a higher percentage of their total debt in foreign currency, in particular around 60%. While firms in other countries like Colombia hold only 8% of their debt denominated in dollars. A similar pattern is observed for short term dollar debt. On average, 25% of short term dollar debt is denominated in dollars, and again, Argentina and Peru are the countries where this practice is most extended. Finally, regarding dollar assets, only 6% of total assets are denominated in dollar and Peru turns out to be the country where firms hold more dollar assets.

There is not only variation across countries in terms of the amount of dollar debt that firms hold but also there is great heterogeneity in dollar debt holdings across different types of firms. This is the crucial variation that we exploit in the paper. Figure 5 shows median exporter hold

higher values of total dollar debt, short term dollar debt and total dollar assets than the typical non-exporter. Figure 6 explores the median dollar holdings of foreign companies versus domestic companies. Foreigners like exporters hold higher total dollar debt, short term dollar debt and dollar assets. We argue that this is an important fact that has been previously overlooked in the literature due to the lack of data.

3 Identification Strategy

Our objective is to identify *how* a financial crisis affects firm performance. The main question is what is the channel through which crises aggravate credit constraints. Hence by using a differences-in-differences methodology we test various hypothesis in order to understand what type of firms outperform during the crisis and consequently are not credit constraint. We start by looking at the traditional channels proposed that are thought to mitigate or aggravate financial constraints. Given the fact that we have more than one depreciation episode, the identification strategy does not only rely on the before/after effects on the depreciation within the same country but it is enhanced by the comparison of firms in countries that suffered an exchange rate depreciation and firms in countries that did not suffered any depreciation episode.

In theory, the depreciation rises investment opportunities in the exporting sector and therefore we would expect exporters to increase investment in the aftermath of the exchange rate crisis. In order to test this hypothesis we estimate the following equation:

$$\begin{aligned} y_{i,c,j,t} = \beta_1 (Exporter_{i,c,j,t-1} \times Post_{c,t}) \\ + \beta_2 Exporter_{i,c,j,t-1} + \phi_{j,t} + \varphi_{c,t} + \alpha_i + \xi_{i,c,j,t} \end{aligned} \tag{1}$$

where $y_{i,c,j,t}$ is the outcome of firm i, in country c, in sector j at time t and *Exporter* refers to whether or not the firm is an exporter. We use three variables to classify the firms as an exporter, all of which yield similar results: a) a time-varying exporter dummy that takes the value of one if the firm reports export revenue, b) the ratio of export revenue to sales and c) a time varying exporter dummy that takes the value of one if the firm's exports to sales ratio is higher than 10 percent.[19] *Post* is the depreciation dummy and equals to one in the year of depreciation and one year after. In order to control for sector, year and country differences we include $\phi_{j,t}$ that controls for sector-year fixed effects, $\varphi_{c,t}$ that captures country-year fixed effects, α_i are firm-specific effects, and $\xi_{i,c,j,t}$ is the error term.[20] In addition to the firm specific effects, to control for firm size we

[19] See section 4.1. for the rationale behind these variables.

[20] Notice this equation, and none of the subsequent ones, will include the Post dummy since it is captured in the

include the lag of total assets when the outcome variable is sales. The investment variable is already scaled by total assets and therefore in those specifications there is no need to include additional size controls. By using firm fixed effects we will be identifying solely from firm changes over time. Country-year effects will absorb the effects of banking crises and any other country macroeconomic shock.

The estimated coefficient, β_1 captures the incremental effect on firm-outcome, say investment, of being an exporter (or having a certain amount of export revenue) in the years after the depreciation. A priori we expect β_1 to be positive both for firm-level sales and investment. The potential benefits from exporting might be mitigated, however, if firms hold a high share of their debt denominated in foreign currency. In order to test for the role of foreign currency denominated debt in the aftermath of exchange rate crises we use the following specification:

$$\begin{aligned} y_{i,c,j,t} = \beta_1 (SDDebt_{i,c,j,t-1} \times Post_{c,t}) \\ +\beta_2 SDDebt_{i,c,j,t-1} + \phi_{j,t} + \varphi_{c,t} + \alpha_i + \xi_{i,c,j,t} \end{aligned} \tag{2}$$

where again $y_{i,c,j,t}$ is the outcome of firm i, in country c, in sector j at time t and $SDDebt$ measures short-term dollar denominated liabilities, which are liabilities with residual maturity of twelve months. As in equation 1, $Post$ is the depreciation dummy and equals to one in the year of depreciation and the year after. At the same time, $\phi_{j,t}$ controls for sector-year fixed effects, $\varphi_{c,t}$ captures country-year fixed effects, α_i are firm-specific effects, and $\xi_{i,c,j,t}$ is the error term. Finally, we follow the same strategy as in equation (1) to control for firm size.

We focus on short-term debt since the literature argues that this is the variable that is important for a balance-sheet mismatch (See Allen at al. 2002).[21] The variable of interest equation (2) is the interaction term between dollar denominated liabilities and the post crisis dummy. Hence, β_1 measures the incremental effect on sales and investment of holding short-term dollar debt in the years after the depreciation. We expect depreciation to affect firms holding dollar debt and those that are not holding dollar debt differently. The debt burden of firms holding dollar denominated liabilities will increase after a depreciation so it will be more difficult for these firms to borrow (due to a lower net worth) and therefore, they will experience a decrease in investment and output. Thus, a priori we expect β_1 to be negative based on the theoretical literature but the empirical literature so far is inconclusive. Aguiar (2005) finds a negative coefficient in case of the Mexican crisis, whereas Bleakley and Cowan (2008) finds a positive one using more countries.

country-year fixed effects. Time dummies are also absorbed by this fixed effect.

[21] We have also experimented with the ratio of short term dollar debt in total debt obtaining similar results. The correlation between the two is 0.87.

One possible explanation for these conflicted results might be the omitted variables problem. There might be no negative effect of holding dollar denominated debt if the firm also has matching dollar denominated assets or revenue (exports), which will lead to finding an insignificant coefficient. Or the sample of firm who hold dollar debt also happen to be the ones with greater access to finance, through foreign ownership, which might lead to finding a positive coefficient. In both cases there will be an omitted correlation between holding dollar debt and being an exporter or having dollar assets or being foreign owned. Therefore it is necessary to control for these variables. Controlling the level of these variables may not be enough since there might be a differential response of exporter firms and foreign owned firms, who hold dollar debt.

Thus, we expect the depreciation to have a differential impact on firms that both export and hold dollar denominated liabilities. In order to explore the relationship between exports and dollar denominated liabilities, and especially their behavior during crisis we estimate the following equation:

$$\begin{aligned} y_{i,c,j,t} &= \beta_1 Exports_{i,c,j,t-1} \times SDDebt_{i,c,j,t-1} \times Post_{c,t} \\ &+ \beta_2 Exports_{i,c,j,t-1} \times SDDebt_{i,c,j,t-1} \\ &+ \beta_3 Exports_{i,c,j,t-1} \times Post_{c,t} \\ &+ \beta_4 SDDebt_{i,c,j,t-1} \times Post_{c,t} \\ &+ \beta_5 Exporter_{i,c,j,t-1} \\ &+ \beta_6 SDDebt_{i,c,j,t-1} \\ &+ \phi_{j,t} + \varphi_{c,t} + \alpha_i + \xi_{i,c,j,t} \end{aligned} \tag{3}$$

where again $y_{i,c,j,t}$ is the outcome of firm i, in country c, in sector j at time t and $SDDebt$ measures short-term dollar denominated liabilities. $Exports$ will be the ratio of export revenue to sales.[22] As in the previous specifications, $Post$ is the depreciation dummy and equals to one in the year of depreciation and the year after. $\phi_{j,t}$ controls for sector-year fixed effects, $\varphi_{c,t}$ captures country-year fixed effects, α_i are firm-specific effects, and $\xi_{i,c,j,t}$ is the error term. Size is accounted for following the same strategy as in (1) and (2).

In the above regression, β_4 measures the effect of holding dollar debt during the crisis for the firms who do not have export revenue (and hence a possible mismatch on their balance-sheet). A negative β_4 means that firms who hold dollar debt without matching export revenue are hurt during the crisis. Including the term $Exporter_{i,c,j,t-1} \times SDDebt_{i,c,j,t-1} \times Post_{c,t}$ is critical since

[22] Similar results are obtained with an exporter dummy.

otherwise one will end up with a regression like equation (2) controlling for exports only. But this will contaminate the interpretation of the coefficient on $SDDebt_{i,c,j,t-1} \times Post_{c,t}$, which is given by β_4 in equation (3) since in that case the estimated coefficient will include both exporter and non-exporter firms, unlike β_4. The other nice property of this specification is that the term $SDDebt_{i,c,j,t-1} \times Post_{c,t}$ controls for any pre-existing differential trends between exporters and non-exporters; and the term $Exports_{i,c,j,t-1} \times Post_{c,t}$ controls for different trends between exporters with and without dollar debt.

The estimated coefficient, β_1 in this regression measures, then, the incremental effect of holding dollar debt for the firms who are exporters and/or have a certain amount of export revenue. If as it has been suggested in the literature, firms match their dollar debt holdings with export revenue we expect the coefficient on the interaction term, β_1, not to be negative and significant, meaning these firms should not do worse than the ones who do not hold dollar debt (which is captured by β_3). However, this coefficient might still be upward bias if foreign companies are more likely to hold dollar debt.

As we also argued in the introduction, the part of the literature that has been focusing on the access to finance channel instead of the mismatch channel has found that foreign companies outperform domestic companies during depreciation episodes. They interpret this finding as better access to credit. To check if this is also true in our data we run,

$$\begin{aligned} y_{i,c,j,t} = \beta_1 (Foreign_{i,c,j,t-1} \times Post_{c,t}) \\ + \beta_2 Foreign_{i,c,j,t-1} + \phi_{j,t} + \varphi_{c,t} + \alpha_i + \xi_{i,c,j,t} \end{aligned} \tag{4}$$

where again $y_{i,c,j,t}$ is the outcome of firm i, in country c, in sector j at time t and $Foreign$ is our continues measure of foreign ownership. As in equation 1, $Post$ is the depreciation dummy and equals to one in the year of depreciation and one year after. At the same time, $\phi_{j,t}$ controls for sector-year fixed effects, $\varphi_{c,t}$ captures country-year fixed effects, α_i are firm-specific effects, and $\xi_{i,c,j,t}$ is the error term. Finally, we follow the same strategy as in equation (1), (2), and (3) to control for firm size.

The interpretation of β_1 here is the incremental effect on sales and investment of being a foreign owned company in the years after the depreciation since we expect domestic and foreign companies to react differently to the crisis. The literature has consensus on this finding. The interpretation of this finding is based on the assumption that foreign companies have *relatively* more access to international markets during stressful times compared to domestic companies, although domestic companies might still have some access. On the other hand, the fact that the firm is foreign owned

might proxy other channels. Foreign firms could outperform domestic firms since they mostly operate in tradable sector and have dollar income in addition to dollar assets and hence will not suffer from a mismatch. The bottomline is that access to finance and balance-sheet mismatch must be accounted for simultaneously.

The unique nature of our dataset allows us to disentangle the effect of balance sheet mismatches and access to credit during crises. To move forward we are going to follow the approach suggested by Blalock, Gertler, and Levine (2007) and focus on a sample of exporters since these are the firms that face the new investment opportunity. Then we proceed in two steps. First, we estimate equation (3) separately for domestic and foreign companies in the exporter sample. A priori we can expect to see no difference for the estimated coefficient on the interaction term $Exporter_{i,c,j,t-1} \times SDDebt_{i,c,j,t-1} \times Post_{c,t}$ for both domestic and foreign companies if firms match export revenue and dollar liabilities. However, if there is an additional effect from being foreign owned, we should see that the coefficient on the interaction term for the subsample of foreign companies is positive significant compared to the subsample of domestic companies. We interpret this additional effect due to being foreign owned as access to credit. Holding dollar debt is not a constraint for foreign companies since they have access to global credit.[23]

We also run the following specification which has the similar interpretation to splitting the sample into foreign and domestic firms for equation (3), but will have the advantage of having more observations:

$$\begin{aligned} y_{i,c,j,t} \quad = \quad & \beta_1 Foreign_{i,c,j,t-1} \times SDDebt_{i,c,j,t-1} \times Post_{c,t} \\ & + \beta_2 Foreign_{i,c,j,t-1} \times SDDebt_{i,c,j,t-1} \\ & + \beta_3 Foreign_{i,c,j,t-1} \times Post_{c,t} \\ & + \beta_4 SDDebt_{i,c,j,t-1} \times Post_{c,t} \\ & + \beta_5 Foreign_{i,c,j,t-1} \\ & + \beta_6 SDDebt_{i,c,j,t-1} \\ & + \phi_{j,t} + \varphi_{c,t} + \alpha_i + \xi_{i,c,j,t} \end{aligned} \tag{5}$$

where again $y_{i,c,j,t}$ is the outcome of firm i, in country c, in sector j at time t and $SDDebt$ measures

[23] Chang and Velasco (2001) argue that their main result of a bank run due short term liabilities exceeding the value of assets can be overturned if they allow FDI in their model.

short-term dollar denominated liabilities. $Foreign$ will be our continuous foreign ownership measure of the firms' shares owned by foreigners. As in the previous specifications, $Post$ is the depreciation dummy and equals to one in the year of depreciation and one year after. $\phi_{j,t}$ controls for sector-year fixed effects, $\varphi_{c,t}$ captures country-year fixed effects, α_i are firm-specific effects, and $\xi_{i,c,j,t}$ is the error term.

In a similar vein to equation (3), β_4 will be the effect of holding dollar debt after the crisis *only* for the sample of domestic firms. If negative it means that domestic firms holding dollar debt are hurt by the crisis (assuming they are non-exporters). Notice again how important is the first term as before; if we wouldn't have $Foreign_{i,c,j,t-1} \times SDDebt_{i,c,j,t-1} \times Post_{c,t}$ in the regression (i.e. imagine we decide to only control for foreign and $foreign \times post$) β_4 would include *both* domestic and foreign companies. Given this interpretation of β_4 as the effect on investment of domestic firms holding dollar debt, β_1 is the incremental effect of being foreign owned. We interpret this as the "access to finance" channel. If β_1 is positive then foreign companies holding dollar debt do better than domestic companies holding dollar debt. Our main argument is that, if both type of firms can avoid a mismatch on their balance-sheet (say they are both exporters), then there should not be a differential response of being foreign owned unless foreign ownership captures access to finance.

What are the potential threats to this identification strategy? First, foreign firms might be on a different trend compared to domestic firms regardless. Hence, for robustness we include $foreign \times year$ trends. Foreign firms with dollar debt might be on a different trend compared to domestic firms with dollar debt in terms of their debt. We will show that this is not the case by checking prior trends. In addition, our specification accounts for this already since we have $SDDebt_{i,c,j,t-1} \times Post_{c,t}$ term.

4 Results

4.1 Exporter's Performance during the Crisis

The traditional textbook theory on the effect of exchange rate depreciations on output, concludes that the depreciation episode should increase sales and investment of exporting firms due to a competitiveness effect. Table 4 tests this hypothesis by estimating equation (1). Columns (1) to (3) use an export dummy capturing whether the firm reported export revenue or not. Column (1) shows that the sales of exporters are 9.8 percent higher than the sales of non-exporters after depreciation. Similarly, results in column (2) suggest that exporters have faster sales growth than

non-exporters after devaluations. In particular, the sales growth of exporters is 16.4 percent higher than those of non-exporters in the aftermath of the crisis. Therefore, as expected from the theory, exporters increase both sales and sales growth after a devaluation. However, contrary to what the standard theory predicts, column (3) shows that exporters do not increase investment after a depreciation episode. An exporter dummy could be a poor predictor of the investment behavior of firms if we thought that only firms with a considerable export revenue would engage in new investment after a devaluation. In column (4), an exporter is defined as a firm whose export revenue to sales ratio is more than 10 percent. The 10 percent cut off level corresponds to the 75 percentile of the distribution of exports to sales ratio.[24] Results in column (4) show that not even high exporters increase investment in the aftermath of the crisis. Finally, in column (5) we show that the same results are obtained using a continuous measure of exports to sales ratio rather than dummy variables. The main message from Table 4 is that exporter increases in sales and sales growth were not accompanied by increases in investment.

This counterintuitive result has been explained in the literature as the result of financial constraints. The depreciation does not only imply a positive competitiveness effect a) if it is combined with a banking crisis, which typically is the case, then there will be an associated credit crunch, b) depreciation can also exacerbate the financial constraints of firms holding dollar denominated debt. As we mentioned in the identification strategy section, this increase in the value of the debt would not represent an obstacle to investment in two cases: a) if the firm could access credit through domestic and international capital markets or b) if the firm has an stream of income denominated in foreign currency (i.e. dollar assets or exports) and hence does not have a problem of balance-sheet mismatch.

We start by looking at the balance sheet channel. Table 5 explores the relationship between export revenue and dollar denominated liabilities at the time of the crisis. Different studies use different definitions regarding the variable dollar debt. The theoretical literature stresses the importance of short-term dollar denominated debt as we argued above and therefore, we focus on this variable in our analysis.[25] Columns (1) and (2) show the performance of firms holding short term dollar denominated liabilities after the crisis. While firms holding dollar debt seem to experience an increase in sales growth compared to firms not holding dollar denominated debt, this unexpected better performance in terms of sales growth is not carried over to investment.[26] The depreciation

[24] Aguiar (2005) defines high exporters and low exporters according to this same definition and cut off level.

[25] We did some preliminary work with total debt instead of short term debt which gives inconsistent results.

[26] Similar results are obtained using the log of sales as dependent variable rather than sales growth.

would increase the value of the debt for firms holding most of their short term liabilities in dollars and we would expect these firms to decrease investment relative to those with lower levels of dollar indebtedness. Instead, we find no significant effect. However, columns (1) and (2) do not control for country-year fixed effects. These fixed effects are crucial in this context since they allow controlling for country-year specific events that could be correlated with firm holdings of short-term dollar liabilities. In particular, both Argentina and Mexico experienced banking crises in the year previous to the exchange rate crisis. Since our sample consists of relatively large companies we expect the banking crisis to affect them in a similar way and control for those episodes and similar macroeconomic shocks by including country-year fixed effects.[27] Columns (3) and (4) show the relevance of controlling for country-year fixed effects. The significance of the sales coefficient is attenuated and what is more important, column (4) shows that firms holding higher levels of short term dollar denominated debt decrease investment in the aftermath of the crisis. These results are fully consistent with Aguiar (2005) but depart from those found by Bleakley and Cowan (2008).[28]

An important omitted control from the regressions in columns (3) and (4) of Table 5 is the share of exports. Firms holding short term dollar debt might not experience an exacerbation in financial constraints after the devaluation if they have "matching" export revenue.[29] The correlation coefficient between short dollar debt and export share is 0.38 and it is significant at the 1% level. Columns (5) and (6) in Table 5 add the ratio of export revenue to sales and the corresponding interaction with the *Post* dummy to allow for a differential impact of the devaluation on the share of exports. Similarly to Table 4 export intensity is not a significant predictor of investment in the

[27]The country-year fixed effects would not be enough if for example firms have different reliance on banks credit, however, similar results are obtained if we control for total debt. In general, we expect the rest of the sector-year, firm fixed effects and control variables to account for different responses to macroeconomic shocks not related to the currency crisis.

[28]In the later the authors use the change in real exchange rate rather than a post dummy. Table A1 in the Appendix replicates the exercise conducted by Bleakley and Cowan (2008). It is worth noting that our sample and that of Bleakley and Cowan (2008) differ in two aspects. First, Bleakley and Cowan use data for 5 Latin American countries, Argentina, Brazil, Chile, Colombia and Mexico; while we also have data on an additional country, Peru. Second, Bleakley and Cowan use data from 1991 to 1999 and therefore have only one major exchange rate crisis episode: Mexico (1995). We use data from 1990 to 2005 and therefore are able to study three major exchange rate crisis episodes: Argentina (2002), Brazil (1999) and Mexico (1995). Similar to them we find that firms with higher levels of *total* dollar denominated liabilities increase investment when using the change in real exchange rate rather than a Post dummy. However, this positive and significant effect disappears when we consider short term dollar debt. Therefore, we conclude that it is short term dollar debt that becomes crucial during devaluation episodes.

[29]Notice that among non-exporting firms the majority has short-term dollar holdings (61%) as suggested by the "original sin" literature on the difficulties that domestic firms face to borrow in local currency.

aftermath of the crisis. However, the short dollar liability coefficient in the aftermath of the crisis, became larger and more significant suggesting a positive correlation between export share and dollar liabilities. We can study the economic relevance of these results by comparing the predicted decrease in investment rates at the time of the crisis for a firm with average holdings of short-term dollar debt with another firm with no short-dollar debt. The average firm holds 31% of her short term debt denominated in foreign currency and has an investment to asset ratio of 0.007 the year prior to the currency crisis. The estimates in column (6) of Table 5 suggest that this average firm would have experienced a 14 percent decline in investment in the Post years of the crisis compare to a firm with no dollar denominated liabilities.[30]

Controlling for export revenue might not be enough to unmask the investment behavior of exporters with high dollar debt if we think that the devaluation had a differential effect on those firms with high short dollar debt *and* high export revenue. Columns (7) and (8) estimate equation (3) where we add an interaction between short dollar debt, export share and the Post dummy. To ease the economic interpretation, we demean the variables of the interaction term in the last two columns, where we remove country-year and sector-year averages from firm-level values since the fixed effects in the regression cannot remove these means from the triple interaction term. Therefore results in columns (7) and (8) should be interpreted as deviations from mean values. The total effect from holding short dollar debt is jointly significant as indicated by the corresponding F-test ($p - value = 0.002$), and negative. However, column (8) shows that, high exporters with high dollar debt increase investment after the devaluation relative to low exporters (or high dollar debt high exporters increase investment relative to low dollar debt high exporters). The total effect from holding short dollar debt in the depreciation period is jointly significant as indicated by the corresponding F-test ($p - value = 0.001$), and this effect is *positive* for the export to sales ratio that are bigger than 0.5, which corresponds to the 90th percentile of the distribution. So firms with export revenue that is half of their sales increase investment in the aftermath of the crisis. The estimated coefficient 0.099 implies that, these firms increase investment to asset ratio 15 percent relative to its mean prior to the crisis, for a given 10 percent increase in their short term dollar debt over the mean holdings of short term debt.

Before, we found that firms holding short term dollar debt decrease investment in the years after devaluation relative to those with no dollar debt holdings. Now, we find that firms with high dollar

[30]The predicted decline in investment rate: $-0.013 = (0.31) \times (-0.043)$. Therefore, the investment to asset ratio would fall by 1.3 percentage points which means the investment to asset ratio for the average firm in the post years would be 0.006, or in other words a 14 percent decline in the investment to asset ratio.

liabilities and high export revenue increase investment after the devaluation, although the overall effect of short term dollar debt is negative. Our main hypothesis is that the coefficient in column (8) of Table 5 is a reduced form effect of two confounded channels: the balance sheet channel and the credit channel. Foreign firms hold on average higher levels of dollar denominated debt and are highly export oriented. Therefore, failing to control for foreign ownership would bias upwards the coefficient on the triple interaction. By proxying access to credit with foreign ownership we should be able to disentangle the balance sheet and access to credit channels. If firms hold dollar denominated debt and they match this by export revenue, both domestic and foreign companies should perform the same during depreciation episodes. However, foreign companies might mitigate a potential negative balance sheet effect by having access to external financing instead of matching dollar liabilities with export revenue. If everybody matches and there is no negative effect of holding dollar debt, and if we still find a higher coefficient on foreign ownership, this shows the additional effect of being foreign-owned, which we interpret as access to finance. Domestic companies that are highly dependent on domestic credit markets would not be able to borrow during depreciations when they are more financially constrained. Therefore, we expect an heterogenous response from firms holding short-term dollar debt and/or exporters, according to ownership.

To advance on this issue we are going to focus on a sub-sample of exporters as suggested by Blalock, Gertler, and Levine (2007). As we argued before, the advantage of focusing on the subsample of exporters is that these firms are the ones with both the investment opportunity due to the devaluation episode and export revenue to compensate any negative effect derived from holding short term dollar debt. This exercise can also be interpreted as an alternative to the triple interactions in columns (7) and (8) of table 5. Table 6 reports the effect of holding dollar debt after a devaluation in the subsample of exporters.[31] The results of table 6 are consistent with the results of Table 5. Here, we repeat the diff-in-diff estimation strategy from columns (3) and (4) in Table 5 in the sub-sample of exporters and find that exporters with higher dollar liabilities in the aftermath of the crisis not to do worse than *exporters* with no dollar liabilities (column (2) of Table 6), which can be again interpreted as firms with export revenue match their dollar liabilities with the foreign earnings.

We still have to reconcile these findings with the positive significant coefficient found in column (8) of Table 5? As we explained in the introduction there is a parallel literature that studies the

[31] We define an exporter as a firm whose export revenue represents more than 10% of sales. The 10% cut off level corresponds to the top quartile of the exports to sales ratio and to the median level of exports to sales ratio in the subsample of firms reporting export revenue.

performance of foreign companies during crises. The main idea is that foreign companies have access to international credit markets when domestic firms are confined to troubled domestic credit markets and that gives foreign firms an advantage to invest. Columns (3) to (6) in Table 6 repeat the diff-in-diff estimation strategy from columns (3) and (4) in Table 5 again but splitting the sample among domestic and foreign exporters (so basically splitting the sample in columns (1) and (2) of Table 6). Results in column (4) show that foreign exporters holding dollar debt increase investment after a devaluation. On the contrary, in column (6) domestic exporters holding dollar debt do not increase investment in the aftermath of the crisis. Therefore, domestic exporters manage to "match" short term dollar liability holdings with export revenue and therefore, do not experience a decline in investment relative to domestic exporters with no dollar liabilities. At the same time foreign exporters with dollar debt holdings outperform foreign exporters with no dollar holdings which suggests an additional role for foreign ownership.

4.2 The Performance of Foreign Companies During Crises

Before investigating the additional role played by foreign ownership for firms with weak balance-sheets during a crisis, we first explore the performance of foreign firms relative to domestic firms after a currency crisis. Previous research by Desai, Foley and Forbes (2008) shows that the U.S. affiliates perform better than their domestic counterparts after a devaluation. They show evidence indicating that the reason for this better performance is the ability of foreign affiliates to access parent equity when local firms are most constrained. Results of Blalock, Gertler, and Levine (2007) and Kolasa et al. (2009) also find similar evidence, where the latter paper shows that Polish firms who got financing from their ultimate parents (multinational affiliates) did better during the latest 2007–2008 crisis. Given these results from the literature, we first focus on majority ownership and define Foreign as the $log(1 + foreign)$ where $foreign$ equals zero if foreign investors owned less than 90% of the capital and $foreign$ takes percent values between 0.9 and a 1 if foreigners owned more than 90% of the capital.

Columns (1) to (3) in Table 7 show the results when foreign is defined as a non-resident investor regardless of the nationality. Column (1) shows the case where the foreign variable is based on the stakes owned by the parent company (i.e. the immediate owner). Indeed foreign firms increase investment relative to domestic firms after a devaluation. It might be that the relevant foreign investor is not the immediate owner but the ultimate parent. Column (2) explores this possibility and shows equivalent results. The estimated coefficient of 0.02 implies that a 10 percentage point

increase in foreign ownership after the devaluation (from 90 percent to 100 percent, for example) would translate into a 30% increase in the investment to asset ratio relative to the mean investment to asset ratio prior to the devaluation of 0.007. Finally, in column (3) we show that results are not driven by MNCs subsidiaries by excluding them from the sample.[32] We obtained qualitative similar results although now the total effect of foreign ownership is not significant as shown by the F-test. In column (3), the foreign owned firms only invest more in the aftermath of the crisis. To avoid possible contagion effects across Latin American countries at the time of the crisis, columns (4) to (6) define foreign as a non-resident investor from a non- Latin American country. Therefore, in these last three columns, foreign companies from other Latin American countries would be considered domestic companies. As expected, these foreign companies do slightly better after the devaluation compared to columns (1) to (3). Finally, column (6) shows that the results are robust to exclude MNC affiliates from the estimation.

Therefore, from Table 7 we conclude foreign companies increase investment after a devaluation, a result that is consistent with the existing literature. However, our main interest in foreign companies derived from the observation in Table 6 that foreign exporters holding dollar debt were increasing investment relative to foreign exporters with no dollar debt and we did not observe this pattern in the subsample of domestic firms. In order to avoid splitting the sample and keep a higher number of observations we estimate an equivalent equation to the sample split, equation (4). In here we are interested in the differential response of foreign companies holding dollar debt after the devaluation. Again we do this exercise in the sample of exporters and show results in Table 8. Based on the previous findings on foreign ownership performance we again distinguish between foreign companies from and outside other Latin American countries. Columns (1) to (3) report the results when foreign is defined as a non-resident investor regardless of the nationality. Instead column (4) consider foreign companies from other Latin American countries as domestic. We keep focusing on the majority ownership but here we define it in a traditional way, where in $log(1 + foreign)$, $foreign$ equals zero if foreign investors owned less than 50% of the capital and values between 0.50 and a 1 if foreigners owned more than 50% of the capital. To ease the economic interpretation, similarly to columns (7) and (8) in Table 5 we demean the variables, by removing country-year and sector-year averages from firm-level values.

Results in column (1), where we consider the stakes owned by the immediate parent, do not show foreigners holding dollar debt behaving differently in terms of investment than domestic exporters holding dollar debt. However, column (2) show that when foreign is defined based on the stakes

[32]We define a subsidiary as a firm with more than 98% of the capital owned by a foreign investor.

owned by the ultimate parent, foreign companies holding dollar debt do increase investment after a devaluation. Based on the p-values of the F-test, all of the total effects are significant and positive in column (2). For the firms that hold the mean values of short term dollar debt and have mean level of foreign ownership the estimated coefficient of 0.046 implies a 50% increase in investment in the aftermath of the depreciation. The estimated coefficient on the triple interaction, 0.175 implies that for the firms who hold half of their short term debt in foreign currency, the foreign owned ones relative to domestic firms increase investment by 25% during depreciations, for a given increase in foreign ownership of 10 percentage point over the sample mean. Column (3) shows that results are not driven by MNCs subsidiaries and column (4) repeats the same exercise as before on the nationality of the ultimate parent. It seems that contagion effects across Latin American countries at the time of the crisis are common since as before limiting foreign companies to the ones owned by non Latin American companies yields a higher coefficient in column (4).

4.3 Robustness

In this section we conduct a series of robustness checks for our main result found in column (2) of Table 8. Given the previous findings on the relative importance of the nationality of the ultimate parent, the robustness checks presented in Table 9 will concentrate on this definition of foreign firm.[33]

First, we control for the possibility that foreign firms are on a different trend than domestic firms by adding foreign-year fixed effects. One concern is whether foreign companies are just different from domestic companies and results are spurious due to the different nature of these companies. For example, foreign firms are characterized by a set of non-tangible assets that make them more productive irrespective of the depreciation episode and therefore, might show a higher propensity to invest. Results, in Table 7 hint to the possibility that this is not the case. In fact, foreigners on average do not invest more than domestic firms. However, in Table 8 we consider the subsample of exporters and there might still be systematic differences between foreign and domestic exporters. In order to control for differential trends between domestic and foreign exporters we include foreign-year fixed effects.[34] Column (1) in Table 9 presents the equivalent estimation to

[33]Notice all columns in Table 9 although not reported, include the corresponding cross products of the main interaction.

[34]Similar results are obtained if in addition to the foreign-year fixed effects we incorporate foreign-country fixed effects. Foreign exporters might differ from domestic exporters across countries. Foreign investors' motivations to set up an exporting plant or a subsidiary that serves the local market might vary according to host country characteristics.

column (2) in Table 8 but including foreign-year fixed effects. We obtain qualitatively the same results as in Table 8. If anything, the exclusion of foreign-year fixed effect was biasing downwards our main effect which suggests that, similar to the results found for the total sample of firms, foreign exporters are in a lower investment trend relative to domestic exporters. Column (2) in Table 9 excludes MNCs subsidiaries and repeats the estimation including foreign-year fixed effects. Similar results as those in column (3) of Table 8 are obtained. Finally, column (3) considers the possibility that currency crises might rapidly expand to neighboring countries in Latin America and therefore, foreign investors in those countries would be facing similar financial constraints as domestic companies following the devaluation. The slightly higher coefficient in column (3), compared to the coefficient in column (2), suggests that this indeed might be the case. Most importantly, non Latin American foreign investors holding dollar debt increase investment after the devaluation even after accounting for differential trends in foreign and domestic exporters.

Second, our identification strategy relies on the assumption that foreign companies have *relatively* better access to credit than domestic firms during crises. However, this might not need to be the case if *domestic* companies are not confined to troubled local credit markets during the crisis and can access international credit markets. We collected data on alternative firm financing resources. We used Bank of New York data to identify those firms whose shares listed in a foreign stock exchange in the form of American Depositary Receipts (ADRs) and firm-level issuance data on private bonds and syndicated loans from Dealogic Bondware and Loanware. Column (4) in Table 9 repeat the estimation in column (2) of Table 8 but now adding three new variables to the main specification that aim to capture access to international capital credit markets. A dummy variable that takes on a value of one starting the year the firm first issued ADRs and 1 thereafter; a dummy variable that takes the value of one only in the year the firm issued a bond in foreign markets (and 0 otherwise) and finally, a dummy variable takes the value of 1 only in the year the firm took a syndicated loan with foreign banks (and 0 otherwise). Column (4) shows that ADRs are not a significant predictor of firm investment. On the contrary the fact of issuing both bonds and loans impacts significantly investment rates. Interestingly, while bond issuance positively affect investment rates, loan issuances has a negative impact, probably reflecting the firm's financial health. Despite the relevance of these indicators in predicting investment, our main interaction effect is not significantly affected, column (4) in Table 9 shows similar results to those in column (2) of Table 8. The same results are obtained if ADR, Bond and Loan are interacted with the Post dummy.

Therefore, in order to control for differences between foreign exporters across countries we might want to control for foreign-country fixed effects.

Regarding the interpretation of our main results, we have not been explicit about the form of access to credit. It can be that foreign companies borrow directly from the ultimate parent and/or foreign companies have better access to international capital markets through reputation effects, lower asymmetric information or better transparency. In the later case this would mean that foreign companies are the ones issuing ADRs, as well as, bonds and loans abroad. However, only 3 percent of the ADRs issued at the time of the crisis were issued by foreign companies, all the bonds were issued by domestic companies and only 5 percent of the loans were issued by foreign companies at the time of the crisis. These low figures on the part of foreign companies together with the fact that the main interaction effect is still positive and significant in column (4) of Table 9, make us think that *direct* access to international capital markets might not be the main channel. Of course, the foreign ultimate parent is more diversified and have access to international capital markets and hence our interpretation is that the foreign-owned firms do get access to the markets through their foreign owners.

Third, an additional source of dollar denominated income rather than exports can be dollar denominated assets. Column (5) repeats the estimation controlling for the share of dollar denominated assets in total assets with no major impact on the triple interaction coefficient.

A final potential concern is that firms that choose to hold dollar denominated debt could be different from the firms that chose not to do so, irrespective of the depreciation, and these differences might be correlated with investment rates. In practice, most of the firm unobservable characteristics are time invariant and therefore, this concern should be mitigated by the fixed effect estimation. In addition, results in Table 8 control for the term $ShortDollarDebt \times Post$ which controls for different trends in short term dollar debt holdings. Figure 7 shows the average investment rates for three different groups of firms: firms not holding dollar debt, firms holding dollar debt above the top quartile of the distribution of firms holding dollar debt and firms holding dollar debt below the 75 percentile. Graphical inspection reveals that there are no major differences in trends between firms holding short-term dollar debt and those that do not prior to the depreciation episodes of Brazil and Mexico. However, it can be argued that prior to the 2002 exchange rate crisis in Argentina, firms not holding dollar debt were decreasing investment while those with high dollar debt[35] were increasing investment. We repeated the estimation in column (2) of Table 8 excluding Argentinean firms and our main results was still positive and significant.

[35]Firms with high levels of dollar debt are those in the top quartile of the distribution of firms holding dollar debt.

4.4 Endogeneity

As argued before, in general we control first order concerns regarding endogeneity through firm, country-year and sector-year effects. In addition, we include foreign-year fixed effects in the robustness section to control for differential trends between foreign and domestic exporters. However, there might be some additional concerns such as reverse causality. Foreign firms might reduce their dollar liabilities or currency and maturity mismatches on their balance-sheets relatively more than domestic firms in anticipation of the crisis. This could be an alternative explanation for why they do better in the aftermath of the crisis. As shown in Figure 8, there was no systematic decrease in dollarization for foreign firms in the eve of crisis. Kamil (2009) finds that, *following* the adoption of a floating exchange rate regime, firms reduce their balance sheet currency mismatches by: (a) reducing their foreign borrowing and (b) hedging a higher share of their dollar liabilities with "natural" foreign currency buffers (export revenues and assets denominated in foreign currency). The causal effect of floating regimes in reducing currency mismatches is more pronounced in firms in the upper tail of the dollarization distribution. He finds no significant change in firms' dollar debt holdings prior to the move to a flexible exchange rate regime. We complement these findings by reporting no significant difference between foreign and domestic firms in short term dollar holdings in the eve of large devaluations.

Another concern relates to changes in the ownership status before or during a crisis. Our identification strategy would be weakened if during the depreciation episode foreign companies acquire the most productive domestic companies. The evidence so far seems to be showing the opposite. Aguiar and Gopinath (2005) show that foreign investors buy inferior firms at fire-sale prices. Hence, our results most likely are not driven by foreigners buying productive firms during a crisis. In our sample, there are 20 cases in which a domestic firm changed ownership status to majority foreign owned at the time of the devaluation. However, in the exporter subsample there are only 5 of such cases. Therefore, we doubt that our results are driven by changes in foreign ownership at the time of the crisis.

Finally, another potential source of endogeneity is is related to exporting firms. The recent literature on firm heterogeneity and trade shows that it is most productive firms that enter the export market (Helpman, Melitz and Yeaple (2004)). Therefore, the depreciation episode would make firms near the threshold productivity cut off level enter the export market. These firms would be more productive than the non exporting ones but less productive than the ones that were already exporting and that due to the depreciation also experience a competitiveness effect. Consequently

in the case of firms changing export status during the depreciation episode we cannot rule out a selection bias. However, similar to the case of foreign ownership, changes in export status from non-exporter to exporter at the time of the crisis where relatively limited in our sample (3 percent of the observations at the time of the crisis) and therefore, limit the potential sample selection concerns.

5 Conclusion

We utilize a new firm-level database from six Latin American countries between 1990 and 2005. Our countries during this time period have experienced severe financial crises and hence constitute a fertile laboratory to investigate the role of financial constraints and the heterogenous impact of financial crises on firms' performance.

We have tested the role of two main channels of financial constraints proposed by the theoretical literature. On the one hand there is the balance-sheet mismatch channel. If there is a mismatch between firms' foreign-currency denominated debt and local currency denominated assets, and also in the maturity structure of this debt, firms might become financial constrained during a depreciation and may not exploit the investment opportunities in the exporting sector. On the other hand, firms might be cut off both from domestic and foreign finance and this limited access to credit can aggravate the financial constrains. As oppose to the previous studies, we are able to differentiate between these two main sources of financial constraints, by utilizing a new firm-level database. Our database includes information not only on the share of firms' debt, denominated in foreign currency, but also on the maturity, the export orientation and the foreign-ownership structure of the firm.

Using a differences-in-differences methodology, we show that foreign owned exporters do better both in terms of sales and investment than the domestic counterparts in the post-crisis period, regardless of the fact that they hold dollar denominated short term dollar debt. Domestic non-exporters who hold foreign currency short term dollar debt decrease investment and domestic exporters who hold short term dollar denominated debt do not perform better or worse then the ones who do not. We interpret the last finding as evidence for the stronger balance-sheet of domestic exporters via a matching of dollar liabilities with export revenue. The fact that domestic exporters do not take advantage of the depreciation as oppose to foreign exporters lead us to conclude that limited access to finance plays an important role in hindering investment during crises.

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Table 1 — Number of Firms

Number of Firms in the Sample per Country and Year																	
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Argentina				47	55	59	63	63	65	63	65	59	54	48	47	45	733
Brazil				20	41	82	154	173	200	216	198	193	181	164	154	128	1904
Chile					155	172	179	184	184	184	181	178	173	167	156	148	2061
Colombia					100	133	139	129	93	90	81	89	98	92	89	69	1202
Mexico	154	185	176	172	149	131	120	104	92	85	74	79	80	70	65	58	1794
Peru					84	94	105	108	96	82	80	79	69	67	60	55	979

Number of Firms in the Sample with Investment Data																	
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
Argentina					33	40	43	47	47	51	53	50	46	44	43	42	539
Brazil					10	22	46	101	121	143	149	148	141	130	128	111	1250
Chile						152	169	175	178	178	175	105	105	102	101	96	1536
Colombia							16	15	79	76	66	69	73	83	74	60	611
Mexico		151	161	153	143	122	112	96	91	83	73	67	62	63	61	55	1493
Peru						32	40	45	48	48	52	49	46	48	49	48	505

Table 2 — Percentage of Observations by Type of Firm

Total Sample

	Total	Argentina	Brazil	Chile	Colombia	Mexico	Peru
Foreign	0.17	0.40	0.18	0.14	0.08	0.10	0.24
UltimateParent	0.17	0.42	0.18	0.15	0.08	0.10	0.24
Exporter	0.51	0.53	0.42	0.36	0.50	0.67	0.76
High Exporter	0.27	0.24	0.30	0.16	0.25	0.35	0.33
DumTotalDollarDebt	0.69	0.89	0.72	0.56	0.45	0.76	0.87
DumShortDollarDebt	0.61	0.76	0.52	0.55	0.44	0.76	0.73
DumDollarAssets	0.47	0.76	0.17	0.50	0.26	0.67	0.86

Investment

	Total	Argentina	Brazil	Chile	Colombia	Mexico	Peru
Foreign	0.17	0.38	0.20	0.14	0.09	0.11	0.27
UltimateParent	0.18	0.40	0.20	0.16	0.09	0.11	0.27
Exporter	0.56	0.57	0.49	0.40	0.52	0.69	0.85
High Exporter	0.29	0.35	0.18	0.31	0.37	0.34	0.30
DumTotalDollarDebt	0.81	0.98	0.87	0.66	0.58	0.90	1.00
DumShortDollarDebt	0.73	0.77	0.63	0.65	0.57	0.89	0.83
DumDollarAssets	0.56	0.88	0.21	0.57	0.44	0.69	0.98

Notes: Exporter is a dummy that takes the value of one if the firm reports export revenue and zero otherwise. High Exporter is a dummy that takes the value of one if the firm reports export revenue greater than 10% of sales. Foreign is a dummy that takes the value of one if the firm is majority owned by a foreign investor and zero otherwise. Ultimate Parent is a dummy that takes the value of one if the firm's foreign ultimate parent owns more than 50% of the capital and zero otherwise. *DumTotalDollarDebt* is a dummy that takes the value of one if the firm reports positive total dollar denominated liabilities. *DumShortDollarDebt* is a dummy that takes the value of one if the firm reports positive short-term dollar denominated liabilities. *DumDollarAssets* is a dummy that takes the value of one if the firm reports positive dollar denominated assets.

Table 3 —Summary Statistics

	Argentina			Brazil			Chile			Colombia		
	Obs	Mean	sd	Obs	Mean	sd	Obs	Mean	sd	Obs	Mean	sd
log(Sales)	733	18.89	1.52	1904	19.50	1.60	2061	16.47	2.51	1202	16.51	2.08
SalesGrowth	665	0.11	0.43	1643	0.12	0.45	1859	0.09	0.66	1022	0.08	0.71
Investment	539	0.01	0.07	1250	-0.02	0.07	1536	0.01	0.06	611	0.00	0.05
ExportShare	733	0.09	0.19	1904	0.12	0.21	2061	0.07	0.19	1202	0.09	0.18
Foreign	733	0.33	0.37	1903	0.17	0.32	2061	0.13	0.30	1202	0.08	0.25
TotalDollarDebt	665	0.58	0.28	1643	0.24	0.21	1859	0.21	0.28	1022	0.08	0.16
ShortDollarDebt	246	0.45	0.28	998	0.18	0.23	1856	0.18	0.25	1005	0.08	0.16
TotalDollarAssets	665	0.07	0.09	1643	0.01	0.04	1835	0.06	0.15	880	0.01	0.03

	Mexico			Peru			Total		
	Obs	Mean	sd	Obs	Mean	sd	Obs	Mean	sd
log(Sales)	1794	19.13	1.77	979	17.00	1.41	8673	17.96	2.35
SalesGrowth	1531	0.05	0.28	851	0.06	0.34	7571	0.08	0.52
Investment	1493	0.00	0.08	505	0.01	0.06	5934	0.00	0.07
ExportShare	1794	0.13	0.19	979	0.17	0.28	8673	0.11	0.21
Foreign	1794	0.10	0.27	979	0.21	0.37	8672	0.15	0.31
TotalDollarDebt	1531	0.37	0.29	851	0.60	0.26	7571	0.31	0.30
ShortDollarDebt	1529	0.35	0.28	525	0.55	0.28	6159	0.25	0.28
TotalDollarAssets	650	0.07	0.11	845	0.15	0.14	6518	0.06	0.11

Notes: Sales Growth is the change in log sales. Investment is physical stock of capital at time t minus physical stock of capital at time $t-1$ normalized by total assets. Foreign is a continuous variable capturing the percentage of capital stock owned by foreign investors. $TotalDollarDebt$ is the ratio of total dollar denominated liabilities to total debt. $ShortDollarDebt$ is the ratio of short-term dollar denominated liabilities to short term debt. $DollarAssets$ is the ratio of total dollar assets to total assets.

Table 4 —Performance of Exporters during Crises

	Sales	Sales Growth	Investment	Investment	Investment
	(1)	(2)	(3)	(4)	(5)
Exporter	0.204***	0.016	0.007**	-0.002	
	(0.04)	(0.03)	(0.00)	(0.00)	
Exporter × *Post*	0.098**	0.164**	-0.006	-0.008	
	(0.04)	(0.07)	(0.01)	(0.01)	
ExportShare					-0.016
					(0.01)
ExportShare × *Post*					-0.007
					(0.01)
Observations	8673	7571	5934	5934	5934
Firms	1102	1066	863	863	863
Firm Fixed-Effects	yes	yes	yes	yes	yes
Country*year	yes	yes	yes	yes	yes
Sector*year	yes	yes	yes	yes	yes

Notes: Standard errors corrected for clustering at the country-year level are reported in parenthesis. Sales regressions control for size by including the log of total assets lagged one period. *Post* is a dummy variable that takes the value of one in the year of depreciation and one year after. Sales is the log of sales. In columns (1), (2) and (3), *Exporter* is a dummy variable that takes the value of 1 if the firm reports export revenue and 0 otherwise. In column (4), *Exporter* is a dummy variable that takes the value of 1 if the export revenue of the firm represents more than 10% of sales and 0 otherwise. *ExportShare* is the ratio of export revenue to sales. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 5 —Exports and Dollar Liabilities during Crises

	Sales Growth	Investment	Sales Growth	Investment	Sales Growth	Investment	Sales Growth	Investment
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ShortDollarDebt	-0.052	-0.010	-0.039	-0.006	-0.021	-0.005	0.003	-0.006
	(0.04)	(0.01)	(0.04)	(0.01)	(0.04)	(0.01)	(0.04)	(0.01)
ShortDollarDebt × *Post*	0.349**	-0.008	0.236*	-0.038*	0.125	-0.043**	0.038	-0.036
	(0.11)	(0.03)	(0.12)	(0.02)	(0.10)	(0.02)	(0.13)	(0.02)
ExportShare					-0.182*	-0.020**	-0.136	-0.021*
					(0.09)	(0.01)	(0.09)	(0.01)
ExportShare × *Post*					0.340**	0.016	0.206*	0.029*
					(0.17)	(0.01)	(0.12)	(0.02)
ShortDollarDebt×							-0.303	0.099*
ExportShare × *Post*							(0.29)	(0.06)
ShortDollarDebt×							0.214	-0.011
ExportShare							(0.13)	(0.03)
Observations	6159	4922	6159	4922	6159	4922	6159	4922
Firms	1002	819	1002	819	1002	819	1002	819
Year Fixed-Effects	yes	yes						
Firm Fixed-Effects	yes	yes	yes	yes	yes	yes	yes	yes
Sector*year	yes	yes	yes	yes	yes	yes	yes	yes
Country*year	no	no	yes	yes	yes	yes	yes	yes
F-test								
ShortDollarDebt	0.009	0.328	0.154	0.097	0.441	0.073	0.346	0.002
ExportShare					0.041	0.119	0.156	0.177
ShortDollarDebt × *Post*							0.2183	0.001
ExportShare × *Post*							0.191	0.090

Notes: Standard errors corrected for clustering at the country-year level are reported in parenthesis. *Post* is a dummy variable that takes the value of one in the year of depreciation and one year after. All accounting variables are lagged one period. *ShortDollarDebt* is the ratio of short-term dollar denominated liabilities to total short-term liabilities. *ExportShare* is the ratio of export revenue to sales. The F-test reports the corresponding p-values associated to the joint significance of the coefficients associated with each variable of interest. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 6 —Exports and Dollar Liabilities during Crises: Subsample of Exporters

	All Exporters		Foreign		Domestic	
	Sales Growth	Investment	Sales Growth	Investment	Sales Growth	Investment
	(1)	(2)	(3)	(4)	(5)	(6)
ShortDollarDebt	0.060	-0.009	0.044	0.003	0.024	-0.009
	(0.06)	(0.01)	(0.15)	(0.03)	(0.07)	(0.01)
ShortDollarDebt × *Post*	0.124	0.013	0.799**	0.135*	0.099	-0.012
	(0.22)	(0.03)	(0.27)	(0.07)	(0.26)	(0.04)
Observations	1639	1424	239	210	1214	1214
Firms	343	298	61	53	261	261
Firm Fixed-Effects	yes	yes	yes	yes	yes	yes
Sector*year	yes	yes	yes	yes	yes	yes
Country*year	no	no	yes	yes	yes	yes

Notes: Standard errors corrected for clustering at the country-year level are reported in parenthesis. *Post* is a dummy variable that takes the value of one in the year of depreciation and one year after. All accounting variables are lagged one period. *ShortDollarDebt* is the ratio of short-term dollar denominated liabilities to total short-term liabilities. The subsample of exporters is defined based on those firms with export revenue greater than 10% of sales revenue. *Foreign* refers to those firm-year observations where the majority shareholder is a foreigner, otherwise the firm-year observation is classified as *Domestic*. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 7 —The Performance of Foreign Companies during Crises
(Dependent Variable: Investment)

	All Foreign Firms			Non-Latin American Foreign Firms		
	Parent	Ultimate Parent	Ultimate Parent	Parent	Ultimate Parent	Ultimate Parent
	(1)	(2)	(3)	(4)	(5)	(6)
Foreign	-0.021**	-0.018*	0.006	-0.016*	-0.010	0.005
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.02)
$Foreign \times Post$	0.022*	0.024*	0.041*	0.035**	0.035**	0.045*
	(0.01)	(0.01)	(0.02)	(0.01)	(0.01)	(0.03)
Observations	5934	5934	5454	5934	5934	5495
Firms	863	863	814	863	863	818
Firm Fixed-Effects	yes	yes	yes	yes	yes	yes
Country*year	yes	yes	yes	yes	yes	yes
Sector*year	yes	yes	yes	yes	yes	yes
F-test						
$Foreign$	0.038	0.056	0.214	0.013	0.034	0.216

Notes: Standard errors corrected for clustering at the country-year level are reported in parenthesis. *Post* is a dummy variable that takes the value of one in the year of depreciation and one year after. Columns (1), (2) and (3) report the results when the owner is a foreign national regardless of the country of origin. Columns (4), (5) and (6) report the results when the owner is a foreign national from a non-Latin American country. *Parent* refers to the nationality of the immediate owner. $UltimateParent$ refers to the nationality of the ultimate owner. $Foreign$ is the log of $1 + foreign$ where $foreign$ is the ratio of foreign to domestic capital when the foreign investor owns more than 90% of the capital and zero otherwise. Columns (3) and(6) exclude from the estimation MNCs subsidiaries. A subsidiary is a firm with more than 98% of the capital owned by a foreign investor. The F-test reports the corresponding p-values associated to the joint significance of the coefficients associated with each variable of interest. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table 8 —The Differential Response of Foreigners Holding Dollar Debt: Subsample of Exporters
(Dependent variable: Investment)

	All Foreign			Non-Latin American
	Parent	UltimateParent	UltimateParent	UltimateParent
	(1)	(2)	(3)	(4)
$ShortDollarDebt \times Foreign \times Post$	0.138	0.175**	0.397*	0.404*
	(0.08)	(0.08)	(0.21)	(0.24)
$ShortDollarDebt \times Foreign$	0.054	0.054	0.080	0.075
	(0.04)	(0.04)	(0.07)	(0.08)
$ShortDollarDebt$	-0.004	-0.004	0.005	0.003
	(0.01)	(0.01)	(0.01)	(0.01)
$ShortDollarDebt \times Post$	0.022	0.026	0.059	0.055
	(0.03)	(0.03)	(0.04)	(0.04)
$Foreign$	0.045	0.046*	0.101**	0.099**
	(0.03)	(0.02)	(0.05)	(0.05)
$Foreign \times Post$	0.013	0.042	0.128	0.130
	(0.05)	(0.05)	(0.10)	(0.10)
Observations	1424	1424	1318	1318
Firms	298	298	277	277
Firm Fixed-Effects	yes	yes	yes	yes
Country*year	yes	yes	yes	yes
Sector*year	yes	yes	yes	yes
F-test				
$ShortDollarDebt$	0.204	0.080	0.195	0.258
$Foreign$	0.095	0.024	0.080	0.121
$ShortDollarDebt \times Post$	0.146	0.046	0.170	0.210
$Foreign \times Post$	0.054	0.040	0.105	0.131

Notes: Standard errors corrected for clustering at the country-year level. Standard errors are reported in parenthesis. *Post* is a dummy variable that takes the value of one in the year of depreciation and one year after. *AllForeign* includes all foreign firms regardless of country of origin. *NonLatinAmerican* excludes foreign firms from other Latin American countries. *Parent* refers to the nationality of the immediate owner. *UltimateParent* refers to the nationality of the ultimate owner. $Foreign$ is the log of $1 + foreign$ where $foreign$ is the ratio of foreign to domestic capital when the foreign investor owns more than 50% of the capital and zero otherwise. Columns (3) and (4) exclude MNCs subsidiaries. A subsidiary is a firm with more than 98% of the capital owned by a foreign investor. $ShortDollarDebt$ is the ratio of short-term dollar denominated liabilities to total short-term liabilities. The F-test reports the corresponding p-values associated to the joint significance of the coefficients associated with each variable of interest. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

TABLE 9 —ROBUSTNESS: SUBSAMPLE OF EXPORTERS
(Dependent variable: Investment)

	Ultimate Parent				
	All Foreign	All Foreign	Non-LatinAmer.	All Foreign	All Foreign
	(1)	(2)	(3)	(4)	(5)
$ShortDollarDebt \times Foreign \times Post$	0.196*	0.434*	0.458*	0.169**	0.244*
	(0.10)	(0.23)	(0.26)	(0.08)	(0.13)
ADR				0.009	
				(0.01)	
Bond				0.026**	
				(0.01)	
Loan				-0.017*	
				(0.01)	
$DollarAssets$					-0.031
					(0.03)
$DollarAssets \times Post$					-0.024
					(0.12)
Observations	1424	1318	1318	1424	1113
Firms	298	277	277	298	257
Foreign*year	yes	yes	yes	no	no
Firm Fixed-Effects	yes	yes	yes	yes	yes
Country*year	yes	yes	yes	yes	yes
Sector*year	yes	yes	yes	yes	yes

Notes: Standard errors corrected for clustering at the country-year level. Standard errors are reported in parenthesis. *Post* is a dummy variable that takes the value of one in the year of depreciation and one year after. $AllForeign$ includes all foreign firms regardless of country of origin. $NonLatinAmerican$ excludes foreign firms from other Latin American countries. *Parent* refers to the nationality of the immediate owner. $Foreign$ is the log of $1 + foreign$ where $foreign$ is the ratio of foreign to domestic capital when the foreign investor owns more than 50% of the capital and zero otherwise. Columns (2) and (3) exclude MNCs subsidiaries. A subsidiary is a firm with more than 98% of the capital owned by a foreign investor. All accounting variables are lagged one period. $ShortDollarDebt$ is the ratio of short-term dollar denominated liabilities to total short-term liabilities. $DollarAssets$ is the ratio of dollar denominated assets to total assets. ADR is a dummy that equals one the first time the firm issues ADRs. *Bond* is a dummy that equal one if the firm issued bonds. *Loan* is a dummy that equal one if the firm issued syndicated loans. ADR, Bond and Loan are included lagged one period. All the double cross products are included in the estimation but omitted for space considerations. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

Table A1 — Results with the Change in Real Exchange Rate

	Sales Growth	Investment	Sales Growth	Investment
	(1)	(2)	(3)	(4)
$TotalDollarDebt$	0.025	-0.014*		
	(0.05)	(0.01)		
$TotalDollarDebt \times \Delta E$	0.436***	0.121***		
	(0.11)	(0.03)		
$ShortDollarDebt$			0.021	-0.005
			(0.06)	(0.01)
$ShortDollarDebt \times \Delta E$			0.663**	0.052
			(0.26)	(0.04)
Observations	7571	5934	6176	4927
Firms	1066	863	1003	819
Firm Fixed-Effects	yes	yes	yes	yes
Sector*year	yes	yes	yes	yes
Country*year	yes	yes	yes	yes

Notes: Standard errors corrected for clustering at the country-year level are reported in parenthesis. ΔE is the change in log real exchange rate. All accounting variables are lagged one period. *, ** and *** indicate significance at the 10%, 5% and 1% levels, respectively.

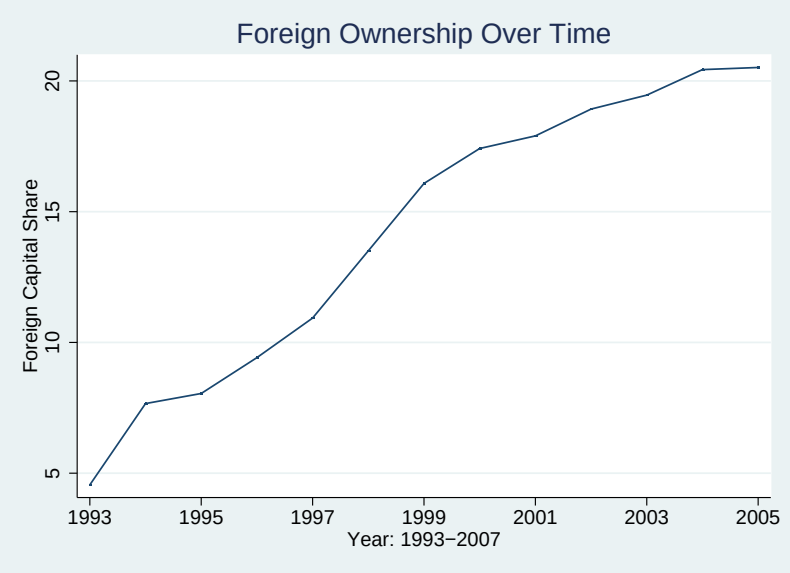


Figure 1: Foreign Ownership Over Time







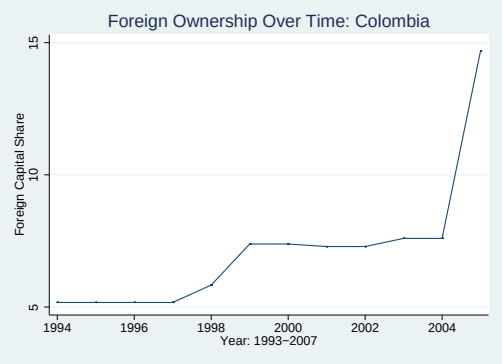






Figure 2: Foreign Ownership over time by country

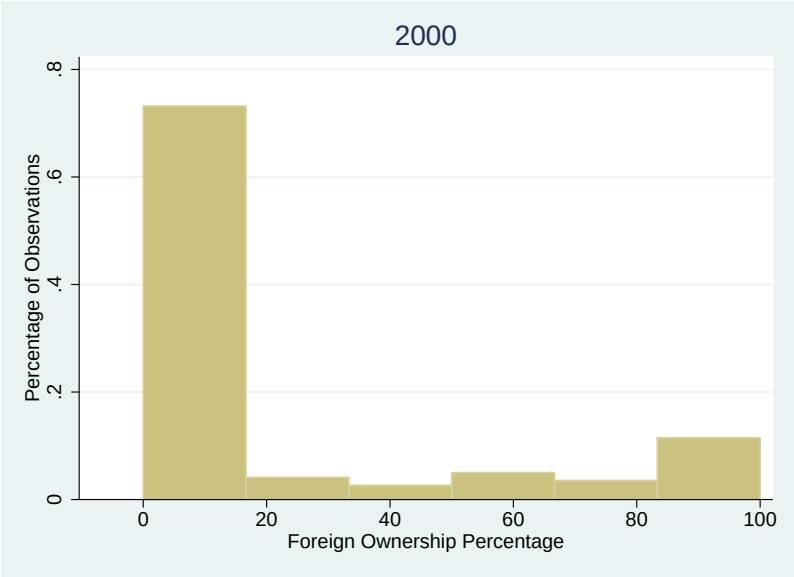


Figure 3: Cross-sectional Distribution of Foreign Ownership

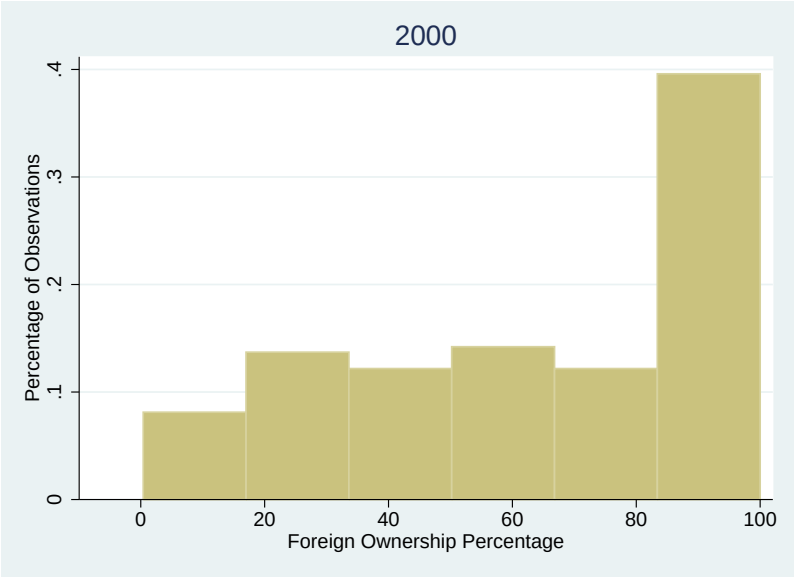


Figure 4: Cross-sectional Distribution of Foreign Ownership among foreign firms



Figure 5: Exporter a dummy equals one if the firm reports export revenue

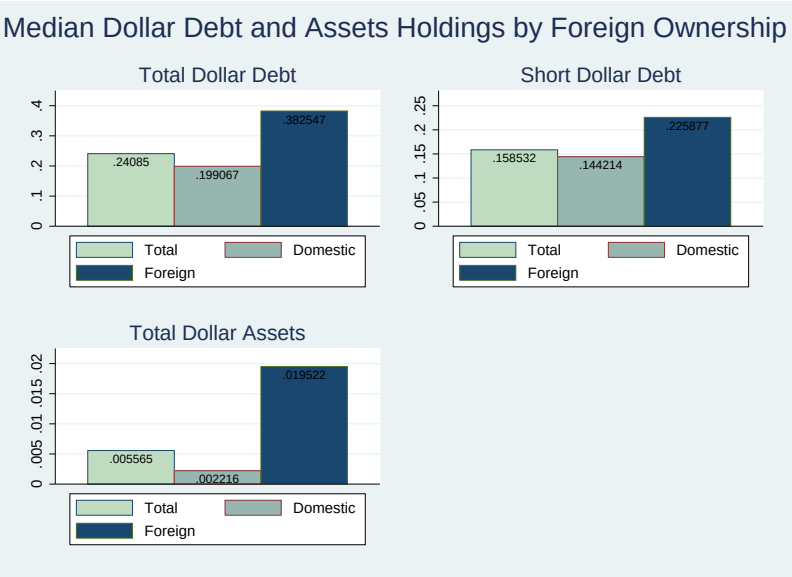


Figure 6: Foreign a dummy equals one if the firms is owned in any percentage by a foreign investor

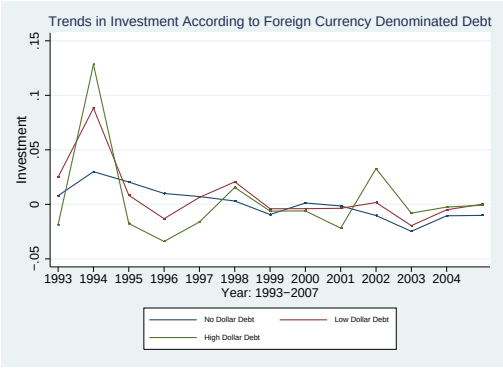


Figure 7: Trends in Investment according to Foreign Currency Denominated Debt



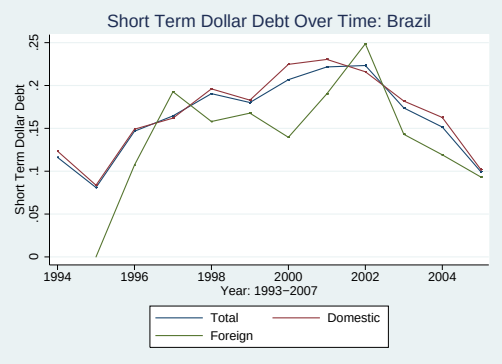




Figure 8: Short Dollar Debt Over Time